

# NORTHWESTERN

Undergraduate Catalog 2008–09

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Undergraduate Catalog 2008–09  
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This catalog for the academic year beginning September 1, 2008, contains University regulations and information about the programs and courses offered by the Judd A. and Marjorie Weinberg College of Arts and Sciences, School of Communication, School of Education and Social Policy, Robert R. McCormick School of Engineering and Applied Science, Medill School of Journalism, and Henry and Leigh Bienen School of Music and about cross-school undergraduate programs. Failure to read this catalog does not excuse a student from knowing and complying with its content.

Northwestern University reserves the right to change without notice any statement in this catalog concerning, but not limited to, rules, policies, tuition, fees, curricula, and courses. In exceptional circumstances, Northwestern University reserves the right, at its sole discretion, to waive any documentation normally required for admission. It also reserves the right to admit or deny a student admission whenever it believes that it has sufficient evidence for the decision.

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## Academic Calendar 2008–09

### Fall Quarter

#### September 2008

1	Monday	Tuition due
16	Tuesday	New student orientation begins
23	Tuesday	Registration for fall quarter Classes for fall quarter begin 8 a.m.
29	Monday	Last day for late registration, adding any course, or changing a section

#### October 2008

31	Friday	Last day for dropping any course Last day to withdraw without academic review
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#### November 2008

17	Monday	Registration for winter quarter
26	Wednesday	Thanksgiving vacation begins 6 p.m.
27	Thursday	Thanksgiving Day

#### December 2008

1	Monday	Classes résumé 8 a.m. Last day for current students to file an undergraduate financial aid application for winter quarter
6	Saturday	Last day of classes for fall quarter
8	Monday	Fall quarter examinations begin
12	Friday	Examinations end; vacation begins 6 p.m.

### Winter Quarter

#### January 2009

1	Thursday	Tuition due
5	Monday	Registration for winter quarter Classes for winter quarter begin 8 a.m.
9	Friday	Last day for late registration, adding any course, or changing a section
19	Monday	Martin Luther King Jr. Day; no classes

#### February 2009

13	Friday	Last day for dropping any course Last day to withdraw without academic review
23	Monday	Registration for spring quarter

#### March 2009

2	Monday	Last day for current students to file an undergraduate financial aid application for spring quarter
14	Saturday	Last day of classes for winter quarter
16	Monday	Winter quarter examinations begin
20	Friday	Examinations end; vacation begins 6 p.m.

## Spring Quarter

### March 2009

30 Monday Registration for spring quarter  
Classes for spring quarter begin 8 a.m.

### April 2009

1 Wednesday Tuition due  
3 Friday Last day for late registration, adding  
any course, or changing a section

NOTE: Before the end of spring quarter, students planning to graduate in arts and sciences, communication, education and social policy, journalism, or music in June or August 2010 must file an application for a degree at the Office of the Registrar. Others must file at the appropriate school office. Students completing requirements in December or March should file an application for a degree one year in advance.

### May 2009

1 Friday Last day for current students to  
file undergraduate financial aid  
applications for Summer Session  
and for academic year 2009–10  
8 Friday Last day for dropping any course  
Last day to withdraw without  
academic review  
18 Monday Registration for fall quarter 2009–10  
25 Monday Memorial Day; no classes

### June 2009

6 Saturday Last day of classes for spring quarter  
8 Monday Spring quarter examinations begin  
12 Friday Examinations end 6 p.m.  
19 Friday Baccalaureate  
151th annual Commencement

## Summer Session

### June 2009

22 Monday Late registration for Summer Session  
Classes for Summer Session begin  
8 a.m.  
Tuition due  
26 Friday Last day for late registration, adding  
any course, or changing a section

### July 2009

3 Friday Independence Day (observed);  
no classes

### August 2009

1 Saturday Six-week Summer Session ends 6 p.m.  
15 Saturday Eight-week Summer Session ends  
6 p.m.

The University reserves the right to make changes in this calendar. A detailed current calendar can be found at [www.registrar.northwestern.edu/calendar](http://www.registrar.northwestern.edu/calendar).

## The University

Northwestern University is committed to excellent teaching, innovative research, and the personal and intellectual growth of its students. Through a combination of close interschool cooperation and a flexible academic calendar, both undergraduate and graduate students and faculty are able to customize education and research across disciplines. Northwestern is a place where faculty work closely with students and each other and where students at all levels interact as part of an innovative and technologically sophisticated learning community.

Northwestern's emphasis on effective communication, regardless of field of study, fosters the ability to think analytically and write and speak clearly and persuasively. The result is that Northwestern graduates are exceptionally well prepared for academic and career success and become leaders in their fields.

The University's locations in Evanston, the first suburb north of Chicago, and in Chicago provide outstanding intellectual, professional, social, and cultural opportunities in beautiful settings on the shore of Lake Michigan.

### THE UNDERGRADUATE EXPERIENCE

Northwestern provides an educational and extracurricular environment that enables students to become accomplished individuals and responsible citizens. Its alumni feel confident exploring a wide range of subjects and experiences, in school and beyond, regardless of their majors. Northwestern believes that students should not invest themselves so fully in one area that they're afraid to risk exploring unfamiliar academic disciplines. More than a fifth of the freshmen enroll with a prospective major of "undecided," and many more change their minds and their majors before they graduate, with one-quarter transferring from one of Northwestern's undergraduate schools to another. Students frequently pursue two majors or even two degrees at the same time, and enterprising students, with their deans' permission, occasionally construct their own majors or programs of study.

At the heart of a Northwestern education is the belief that a solid foundation in the liberal arts is essential, regardless of one's future plans. All students in the six undergraduate schools take courses in science, mathematics and technology, individual and social behavior, historical studies, the humanities, and fine and performing arts. In addition to the traditional components of undergraduate education — general requirements and advanced work in the major — Northwestern prides itself on making unusual

academic opportunities available. Students also are encouraged to pursue independent study, internships, research, and study abroad. At least 30 percent of Northwestern's undergraduates engage in internships, practicums, paid cooperative education programs, applied research, and other off-campus experiences, often for academic credit.

Underpinning the breadth of a Northwestern education is the quarter system, which gives students the opportunity to take more courses than they would under a traditional semester system. Undergraduates typically take 4 courses each quarter and 12 courses in an academic year.

In both its academic and extracurricular programs, Northwestern encourages students to obtain a broad understanding of the world in which they live and to cultivate the habits of critical inquiry, creativity, and reflection that characterize the educated person. The University places particular value on being able to communicate effectively, to interpret the developments in science and technology that shape our changing world, and to use the techniques of quantitative analysis that are necessary to effective professional and social life.

One of Northwestern's strongest traditions is the energetic involvement of its undergraduates in campus life, a tradition that often leads them beyond the campus itself. Northwestern is a major force in the economic, social, and cultural life of Evanston, Chicago, and nearby communities. Each year Northwestern students, faculty, and staff provide thousands of hours of volunteer service to the community.

### STUDENT DEMOGRAPHICS

Northwestern recruits students of demonstrated academic achievement from diverse social, ethnic, and economic backgrounds. All 50 states and nearly 50 countries are represented in the undergraduate student body. In the class of 2011, 43 percent are from the Midwest, 22 percent from the Northeast and Middle Atlantic states, 15 percent from the South, and 14 percent from the West; 6 percent have overseas addresses. Slightly more than half are female, and 34 percent are members of minority groups. Sixty percent enrolled with financial aid.

### GRADUATION RATES

More than 90 percent of Northwestern undergraduates earn baccalaureate degrees within six years, a graduation rate that remains consistent. Of the 1,942 full-time freshmen who entered in 2001, 92.9 percent had graduated at the

end of six years. For more information about graduation rates, see [www.registrar.northwestern.edu/statistics/grad/graduation\\_rates.html](http://www.registrar.northwestern.edu/statistics/grad/graduation_rates.html).

## A HISTORICAL OVERVIEW

Excellence has been Northwestern's goal since nine pioneering Chicagoans met in 1850 to establish an educational institution that would rival any in the eastern United States. That group — a physician, three attorneys, two businessmen, and three Methodist clergymen — envisioned a university “of the highest order of excellence” to serve the people of the Northwest Territory. Northwestern University was officially established on January 28, 1851, when its act of incorporation was passed by the Illinois legislature.

In 1853 the founders purchased a 379-acre tract of farmland along Lake Michigan 12 miles north of Chicago as a site for the new university. The location so impressed founder Orrington Lunt that he wrote, “I could not rid myself of the fairy visions constantly presenting themselves in fanciful beauties — of the gently waving lake — its pebbly shore — the beautiful oak openings and bluffs beyond.”

The town that grew up around Northwestern was named Evanston in honor of one of the University's most prominent founders, John Evans. A physician and businessman, Evans provided the cash to place a \$1,000 down payment on the land and assumed responsibility for the mortgage covering the balance. Evans was chairman of the board from the University's founding until his death in 1897.

After completing its first building in 1855, Northwestern began classes that fall with two faculty members and 10 male students. In 1869 it enrolled its first female students, thereby becoming a pioneer in the higher education of women. By 1900 the University was composed of a liberal arts college and six professional schools, including the schools of law and medicine, with a total of 2,700 students. With the establishment of the Graduate School in 1910, Northwestern adopted the German university model of providing graduate as well as undergraduate instruction and stressing research along with teaching.

Today Northwestern enjoys a position as one of the country's leading private research universities. Approximately 18,500 full-time and part-time students are enrolled in 11 colleges and schools located on lakefront campuses in Evanston and Chicago and a new branch campus in Qatar. Undergraduate education takes place on the Evanston campus in the Judd A. and Marjorie Weinberg College of Arts and Sciences, the School of Communication, the School of Education and Social Policy, the Robert R. McCormick School of Engineering and Applied Science, the Medill School of Journalism, and the Henry and Leigh Bienen School of Music.

## ACCREDITATION

Northwestern University is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools. Other professional, college, school, and departmental accreditations are listed under the respective areas in the following section.

## CAMPUSES

The undergraduate schools offer the programs and courses of instruction described in the respective sections of this catalog. Undergraduate study may lead to the bachelor's degree as a final academic goal or to advanced work toward a graduate or professional degree.

### Evanston Campus

The schools and other institutional divisions, in order of establishment, are as follows:

- The Judd A. and Marjorie Weinberg College of Arts and Sciences (1851) offers the degree of bachelor of arts. Through the School of Continuing Studies, Weinberg College also offers the degrees of bachelor of philosophy and bachelor of science in general studies and two certificates in arts and sciences.
- The School of Communication (1878), with departments of communication sciences and disorders, communication studies, performance studies, radio/television/film, and theater, offers a bachelor of science in communication degree and a bachelor of arts in communication degree. Through the School of Continuing Studies, the School of Communication offers the bachelor of philosophy in communication. The school also offers the degrees of master of science in communication and doctor of audiology. Its programs are accredited by the American Speech-Language-Hearing Association and the National Association of Schools of Theatre.
- The Henry and Leigh Bienen School of Music (1895) offers the degrees of bachelor of music and bachelor of arts in music. In its graduate division the school offers the degrees of doctor of music and master of music and a certificate in performance. The school is accredited by the National Association of Schools of Music.
- The J. L. Kellogg School of Management (1908) offers undergraduate certificates in financial economics and managerial analytics as well as the master of business administration degree. MBA students may study general management; finance; marketing; entrepreneurship; family business; management strategy; decision sciences; health services; manufacturing; and public and nonprofit, real estate, technology, and biotechnology management. In addition to the full-time MBA, Kellogg offers a part-time evening MBA through its Managers' Program on Northwestern's Chicago campus, a weekend executive MBA through the Executive Master's Program (EMBA) on the Evanston campus, and international executive

MBA (IEMBA) programs in Canada, Europe, the Middle East, and Asia. Kellogg also offers a wide range of nondegree executive education courses at its Allen Center on the Evanston campus. Kellogg is accredited by the American Assembly of Collegiate Schools of Business and the Accrediting Commission on Graduate Education for Hospital Administration.

- The Robert R. McCormick School of Engineering and Applied Science (1909) offers the bachelor of science degree in applied mathematics, biomedical engineering, chemical engineering, civil engineering, computer engineering, computer science, electrical engineering, environmental engineering, industrial engineering, manufacturing and design engineering, materials science and engineering, mechanical engineering, and medical engineering (only for students enrolled in the Honors Program in Medical Education). All departments offer advanced study for graduate students. The McCormick School also offers master's degrees in biotechnology, engineering management, information technology, product development, and project management and, jointly with the Kellogg School, the master of management in manufacturing (MMM). McCormick programs are accredited by the Engineering Accreditation Council of the Accreditation Board for Engineering and Technology.
- The Graduate School (1910) controls all advanced programs leading to the degrees of doctor of philosophy, master of arts, master of fine arts, master of public health, and master of science. *The Graduate School Handbook*, describing procedures for earning those degrees in all schools and departments, is available online at the school's web site, [www.northwestern.edu/graduate](http://www.northwestern.edu/graduate). Descriptions of individual graduate programs, with degree requirements and authorized courses, can also be found on that web site.
- Summer Session (1920) provides summer programs for undergraduate, graduate, and visiting students.
- The Medill School of Journalism (1921) offers the bachelor of science in journalism degree, master of science degrees in journalism and integrated marketing communications, and undergraduate certificate in integrated marketing communications. Medill is accredited by the Accrediting Council on Education in Journalism and Mass Communication.
- The School of Education and Social Policy (1926) offers the bachelor of science and master of science in education and social policy and the master of science in learning and organizational change. Its teacher education programs are accredited by the Illinois Board of Education.

## Chicago Campus

Schools and institutional divisions on the Chicago campus, in order of establishment, are as follows:

- The Feinberg School of Medicine (1859) offers the degrees of doctor of medicine and doctor of physical therapy. High school graduates accepted for the Honors Program in Medical Education can receive the MD degree from the Feinberg School seven or eight years after they enter Weinberg College, the McCormick School, or the School of Communication as freshmen. The Feinberg and McCormick Schools cooperate in biomedical engineering programs, and joint degree programs with the Graduate School and Kellogg School offer an MD degree as well as PhD, MPH, and MBA degrees. The Feinberg School has accreditation from the Liaison Committee on Medical Education, Accreditation Council for Continuing Medical Education, American Psychological Association, American Board for Certification in Prosthetics and Orthotics, American Physical Therapy Association, and Accreditation Council for Graduate Medical Education.
- The School of Law (1859) is dedicated to advancing the understanding of law and producing graduates prepared to excel in a rapidly changing world. The curriculum provides a superior foundation in legal reasoning, analysis, and writing as well as a thorough understanding of the structures and policies of the law. Communication, collaboration, and teamwork; cross-training in business; and a blend of a rigorous intellectual environment with a supportive, collegial community are hallmarks of the school. It offers the degrees of juris doctor, master of laws, master of laws in taxation, and doctor of juridical science. The School of Law and the Kellogg School offer a joint degree program allowing students to earn both juris doctor and master of business administration degrees in three years. Another joint program with Kellogg permits international and foreign-trained students to earn a master of laws degree and a certificate in business administration in one year. Students also may participate in a five-year program to earn a JD and a PhD in one of the social sciences. In addition, the School of Law offers a master of laws degree to executive students in Seoul, South Korea, and Madrid, Spain. The school is accredited by the American Bar Association and the Association for American Law Schools.
- The School of Continuing Studies (1933) is the continuing education division of the University, providing adults an opportunity to return to school part-time or full-time on evenings and weekends to earn a degree or a certificate. In addition, students take courses for personal enrichment or enroll in credit and noncredit professional development programs. Credit professional development programs include preparation for professional health careers, clinical psychology, and business administration. Classes are offered on the Chicago and Evanston campuses and in the Loop. Undergraduate degrees offered through SCS are conferred by Weinberg College



and the School of Communication. In partnership with the Graduate School, SCS offers master of arts degrees in liberal studies, literature, creative writing, and public policy and administration. In partnership with the Feinberg School, SCS offers the master of science in medical informatics degree in on-campus and online formats. In partnership with the Department of Chemistry in Weinberg College, SCS offers the master of science in quality assurance and regulatory science. SCS also offers a master of arts in sports administration and a master of science in computer information systems. In addition, SCS administers Summer Session programs for the University and is the home of the Center for Public Safety and the Osher Lifelong Learning Institute.

### Northwestern University in Qatar

Beginning in fall 2008 Northwestern is offering two academic programs, one in journalism and one in communication, at its new branch campus in Qatar. The Medill School of Journalism offers the bachelor of science in journalism degree; the School of Communication offers the bachelor of science in communication degree.

Northwestern is the sixth U.S. university — joining Carnegie Mellon, Cornell, Georgetown, Texas A&M, and Virginia Commonwealth Universities — to accept an invitation from the Qatar Foundation to establish a campus in Education City in the Qatari capital of Doha. Admission requirements for Northwestern's Education City program are identical to those at the parent campus, and the degrees offered are the same.

For more information about Northwestern University in Qatar, please visit [www.qatar.northwestern.edu](http://www.qatar.northwestern.edu).

## UNIVERSITY RESEARCH CENTERS

University research centers exemplify Northwestern's long-standing tradition of encouraging faculty to collaborate across the boundaries of traditional disciplines. By bringing together interdisciplinary teams of investigators to seek innovative solutions to some of the world's most challenging problems, these centers have profound implications for undergraduates; such research often alters theory and practice within an academic discipline and results in the development of new curricular programs.

- Many University research centers have special research programs for undergraduates. Students also may be involved directly with the centers through lectures or other special events. University research centers include the following:
- Argonne-Northwestern Solar Energy Research Center
- Roberta Buffett Center for International and Comparative Studies
- Center for Applied Psychological and Family Studies
- Center for Catalysis and Surface Science
- Center for Drug Discovery and Chemical Biology

- Center for Functional Genomics
- Center for Reproductive Science
- Center for Sleep and Circadian Biology
- Center for Technology and Social Behavior
- Center of Cancer Nanotechnology Excellence
- Chemistry of Life Processes Institute
- Institute for Bionanotechnology in Medicine
- Institute for Policy Research
- International Institute for Nanotechnology
- Materials Research Center
- Nanoscale Science and Engineering Center
- Northwestern Institute on Complex Systems
- Northwestern Synchrotron Research Center
- Northwestern University Atomic and Nanoscale Characterization Experimental Center
- Spatial Intelligence and Learning Center

For detailed information about these centers, see [www.research.northwestern.edu/research/centers](http://www.research.northwestern.edu/research/centers).

## LIBRARIES

Undergraduates at Northwestern have access to a wealth of library resources and services. With more than 4.7 million volumes in the University Library system, the Galter Health Sciences Library, and the Pritzker Legal Research Center, Northwestern offers its students the 10th largest library collection in the Association of Research Libraries, a group of 123 academic and research libraries in the United States and Canada. Undergraduates are encouraged to explore the full range of resources available to them and to develop their skills as information seekers.

Northwestern undergraduates have full access to interlibrary loan services and to materials from libraries worldwide. Through the Infopass program, students can gain admittance to other collections in the Chicago area, including those of the Newberry Library, the Field Museum library, the Art Institute of Chicago library, and other academic and private libraries.

### University Library

"University Library" refers to the main library, which houses the University's major collections in the humanities and social sciences, as well as several specialized research collections; the adjoining Charles Deering Library, which houses fine arts and other specialized collections; the Seeley G. Mudd Library for Science and Engineering; the Geology Library; the Mathematics Library; and the Joseph Schaffner Library, which supports the research needs of students on the Chicago campus.

Northwestern's libraries offer many electronic and textual resources. NUcat, the online catalog of University Library, provides bibliographic, location, and circulation status information for materials from these libraries. NUcat and many other resources and services are available on the web at [www.library.northwestern.edu](http://www.library.northwestern.edu).

*Main Library (Evanston Campus)*

The main library building houses collections on levels 3 to 5 of the three research towers. The focus is on the humanities and social sciences, with history materials in the East Tower, humanities in the South Tower, and social sciences in the North Tower.

The main library's Information Commons and Reference Department, both located on level 1, offer students research assistance and support. The Information Commons has staff to answer questions and 56 workstations for electronic access to information. The Reference Department offers in-depth research assistance, online reference services, and instructional services. The reference collection contains 55,000 volumes as well as extensive electronic resources.

Also located on level 1 are the Circulation Services Department, the Periodicals and Newspapers Reading Room, and the Interlibrary Loan Department. Occupying level 2 are the Marjorie Iglow Mitchell Multimedia Center, Forum Room, and Video Theater (for special programs and video presentations); Core/Reserve Collections; and a student lounge. The Mitchell Multimedia Center features a videotape collection of classic films, documentaries, and performing arts titles. The Core Collection holds 40,000 books in all disciplines, ensuring easy access and permanent availability of works essential to undergraduates. Core books may be checked out for three days.

Three special units are located on level 5. The Curriculum Collection houses K-12 textbooks and children's literature. The Melville J. Herskovits Library of African Studies (popularly called Africana) is known internationally for its comprehensive collection of materials on every aspect of Africa. The Transportation Library, one of the major collections of its kind in the United States, specializes in transportation socioeconomics, law enforcement, police administration, and environmental impact statements.

*Charles Deering Library (Evanston Campus)*

The Charles Deering Library, attached to the main library, houses the Art Collection, the Government and Geographic Information and Data Services Department, the Charles Deering McCormick Library of Special Collections, the Music Library and Listening Center/Music Lab, and University Archives.

The holdings of Special Collections include 20th-century collections, underground press publications, women's movement literature, and numerous rare books, manuscripts, limited editions, and fine bindings.

The Music Library meets the curriculum, research, and performance needs of students and faculty at the Bienen School of Music. This library contains 300,000 scores, journals, books, manuscripts, and sound recordings. Students may listen to the extensive collection of recordings in the Music Library's Listening Center/Music Lab.

Featuring an extensive collection of federal, state, and international documents, the Government and Geographic

Information and Data Services Department is a depository for documents of the United States, the United Nations, the state of Illinois, and the European Union, as well as selected publications of other international agencies and state and local governments.

*Seeley G. Mudd Library for Science and Engineering, Geology Library, and Mathematics Library (Evanston Campus)*

The Seeley G. Mudd Library for Science and Engineering houses books and journals in applied mathematics, astronomy, biological sciences, chemistry, computer science, engineering, and physics. Two smaller departmental libraries, the Geology Library in Locy Hall and the Mathematics Library in the Lunt Building, also serve the Evanston campus.

*Joseph Schaffner Library (Chicago Campus)*

The Joseph Schaffner Library in Wieboldt Hall serves the School of Continuing Studies, the evening Managers' Program of the J. L. Kellogg School of Management, and Medill School of Journalism graduate programs.

**Other Libraries**

The Galter Health Sciences Library, which serves the Feinberg School of Medicine, and the Pritzker Legal Research Center, which serves the School of Law, are located on the Chicago campus and are open to all Northwestern students. The collections of these libraries are listed in NUcat, the library's online catalog. Materials may be checked out directly or may be sent to Evanston libraries through online interlibrary loan request forms.

Also open to all Northwestern students are the outstanding collections on religion held in the United Library of Garrett-Evangelical and Seabury Western Theological Seminaries, located on the Evanston campus. The United Library's holdings are listed in NUcat.

**INFORMATION TECHNOLOGY SERVICES**

Northwestern University Information Technology (NUIT) is the principal campus unit charged with supporting the University community's use of technology. The full range of its services can be found online at [www.it.northwestern.edu](http://www.it.northwestern.edu).

All buildings on the Evanston and Chicago campuses are connected to the internal campus network and to the Internet via high-speed networks. Every student living in the residence halls has a high-speed Internet connection. In addition, the University's more than 600 wireless access points allow students using laptops with wireless cards or wireless personal digital assistants to take advantage of the full range of online services from almost any location on either campus.

Although nearly all undergraduates have one or more personal computers, computing sites are abundant on

campus. Some sites offer workstations arranged in a traditional computer lab, where an entire class can meet together and work with critical software programs and datasets. Other sites, such as the new Information Commons in University Library, offer digital collaboration areas where small groups can work together on projects. A high-tech conference room is also available for student meetings. The MediaWorks studio in the library's lower level offers high-end media production systems with tools to capture and edit video and audio, scan and manipulate photos, and develop web content and animation. Students also may check out video cameras from MediaWorks. For more details on NUIT's computing sites, please see [www.at.northwestern.edu/ctg/labs](http://www.at.northwestern.edu/ctg/labs).

Northwestern offers students a variety of online services for their University needs:

- **CAESAR** ([www.northwestern.edu/caesar](http://www.northwestern.edu/caesar)), a self-service application, allows students to register for classes, search class schedules and course offerings, obtain unofficial transcripts, view financial aid and student account information, maintain directory and emergency contact information, and much more.
- **NUTV** ([www.tss.northwestern.edu/nutv/helpguide](http://www.tss.northwestern.edu/nutv/helpguide)) is Northwestern's innovative system for delivering entertainment television and University channels to undergraduate residence halls via the campus data network on students' computers.
- **Plan-It Purple** ([www.planitpurple.northwestern.edu](http://www.planitpurple.northwestern.edu)) is an online calendar of activities at Northwestern.
- **Course Management System** (<http://course-management.northwestern.edu>) provides an efficient way for instructors to manage and distribute course materials and communicate with students. In addition, students can communicate and share information with each other online.

At the beginning of each academic year, NUIT welcomes new students to Northwestern with the *Get Connected* newsletter ([www.it.northwestern.edu/bin/news/GetConnected\\_current.pdf](http://www.it.northwestern.edu/bin/news/GetConnected_current.pdf)). The newsletter introduces students to the University's electronic environment with helpful tips that include making the right computer and software purchases, understanding Northwestern's electronic identity (NetID), mastering online resources, and preparing to use the wide range of technology opportunities at Northwestern.

NUIT provides technology support through its web site and support center at 1800 Sherman Avenue on the Evanston campus. The center is Northwestern's primary information resource for computing and networking. It provides phone consulting on University-supported hardware, software, operating systems, and computing facilities. Hours during the academic year are Monday through Thursday, 8 a.m. to 8 p.m.; Friday, 8 a.m. to 5 p.m.; Saturday, noon to 5 p.m.; and Sunday, noon to 8 p.m. Laptop support consultants also are available at various

sites on campus. Check [www.it.northwestern.edu/laptop](http://www.it.northwestern.edu/laptop) for exact locations, dates, and times.

Residential networking consultants are available to support students in the residential halls.

For technology support the NUIT support center may be reached by calling 847-491-HELP (4357), e-mailing [consultant@northwestern.edu](mailto:consultant@northwestern.edu), or clicking Live Support on the NUIT home page.

Students are encouraged to review University policies about technology rights and responsibilities at [www.it.northwestern.edu/policies](http://www.it.northwestern.edu/policies).

## STUDENT SERVICES

### Student Affairs

The Division of Student Affairs has three overarching goals:

- To provide essential student and institutional services, programs, and facilities
- To maintain high standards of care and effective advocacy for the well-being and safety of all students
- To emphasize and provide learning-focused co-curricular and extracurricular activities and programs that engage students constructively in University and community life; enable them to develop more holistically as competent individuals prepared to live in a complex, diverse, and interconnected world; and enhance and integrate their overall Northwestern experience.

Students are encouraged to take advantage of the wealth of opportunities and services available on campus. Each of the departments in Student Affairs offers multiple ways in which students can expand and enrich their learning experiences at Northwestern. See [www.northwestern.edu/studentaffairs](http://www.northwestern.edu/studentaffairs) for links to all Student Affairs departments.

#### *Student Affairs Office*

The Office of Student Affairs in Scott Hall is a source of information and assistance for students, parents, and faculty and staff. The dean of students/associate vice president for student affairs serves students who have personal and academic concerns and counsels students who believe they have been victims of sexual harassment and discrimination by other students.

#### *Orientation and Parent Programs*

The coordinator of orientation and parent programs plans and implements new-student orientation, organizes family weekend, and produces publications for parents of undergraduates.

#### *Multicultural Student Affairs*

The Department of Multicultural Student Affairs (MSA) supports Northwestern's institutional belief that cultural pluralism is a valuable part of the overall educational experience at Northwestern. As the umbrella for the Offices of African American, Asian/Asian American, and Hispanic/

Latino Student Affairs, MSA plans and implements activities and educational programs through which students, faculty, staff, and alumni participate in cross-cultural communication, multicultural education, and outreach activities.

The directors of African American, Asian/Asian American, and Hispanic/Latino Student Affairs oversee support, services, and programs for their respective students.

### **African American Student Affairs**

The services and activities of African American Student Affairs include support and referral on personal, academic, and career issues; tutoring in math, the sciences, economics, and writing; and coordination of educational programs and special events. The office is home to a number of student organizations and provides office and meeting space for students as well as staff. The programs of this office are designed to promote academic achievement, provide cultural and social outlets, and give voice to the needs and concerns of the African American student community.

### **Asian/Asian American Student Affairs**

Asian/Asian American Student Affairs serves as a beacon of guidance, support, and empowerment and provider of comprehensive resources and opportunities for undergraduate students of Asian descent. Through a variety of programs and services, it strives to satisfy the needs and interests of these students and contributes to their intellectual, cultural, social, and professional development so that they may have fulfilling college experiences. Asian/Asian American Student Affairs also serves as a resource to the Northwestern community.

### **Hispanic/Latino Student Affairs**

The mission of Hispanic/Latino Student Affairs is to plan and implement services and programs that complement the missions of Northwestern University and MSA, as well as to support the personal and career development of Hispanic/Latino students.

### *Services for Students with Disabilities*

Services for Students with Disabilities (SSD) provides the tools, reasonable accommodations, and support services that students with disabilities need to fully participate in academic programming and other facets of university life. All students with verified disabilities, including invisible ones (learning disabilities, Attention-Deficit/Hyperactivity Disorder, psychiatric disabilities, and hidden medical conditions), may be entitled to services. Accommodations are provided on a case-by-case basis.

SSD also seeks to raise awareness in the Northwestern community of the shared responsibility of making the University fully accessible to all students, including providing information to faculty about academic accommodations for students with disabilities.

Additional information is available on the SSD web site ([www.northwestern.edu/disability](http://www.northwestern.edu/disability)) or by calling 847-467-5530 or e-mailing [ssd@northwestern.edu](mailto:ssd@northwestern.edu).

### *Norris University Center*

Norris University Center is the community center of the University. It provides programs and services that enhance the quality of campus life for students, faculty, parents, staff, alumni, and guests. Within Norris Center, Northwestern's many student organizations sponsor a variety of activities that promote social, cultural, and educational interaction outside the classroom. Cultivating a sense of community and a spirit of loyalty, Norris Center serves as a unifying force in the life of the University.

Additionally, Norris Center provides amenities and conveniences that enrich the quality of daily campus life for the University community. These include the campus bookstore, Norris Information Desk, a food court, meeting rooms, a full-service branch bank and multiple ATMs, Dittmar Memorial Art Gallery, a box office, a convenience store, WildCARD office, FedEx, Kinko's Copy Center, Cat's Corner Video, and 34 student organization offices. Other services include a game room, a variety of mini-courses, the Lesbian, Gay, Bisexual, and Transgender (LGBT) Resource Center, outdoor recreation equipment rental, audiovisual equipment rental, a craft studio, a coffeehouse, and plenty of places to meet and study.

### *Center for Student Involvement*

Central to the mission of the Center for Student Involvement is support and advice for all student groups on campus. The center directly advises diverse student groups, including activist, preprofessional, cultural, theatrical, musical, and political groups. For more information on all the programs offered, see <http://norris.northwestern.edu/csi.php>.

Campus programming develops and implements social, cultural, and educational activities supporting the mission of Norris University Center. The wide variety of programs run by student employees provide opportunities for social interaction and for greater understanding and awareness of diverse cultures, religions, and ethnicities.

Student community service promotes engaged citizenship by supporting student service and philanthropy organizations and connecting students to community agencies in Evanston and the Chicago area. Among the programs coordinated are transportation to service sites, one-day service projects, and National Volunteer Week activities.

Leadership development programming aims to provide experiential and reflective opportunities through which students develop the values, knowledge, critical thinking, and interpersonal skills to become engaged citizens and responsible leaders. Students explore topics from social responsibility to understanding their personal leadership

styles. Annual programs include CATalyst, Freshman Emerging Leaders Program, and Women in Leadership Series.

Lesbian, gay, bisexual, and transgender support, coordinated through the LGBT Resource Center, provides a safe space and a hub for organizations, resources, services, and programs of interest to the LGBT and allied community at Northwestern. The center's aim is to increase visibility and awareness of issues surrounding gender and sexuality by uniting existing community entities and educational and outreach programming.

Organizational development programs help organizations promote healthy change by giving them tools for effective development and management.

Social justice efforts strive to provide information and support to all groups and individuals interested in promoting progressive social change. An office provides advising for social justice groups and an activist portal.

### *Residence Halls and Food Services*

Students at Northwestern have a wide variety of living facilities available to them. Smaller residences accommodate as few as 27 students; larger units house more than 600. Most rooms are doubles, but residences also contain single, triple, and suite arrangements. A student may select a residential college, themed housing such as “healthy living,” a coeducational residence hall, or a same-sex facility. Some of the houses are older, ivy-covered residences; others are modern, recently built halls. Each building has its own character and spirit and its own distinct advantages.

Approximately 4,200 undergraduate students live in the University's residence halls; another 800 students have chosen to live in fraternity and sorority houses. The approximately 3,000 remaining undergraduates commute from home or live off campus.

The residence halls bring together individual students with diverse backgrounds and various interests. Each residence hall is free to set its own norms of behavior within the general guidelines of the law and University policy. Students adopt constitutions and elect their own hall officers. Living in a residence hall makes a student a member of its government, with the rights, privileges, and responsibilities of membership.

Residence hall activities are planned by the elected officers and developed by the residents to provide social, academic, and cultural experiences. These programs are financially supported through voluntary social fees.

Students take their meals at any of the six dining facilities located in the larger residence halls. Twenty meals are available each week: breakfast, lunch, and dinner, Monday through Saturday, and brunch and dinner on Sunday. Unlimited, traditional, and block meal plans are available. All plans include a quarterly allocation of points, which may be used for guest meal purchases and at on-campus restaurants. The unlimited plans offer the best value.

Complete information about Northwestern's residences, including rental rates, is e-mailed to applicants after they have been admitted to the University and paid the required tuition deposit.

### *Health Service*

All students are required to have health-care insurance coverage. For information about the program offered through the University, consult the insurance office.

The University maintains a health service for students, including a pharmacy, laboratory, radiology suite, and health education program at Searle Hall. Students registered for full-time study (as defined by their program and the registrar) are entitled to the full privileges of this service.

Full-time students must comply with Illinois state and Northwestern University health, immunization, and insurance requirements, which are described in Health Service and insurance office letters sent to them after they are accepted to the University. Students who fail to comply will be subject to late fees, and their registration will be withheld until these requirements are met.

### *Counseling and Psychological Services*

Counseling and Psychological Services (CAPS) is the University's primary counseling resource. CAPS counselors, social workers, psychologists, and psychiatrists offer students a variety of academic and personal services, including individual and group counseling, crisis intervention, and psychoeducational and developmental programming. When students have problems, talking with an experienced counselor often can provide relief. Students may talk with a counselor confidentially about specific problems such as managing stress and difficult relationships or about nonspecific feelings of anxiety or loneliness.

CAPS offers group counseling on eating behavior, self-esteem, sexual identity, shyness, grief, stress management, self-exploration, and relationship enhancement. Groups and topics may be added in response to student interests or needs.

While there is a limit of 12 individual CAPS counseling sessions, this office can refer students who will benefit from additional help to other appropriate and affordable counseling providers in the community. Students who participate in group counseling are still eligible for 12 individual sessions.

Counseling is available to full-time students (those registered for at least three courses). Crisis intervention and consultation, assessment, and referral resources are available to part-time students.

### *University Career Services*

University Career Services is a centralized career center, providing a full spectrum of career counseling and advising services, workshops, programming, and special events for



undergraduate and graduate students and alumni. It aims to help students translate their superb Northwestern education into excellent professional opportunities, including successful job and internship searches and graduate work. Services include

- walk-in and individual appointments for confidential career counseling, career assessments, preparation for job and internship searches and graduate studies
- help with the internship and job search processes, including strategizing, résumé review, mock interviewing, and advice on salary negotiations
- workshops and outreach programming to the campus community
- electronic databases offering access to internships and full- and part-time jobs
- CareerCat, a career management system that offers access to on-campus interviews for students, easy online registration, and other features
- campus recruiting visits and information sessions by hundreds of employers
- credential, dossier, and recommendation files services

Annual special events include fall and winter job fairs, internship programs, and career discussion groups.

The Career Information Center offers current resources and publications on industries and occupations, internship opportunities, employer contacts, salary information, and graduate and professional school preparation. An outreach office is located in the main library.

Students are encouraged to register with University Career Services at [www.northwestern.edu/careers](http://www.northwestern.edu/careers). Offices are at 620 Lincoln Street and on the second floor of the north tower of University Library.

### *University Chaplains*

The Office of the University Chaplains provides support for religious life at Northwestern. The Alice S. Millar Chapel and Religious Center, which includes Parkes Hall and the Jeanne Vail Meditation Chapel, has facilities for religious programs and services such as lectures, study groups, discussions on faith and life, weddings, baptisms, and other special events. The facilities are available to recognized religious groups. Events may be scheduled through the chaplains' office.

The University chaplains also work closely with denominational religious centers on campus sponsored by Protestant denominations, the Roman Catholic Church, and the Jewish community. University chaplains and campus ministers and rabbis are available to meet with individuals and groups as counselors, teachers, and resource persons.

Student religious organizations are recognized through the Office of the University Chaplains. The chaplains serve as the University's liaison with all student religious

groups. For information about the recognition process, contact the office to make an appointment (847-491-7256).

Information about campus religious organizations is published on the Office of the University Chaplains' web site, [www.northwestern.edu/chaplain](http://www.northwestern.edu/chaplain).

### *Judicial Affairs Office*

The judicial affairs director and staff are responsible for adjudicating violations of University rules and regulations. Disciplinary matters are resolved administratively or through the University Hearing and Appeals System (UHAS) and the Sexual Assault Hearing and Appeals System (SAHAS).

### **Fitness and Recreation**

All students at Northwestern are strongly encouraged to participate in University-sponsored sports, fitness, and recreation activities, which include intramural, club, informal, and instructional sport and fitness programs.

Intramural competition is conducted in a variety of individual and team sports. League play and tournaments are provided for men and women, both separately and corecreationally. Competition is organized for individuals and teams, by independent groups, living units, fraternities, sororities, and University departments and organizations.

Sport clubs offer competitive and noncompetitive sports experiences. Extramural competition, with outside institutions and sports groups, is available in baseball, basketball, boxing, crew, cycling, equestrianism, fencing, golf, gymnastics, ice hockey, lacrosse, power lifting, rugby, running, sailing, ski racing, soccer, squash, synchronized skating, table tennis, tennis, triathlon, Ultimate Frisbee, volleyball, and water polo. Noncompetitive special-interest clubs include aikido, karate, tae kwon do, and juditsu. Clubs are student directed.

Drop-in recreation periods are scheduled throughout the day and evening at Blomquist Recreation Center, Patten Gymnasium, and the Henry Crown Sports Pavilion, Norris Aquatics Center, and Combe Tennis Center. Included are facilities for badminton, basketball, cardiovascular activities, floor hockey, group fitness programs, jogging, racquetball, squash, swimming, tennis, volleyball, and weight training.

Noncredit instructional sports classes are offered in a variety of areas. Students can register for sports and fitness classes by visiting the recreation registration office in the sports pavilion and paying a nominal fee. Courses for each quarter are listed in the *NUFitRec* guide and on the Fitness and Recreation web site ([www.fitness.northwestern.edu](http://www.fitness.northwestern.edu)).

The Sailing Center offers instructional and informal sailing programs for beginning and novice sailors. The fleet consists of 420 class and laser sailboats as well as Windsurfers.

## International Office

International students, visiting scholars, and staff will find assistance for themselves and their families at the International Office. Although the main focus is immigration related, the office provides a variety of programs and services that enhance the educational experience of the international population. Students and scholars have an opportunity to explore Chicago and the surrounding communities; deal with cultural adjustment issues; and attend workshops on immigration issues and career and employment seminars. The office also coordinates new student orientation for international students and scholars and serves as an information center for locating services and activities available both on and off campus.

A volunteer organization, the Community Council for International Students, works effectively with the office to provide international visitors such services as English language tutoring, the International-American Women's group, and a play group for children.

More information on the office's services can be found at [www.northwestern.edu/international](http://www.northwestern.edu/international).

## Women's Center

The Women's Center is a gathering place for all students, staff, and faculty where the achievements of women are celebrated. It serves the needs of all University women across lines of race, class, and sexual orientation, with the goal of achieving gender equity. The center provides educational programming with a particular emphasis on women's health, women and leadership, career and professional development, safety and self-defense, stress management, and issues of balancing work and family or other work/life concerns. The center provides advocacy services for women and men who have experienced sexual harassment, sexual assault, relationship violence, and discrimination. Many of its goals are achieved through outreach and coalition building. Counseling services are provided through individual appointments and support groups. Additional services include a referral service and resource library. Students can call 847-491-7360 or 312-503-3400 for information on programs or services, or they can check out the web site [www.northwestern.edu/womencenter](http://www.northwestern.edu/womencenter).

## UNIVERSITY POLICE

The University Police Department is responsible for crime prevention, law enforcement, parking control, special events, and emergency management on both the Evanston and Chicago campuses. University Police officers are on duty 24 hours a day, seven days a week. All officers are police academy graduates with full police authority; most have bachelor's degrees.

The police division on the Evanston campus provides a number of services, including customized crime prevention programs. Specialty training programs include rape aggression defense and CPR. Other services provide

unlocking of vehicles, residence hall security checks, sale of bicycle locks (at cost), and loan of battery jumper cables. Emergency phones on campus, located in yellow or black boxes with blue lights above, automatically connect with University Police when a person pushes the button.

Additional information about campus crime and crime prevention programs is available on the University Police web site ([www.northwestern.edu/up](http://www.northwestern.edu/up)) or by requesting a copy of "Campus Safety: A Shared Responsibility" from the University Police Department, 1819 Hinman Avenue, Evanston, Illinois 60208-1320.

## Motor Vehicles

Regulations governing the possession, operation, and parking of motor vehicles on the Evanston campus are described in the parking regulations handout available at the Parking Office, 1819 Hinman Avenue, or online at [www.northwestern.edu/up/parking](http://www.northwestern.edu/up/parking).

Parking permits are required in campus lots from 7:30 a.m. to 4 p.m. Monday through Friday (official holidays excluded), except in lots that are designated in the regulations as 24-hour enforced. Parking on campus is available only to seniors living on campus and to students living outside the designated walking zone. Ryan Field remote parking is available to all students. Exceptions to these rules may be granted only by the Parking Committee.

## Personal Losses

The University is not responsible for the loss of or damage to personal property belonging to students in any building it owns, whether the loss or damage occurs by theft, fire, or an unknown cause.

## IDENTIFICATION CARDS

The University identification card (WildCARD) identifies registered students and should be carried at all times. The WildCARD is the property of the University and is not transferable; its privileges may be canceled at any time the card is misused. Students are required to surrender their WildCARD to University officials upon request.

The student's ID number is encoded on the card and indicates whether the student is currently registered and if the card is valid. The card identifies the holder for admission to the library during hours of limited access and is needed at all times to borrow books. If a student has a meal plan, the WildCARD admits the student to residence hall dining facilities. It also identifies the holder at the Health Service, Norris University Center, student functions and elections, and University athletic events.

Lost or stolen cards should be reported to the WildCARD office, where replacement cards are issued. For the cost of replacing an ID card, see Service Fees under Tuition and Fees in the next section of this catalog.

## Undergraduate Education

### ADMISSION

#### General Requirements for Admission

Northwestern University attracts and enrolls a student body of high ability that reflects a variety of talents, ideas, backgrounds, and experiences, thereby contributing to the diversity of the campus community.

Candidates for admission should demonstrate a level of performance in curricular and extracurricular areas that indicates they will be able to compete successfully in a competitive academic environment. In the selection of students, careful attention is given to the ability of each candidate as evidenced by academic records and the results of entrance tests as well as by character and personality. The University attempts to select students who are committed to scholarship and who have shown a willingness to become involved in their expressed interest areas. In determining whether to accept a candidate, the University considers

- secondary school record
- college record (required for transfer candidates)
- recommendations from school officials and other persons who have information pertinent to the candidate's probable success at Northwestern
- results of required or recommended tests (All candidates must submit the Scholastic Assessment Test [SAT] Reasoning Test or the American College Test [ACT] Plus Writing. Candidates for certain special programs and all home-schooled applicants must submit the SAT Subject Tests specified in the following sections. SAT Subject Tests are recommended for other candidates.)
- music audition (required of Bienen School of Music candidates)
- the candidate's statements on the application and other evidence of special skills, such as writing, art, music, mathematics, and science, or of special accomplishments in extracurricular areas of interest
- any other information received by the University that bears on the candidate's readiness for study at Northwestern

#### SAT Subject Tests

##### *Recommended for Regular Programs*

- Weinberg College of Arts and Sciences, School of Communication, School of Education and Social Policy, Medill School of Journalism, and Bienen School of Music: three of student's choice, in three different subject areas (math, English, social sciences, natural sciences, or foreign language)

- McCormick School of Engineering and Applied Science: Mathematics I or IIC, Chemistry or Physics, and a third subject of choice

##### *Required for Special Programs and Home-Schooled Applicants*

- Honors Program in Medical Education: Mathematics IIC and Chemistry
- Integrated Science Program: Mathematics IIC, Chemistry or Physics, and an additional science
- Home-schooled applicants: Mathematics I or IIC and two other SAT Subject Tests of the applicant's choice from different subject areas (i.e., not two science, two foreign language, or two history, etc.).

#### Required Subjects

A broad academic experience in high school is the best preparation for admission to Northwestern. Whatever fields of study students follow, the best foundation consists of reading, writing, and mathematics. The value of thorough training in fundamental subjects cannot be overemphasized.

In considering the academic record of a candidate for admission to Northwestern, the Office of Undergraduate Admission notes the subjects studied and the grades received. The student's record should include a minimum of 16 units. (A unit represents a course studied for one year.)

The subject recommendations in the following list represent the minimum requirements for entrance to the University. Allowances are made to permit students to pursue special areas of academic interest. Most applicants present more academic subjects than the minimum.

#### Required Units

Weinberg College of Arts and Sciences, School of Communication, School of Education and Social Policy, Medill School of Journalism, and Bienen School of Music: 16 units, divided among the following academic areas:

- English: 4 units
- foreign language: 2 to 4 units
- mathematics: 3 to 4 units
- laboratory science: 2 to 3 units
- history/social studies: 2 to 4 units
- electives: 1 to 3 units in the above academic areas

Students preparing for college are strongly advised to take four years of work in English with as much emphasis on composition as the curriculum allows. Two units of the



same foreign language should be taken; three or four years are strongly recommended.

The McCormick School of Engineering and Applied Science requires a sound secondary school education as described above, with strong preparation in mathematics and science. Specifically recommended are

- mathematics:  $3\frac{1}{2}$  to 4 units (the minimum requirements for mathematics include algebra [2 units], plane geometry [1 unit], and trigonometry [ $\frac{1}{2}$  unit]; many entering McCormick freshmen will have taken calculus [1 unit])
- science: 2 units (credit in both chemistry and physics is recommended)

Credit in other subjects should bring the total to 16 units or more, including 4 units of English and work in social studies and foreign languages.

### Admission Notification

Northwestern offers freshman candidates a choice of two notification plans, Early Decision and Regular Decision. Early Decision is a binding admission commitment. Candidates accepted to Northwestern under Early Decision must withdraw all other university applications.

The table on the next page outlines these plans, the notification plans for transfer students, and the financial aid application procedure, including deadlines and the forms available through the College Scholarship Service.

### Admission Procedure

To be considered for admission to Northwestern, candidates must complete the following three steps:

- Complete both the Common Application and the Northwestern Supplement. You may apply online at [www.commonapp.org](http://www.commonapp.org) or request a paper application from the Office of Undergraduate Admission, Northwestern University, 1801 Hinman Avenue, P.O. Box 3060, Evanston, Illinois 60204-3060. Applications for admission may be submitted before candidates take the standardized tests required for college admission.
- Arrange with the officials of their high school to complete and forward the Secondary School Report to the Office of Undergraduate Admission. All candidates should have their records through the sixth semester sent to Northwestern as early in the senior year as possible. Regular Decision candidates should have seventh-semester grades sent as soon as they are available.
- Take standardized tests as described on pages 16 and 18.
- If applying for admission to the Bienen School of Music, present a music audition in person or a high-quality recording. (Audition guidelines will be furnished on request.)

### Advanced Placement

In nearly all areas Northwestern awards credit for Advanced Placement Examination scores of 5; in some cases credit is also awarded for scores of 3 and 4. Specific questions concerning Northwestern's advanced placement

policies should be addressed to the Weinberg College Office of Undergraduate Studies and Advising. In some fields, advanced placement and/or credit can be earned through appropriate performance on examinations administered by Northwestern departments.

Northwestern awards credit for distinguished performance on the British General Certificate of Education (A-Level) Examinations, the higher-level examinations of the International Baccalaureate, and certain other foreign university entrance examinations.

Northwestern also recognizes college credits earned by students before entering the University as freshmen. To qualify for such recognition, the courses must be similar to courses offered at Northwestern, must have been taken at a college or university whose accreditation is recognized by Northwestern, must not have been submitted in partial fulfillment of the normal secondary school graduation requirement, and must have been given on the campus of a college or university and taken primarily by bona fide college students (i.e., high school graduates pursuing a college degree). If candidates have taken college courses that do not qualify for credit under these conditions, they should take Advanced Placement Examinations in the appropriate subjects.

### Transfer Candidates

Students may be considered for admission as transfers from another college or university provided they have completed one full year of university studies by the application deadline, are in good standing at their postsecondary institution, and have maintained at least a B average in rigorous academic courses. If students have been enrolled full-time at any institution except Northwestern, they cannot be considered for freshman admission and must meet the criteria to apply as transfer candidates. Some undergraduate schools at Northwestern enroll transfer students in the fall quarter only. Transfer students must complete at least the last 23 quarter-courses and six full-time quarters in residence at Northwestern to be eligible for a bachelor's degree.

#### *Transfer Admission Procedure*

To be considered for admission, transfer students must complete the following steps:

- File the completed Common Application and Northwestern Supplement, available from the Office of Undergraduate Admission, Northwestern University, 1801 Hinman Avenue, P.O. Box 3060, Evanston, Illinois 60204-3060.
- The application can also be downloaded or completed online at [www.commonapp.org](http://www.commonapp.org).
- Arrange with the officials of the high school to forward the complete high school report to the Office of Undergraduate Admission.
- Submit results of the SAT Reasoning Test or the ACT Plus Writing.

## APPLICATION AND TESTING DEADLINES: NOTIFICATION PLANS

### Regular Programs for Fall Quarter Matriculation

Freshman candidates for other quarters should request information from the Office of Undergraduate Admission.

	<b>Early Decision</b>	<b>Regular Decision</b>
Apply by	November 1	January 1
Take SAT Reasoning Test or ACT Plus Writing by	November test	January test
If taking SAT Subject Tests, take by	November test	January test
To apply for financial aid, file CSS PROFILE by	December 1	February 15
and file FAFSA by	February 15	February 15
Northwestern mails decision letter by	December 15	early April
Applicant's reply and nonrefundable tuition deposit by	February 1	May 1

### Honors Program in Medical Education

	<b>Regular Decision</b>
HPME preapplication deadline	December 1
HPME application deadline	January 1
Freshman application to Northwestern by	January 1
Take SAT Reasoning Test (or ACT Plus Writing) by	November test
Take two SAT Subject Tests by	December test
To apply for financial aid, file FAFSA and CSS PROFILE by	February 15
Northwestern mails decision letter by	early April
Applicant's reply and nonrefundable tuition deposit by	May 1

### Transfer Students for Any Quarter of Matriculation

	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer</b>
Apply by	May 1	November 1	February 1	May 1
(Because space is limited in some programs, transfer candidates should apply well before these dates)				
Take tests by	May 1	November 1	February 1	May 1
(SAT Reasoning Test or ACT Plus Writing; scores from previous academic years are acceptable)				
Apply for financial aid by	April 1	October 1	January 1	April 1
(Consult with Office of Undergraduate Admission)				
Northwestern mails decision letter as soon as possible after the application deadline; a reply is due within two weeks.				

- Arrange with the registrar of each college previously attended to forward transcripts of record to the Office of Undergraduate Admission.
- Request a statement of good academic and social standing from the dean of students at the college from which the student is transferring.
- Present a music audition (in person or a high-quality recording) if applying for admission to the Bienen School of Music (audition guidelines will be furnished on request).
- Submit application for admission before the deadline of May 1 (for admission in the fall quarter), November 1 (winter), February 1 (spring), or May 1 (summer).

### *Evaluation of Credits*

Transfer candidates who are accepted by Northwestern will receive a preliminary evaluation of the credits they have earned to date before matriculation, assuming all pertinent transcripts have been received. An official evaluation of credits earned will be made by the Office of the Registrar when an admitted student matriculates. To read the transfer credit policy, go to [www.registrar.northwestern.edu/student\\_info/coll\\_credit.html](http://www.registrar.northwestern.edu/student_info/coll_credit.html).

### **Foreign Students**

In addition to meeting all regular admission requirements, foreign students are required to present evidence of their ability to speak, read, and write the English language and to meet the financial obligations associated with their study at Northwestern. Students for whom English is a second language must present the results of the Test of English as a Foreign Language (TOEFL). Foreign students must have achieved outstanding school records to be considered for admission. Foreign transfer candidates may apply for fall quarter admission only and must submit their completed applications by May 1.

### **Returning Adult Students**

Adults who interrupt their education following high school or during college and, after several years, decide to complete their undergraduate education are considered “returning adult students” by the Office of Undergraduate Admission. Ordinarily, returning adult students have been out of high school for seven years or more. Depending on the amount of college credit previously earned, they apply as returning adult or transfer candidates.

### **Evening Students**

The School of Continuing Studies (SCS), Northwestern’s continuing education division, offers courses in the evenings and on Saturdays for adult students seeking personal enrichment or professional mobility, preparation for graduate study, or pursuit of a degree or a certificate.

Quarter-long courses are offered on the Chicago and Evanston campuses.

SCS allows adults with a college degree, or some college credit and good standing, or a high school diploma but no prior college work, to enroll in courses as students at large. Students who wish to earn a degree or a certificate should speak with an academic adviser about admission.

More information about SCS is available on its web site, [www.scs.northwestern.edu](http://www.scs.northwestern.edu).

### **Special Students**

Properly qualified persons who demonstrate a need for certain courses required for their academic or professional advancement may apply to the University as special nondegree-seeking students. Applicants must present official transcripts of previous study and show evidence of successful academic achievement. Persons who do not meet these requirements should not apply.

Enrollment as a special student does not constitute admission to any degree program at the University, and credits earned as a special student may not be counted toward a degree at Northwestern. (Exception: Special students who subsequently become eligible for admission into the School of Continuing Studies may apply these credits toward a degree.) Special students are granted academic credit for course work satisfactorily completed, and these credits may be transferred to another institution.

Special students are admitted with the understanding that they may register only after students working toward Northwestern degrees have registered. Some classes will be closed, and some schools or departments may not accept nondegree students. These restrictions do not apply to Summer Session.

Special students are not permitted to enroll in 399 or 499 Independent Study courses.

All tuition and fees for special students are charged at the undergraduate rate. Complete instructions and application forms may be obtained from the Office of Special Students, 162 Walter Annenberg Hall, Northwestern University, Evanston, Illinois 60208-2650.

### **Auditors**

Course audits for degree-seeking undergraduates are not given formal recognition by either Northwestern or the Office of the Registrar. Only students in the School of Continuing Studies or summer nondegree students are permitted to formally audit classes.

Auditors are persons who enroll in a course to observe or listen only; they are not permitted to engage in class discussion, submit written or oral assignments, or take examinations, and they do not receive academic credit. Auditors are charged a special tuition rate. Consult with the Office of Special Students or the School of Continuing Studies.

## FINANCIAL AID

The University awards financial aid on the basis of need as determined by the financial circumstances of the family. Aid can be a loan, part-time employment, a grant/scholarship, or a combination of these. The funds may come from state, federal, institutional, or private sources. Students are required to reapply for financial assistance each year and maintain the requirements established by the Committee on Financial Aid. The amount of financial aid may change based on the family's financial circumstances. For entering freshmen, financial aid generally is renewable for up to 12 quarters of enrollment. If a student has been enrolled and has not applied for and/or has not received financial aid, the quarters of enrollment will count toward the maximum eligibility. For transfer students, the maximum number of quarters of assistance depends on the number of quarters of transfer credit accepted, as determined by the Office of the Registrar (i.e., a student who transfers with 3 quarters of acceptable credit is eligible for 9 quarters of assistance). Transfer students requiring additional quarters of aid must petition the Committee on Financial Aid.

During the 2007–08 academic year, undergraduate students at Northwestern received more than \$81 million in grant assistance: \$70 million from Northwestern, \$7.5 million from federal and state governments, and \$3.8 million from outside sources. The average Northwestern need-based grant for the 3,380 students receiving aid was \$20,535. In addition, \$20.8 million in loan assistance and 3,000 campus jobs were available.

Assistance that is not need based is provided by the Reserve Officers Training Corps (see Military Studies) and from other sources discussed in the Northwestern publication "Making It Possible — Financial Aid at Northwestern University," distributed by the Office of Undergraduate Admission. For more information consult [www.ugadm.northwestern.edu/freshman/financing](http://www.ugadm.northwestern.edu/freshman/financing).

### Who Should Apply

Any undergraduate students who believe they cannot afford the full cost of a Northwestern education may apply for financial aid. Since funding is limited, institutional assistance may not be available to transfer students for the first year of study.

### Application Procedure

Applicants request consideration for financial aid when submitting the Application for Admission. The Committee on Financial Aid cannot make a decision until the University has admitted the applicant. Candidates should do the following:

- Complete and submit the Common Application and the Northwestern Supplement.
- File the Free Application for Federal Student Aid

(FAFSA) and the College Scholarship Service/Financial Aid PROFILE (CSS PROFILE) and request that copies of both reports be sent to Northwestern.

- Submit parent and student federal tax returns to the College Board's Institutional Documentation Service.
- File the applications as soon as the need for assistance is realized but not later than the dates indicated in the table titled Application and Testing Deadlines: Notification Plans (page 18).

Returning students should consult the web site <http://ug-finaid.northwestern.edu> for reapplication instructions and deadlines.

Students are expected to consult their CAESAR accounts to verify that all required applications and additional information have been received by the Office of Financial Aid.

### Satisfactory Academic Progress and Financial Aid

Satisfactory academic progress at Northwestern means the completion of a minimum full-time course load (9 academic units) at the end of each 3- or 4-quarter cycle of enrollment. Withdrawn, incomplete, and repeated courses are not counted toward that minimum.

Eighteen full-time quarters are the maximum for completing a four-year program, 22.5 quarters for completing a recognized five-year program.

Each school at the University has specific qualitative measurements of progress, which are listed in its section of this catalog. Although Northwestern does not require students to have a C average at the end of their sophomore year as long as they have made progress toward a degree, federal regulations state that a student without a C average or equivalent or the required academic standing at the end of the second academic year may not receive further federal aid.

If a student fails to maintain academic progress as described above, financial aid eligibility is limited to one more quarter of enrollment as a probationary period. During this quarter the student must complete course work equivalent to at least three units and earn a C or better in each class. The student will lose financial aid eligibility if he or she fails to meet these requirements but may reestablish eligibility by successfully completing a full-time quarter of enrollment at Northwestern without federal or institutional assistance.

A student may submit a written appeal within two weeks of being notified of aid cancellation because of failure to meet satisfactory academic progress requirements. The appeal must be specific and document any unusual or mitigating circumstances such as illness, family hardship, or a death in the family.

The above procedure is followed except in these cases:

- Students returning to the University after academic dismissal are eligible only for federal assistance during

the first quarter of full-time study, when satisfactory academic progress is being reestablished. After completing course work equivalent to three units with a grade of C or better in each class, students are considered to be making satisfactory academic progress and become eligible for federal and institutional financial assistance in subsequent quarters.

- When students have been in attendance at Northwestern for 12 quarters or the equivalent, they are ineligible for more financial assistance from the University even if they are maintaining satisfactory academic progress. The exceptions are students admitted to the five-year BA/BMus and BS in engineering/BMus programs; they are eligible for University funds for up to 15 quarters of enrollment. Students pursuing other double-degree opportunities are eligible for only federal and state funding.
- The Committee on Financial Aid may grant a continuation of aid when unusual circumstances exist and students demonstrate academic promise.

## FINANCIAL REGULATIONS

### Tuition and Fees

The cost of education at Northwestern is only partly covered by tuition charges. The balance is met by the income from invested funds and by the gifts of alumni and other supporters of the University.

Tuition and fees listed below are for 2008–09 unless noted otherwise. Rates are subject to change without notice, and increases should be expected in subsequent years. For tuition purposes, the term course refers to course credit. Some course offerings carry more than one course credit.

#### *Undergraduate Tuition*

All undergraduate students in degree programs must conform to the Undergraduate Residence Requirement (see page 22). Full-time registration for all undergraduate degree-seeking students is three or more units of credit.

Tuition: each quarter \$12,252

A student who takes more than four units of credit in a quarter will be subject to an overload charge if these credits are used to accelerate graduation. See the Undergraduate Residence Requirement for more complete information.

Acceleration tuition: each course, each quarter \$3,063

#### *Undergraduate Tuition:*

##### *Nondegree-Seeking Students and Exceptions*

Full-time tuition: three or four courses  
each quarter \$12,252

Registration exceptions (less than full-time or more than four units): each course, each quarter \$4,361

### *Service Fees*

#### *Student Hospitalization Plan*

Required for all students unless they have equivalent hospitalization coverage \$2,360

#### *Study abroad administrative fee (not refundable)*

Non-Northwestern summer 2007 study abroad \$725

Term fee (semester or quarter) \$2,200

Annual fee (academic or calendar year) \$3,600

Tuition deposit fee \$400

Required for each new undergraduate student; applied on the first tuition bill and not refundable

Application fee (not refundable) \$65

Returned check service fee \$35

Replacement WildCARD fee \$15

Transcript fee \$5

Makeup laboratory time, breakage fee varies

### *Other Fees*

Late registration fee \$25

If fee is billed \$30

For registering at other than the scheduled times

Retroactive registration fee \$225

For registering for a term after the last day of classes for that term

Housing deposit fee \$200

Late payment penalty fee \$100

Associated Student Government \$46

Activity fee, each quarter

Athletic events fee \$33

Student Health fee \$67

For new students

#### *Dependent Hospitalization Plan*

Contact Student Health Office

Field trip fee varies

For courses in which field trips are required to earn credit

### Bills and Payments

The Office of Student Accounts issues student bills. A due date is shown on each University bill, and payment must be received by that date. Failure to receive bills is not sufficient cause to extend due dates.

#### *Electronic Billing and Payment*

Northwestern's preferred means of transmitting bills and receiving payments for tuition and fees is QuikPAY, the University's electronic billing and payment service. QuikPAY provides e-mail notification of each new bill, allows payments to be made online, and offers the option of receiving paper bills. QuikPAY is free to students and authorized payers such as their parents. Additional information can be found at [www.northwestern.edu/sfs](http://www.northwestern.edu/sfs).

### *Installment Payment Plan*

The University provides a tuition and fee installment payment plan, 9PAY, which offers the benefit of dividing the educational costs for the academic year into nine monthly payments. For information, contact the Office of Student Accounts, Northwestern University, 555 Clark Street, Evanston, Illinois 60208-1221, phone 847-491-5224, fax 847-467-2451.

### **Withdrawal from the University: Refunds**

Students who withdraw from the University must immediately file a withdrawal form, available at the Office of the Registrar. The completed form, bearing the required signatures, must be filed at the Office of the Registrar.

The Office of Student Accounts considers the date the completed form is received at the Office of the Registrar as the effective date in making financial adjustments.

Tuition deposits are not refundable under any circumstances. Tuition, less the tuition deposit, and refundable fees are refundable depending on the percentage of time the student was enrolled in the quarter. The following policy applies to withdrawals:

- When or before the first 10 percent of the quarter has elapsed, 100 percent of the tuition (less the deposit) is refunded.
- After 10 percent but not more than 25 percent of the quarter has elapsed, 75 percent of the tuition is refunded.
- After 25 percent but not more than 50 percent of the quarter has elapsed, 50 percent of the tuition is refunded.
- After 50 percent of the quarter has elapsed, no refunds are given.

Residence and meal contracts are signed for the full school year. Students who leave a residence before the end of the year are liable for the entire year's rent or for charges up to the date another student takes the vacated space. Meal charges are assessed until the end of the week in which withdrawal is in effect. Adjustments may be made at the discretion of the Housing Office for students who for financial reasons must make room and board arrangements other than those for which they first contracted.

Financial aid recipients who withdraw from the University may be required to return a portion of their Title IV funds to the federal programs as well as some of their state assistance, outside scholarships, and/or institutional financial aid. Three different calculations — the Institutional Refund, Return of Title IV Funds, and Return of Non-Title IV Funds — are used to determine such repayments. Students may request samples of the applications of these refund policies from the Office of Student Accounts or the Office of Financial Aid.

### **Changes of Registration**

No refund or bill reduction is made on any course dropped after the fifth day of classes in the quarter.

### **Financial Obligations**

Students whose University bills are overdue may not be given an academic transcript until all financial obligations are paid in full. Students whose accounts are overdue must pay a late payment penalty fee of \$100. The director of student accounts may cancel or prevent the registration of a student whose bills are past due.

Each student is liable for any costs associated with the collection of his or her past-due account, including but not limited to collection agency costs, court costs, and legal fees.

### **Supplemental Enrollment Benefit**

Students who are unable to complete bachelor's degree requirements in 12 quarters due to circumstances beyond their control, and who have paid full-time tuition to Northwestern for 12 quarters, may petition the Residence Requirement Appeals Committee to enroll in their final quarter at no additional tuition charge. Transfer students who have paid full-time tuition to Northwestern for 9 quarters are also eligible.

A final quarter at no tuition charge is not available for students who choose a program that may take more than 12 quarters to complete or for students who have graduated. A final quarter at no charge is also not available for students who choose an optional program, such as study abroad, a double degree, double major, minor, or extra course work beyond that normally required for the degree. Further information is available from the Office of the Registrar at [www.registrar.northwestern.edu](http://www.registrar.northwestern.edu).

## **UNDERGRADUATE RESIDENCE REQUIREMENT**

The Undergraduate Residence Requirement (URR) is predicated on the principle that when a student receives a bachelor's degree from Northwestern University, the majority — and certainly the most advanced portion — of his or her academic work is completed on a Northwestern campus as a full-time student under the instruction of Northwestern faculty during the regular academic year. Thus, being “in residence” for a quarter means that the student is enrolled during the fall, winter, or spring quarter at Northwestern, is being taught by or is under the supervision of Northwestern faculty, and completes three or more credits. It includes, for instance, the practicum in the School of Education and Social Policy and the Journalism Residency in the Medill School of Journalism. It does not include study abroad of any type or the Cooperative Engineering Education Program in the McCormick School.

The URR applies only to undergraduate students seeking a bachelor's degree and must be completed in addition to the degree requirements established by the various school faculties. Its provisions are:

- A student entering as a freshman is required to be in residence for 12 quarters in a four-year degree program



and 15 quarters in an approved combined degree program involving two schools. Please refer to Combined Bachelor's Programs on page 30 for the approved combined degree programs for which two bachelor degrees may be awarded concurrently.

- A student entering as a freshman may gain exemption from the required residency by up to three quarters through any combination of a maximum of 12 credits earned through the Advanced Placement or the International Baccalaureate programs; a maximum of 12 credits earned through approved study abroad; credits earned through "credit by examination" at Northwestern; credits earned at Northwestern through less than full-time enrollment; and a maximum of four transfer credits from other (domestic) colleges or universities earned at any time prior to the final three quarters of residence. Each four such credits confer one-quarter exemption from the URR.
- A student who completes three or more credits in a single Northwestern Summer Session will gain exemption from one quarter of the URR. A second quarter of exemption may be earned by completing four credits in a second Summer Session.
- A student who receives Northwestern credit for study abroad must be in residence for either the final three quarters or 4 of the last 6 quarters before the awarding of the degree.
- A student who takes more than four credits in one quarter will be subject to an overload charge if these credits are used to accelerate graduation. (Acceleration occurs when the total quarters completed by the student, including those allowed in the second and the fourth exemption provisions above, at graduation total less than 12 for a single-degree program or less than 15 for two bachelor's degree programs involving two schools.)
- A student entering as a transfer student will have his or her residence requirement determined at the time of transfer; in no case will the residence requirement be less than 6 quarters and 23 credits. The URR, once established, is not subject to the exemption possibilities listed above.
- Students may appeal for URR variances to the Residence Requirement Appeals Committee, which consists of the associate provost for University enrollment, the associate provost for undergraduate education, the University registrar, and two associate deans from different undergraduate schools. The deans serve three-year terms on a rotating basis.

For additional information, interpretation, or application of the URR, contact the Office of the Registrar, 633 Clark Street, Evanston, Illinois 60208-1118, 847-491-5234.

## Returning Students

Students who withdraw from the University and wish to return must submit a Returning Student Application Form to the Office of the Registrar six weeks before the desired

date of reentry. Students who want credit for course work taken at another institution must submit an official transcript to the Office of the Registrar. The Office of the Registrar will determine the extent to which credit earned away from Northwestern may apply toward the 12-quarter URR.

## Transfer Students

Students who transfer to Northwestern from another institution will be informed of the extent to which their previous work reduces the 12-quarter URR. All transfer students have a 6-quarter minimum URR. Those entering as transfer students from another institution may not apply any additional work taken outside the University toward the URR. Such courses beyond the maximum may be useful in meeting academic requirements but may not be used toward the URR.

## ACADEMIC REGULATIONS

### Registration for All Students

The Office of the Registrar maintains a complete, up-to-date online class schedule, which can be found by selecting the "View the Quarterly Class Schedule" link at [www.northwestern.edu/caesar](http://www.northwestern.edu/caesar).

- A quarterly reference copy may be downloaded from [www.registrar.northwestern.edu/registration](http://www.registrar.northwestern.edu/registration). Failure to read the registration information at [www.registrar.northwestern.edu/registration](http://www.registrar.northwestern.edu/registration) or the printed class schedule does not excuse students from compliance with the information and regulations stated therein.
- The dates of registration for each quarter are announced in advance. Students whose initial registration occurs during the late registration period are subject to a late-registration fee. Inconvenience, illness, and other personal reasons for registering late are not accepted as reasons for waiving the fee. Late registration is permitted only through the fifth full day (Saturday is not a full day) of classes in any quarter.
- Credit is not given for work in a course in which a student is not properly registered.
- Duplicate course entries remain on the student's permanent record and are used to calculate the cumulative grade point average. However, credit is awarded only once.
- Credit is not given for a course that is a prerequisite for a more advanced course if that prerequisite is taken after the more advanced course has been completed. Waiver of prerequisites for admission to courses may be obtained from the instructor concerned or the chair of the department in which the course is offered.
- Undergraduate students may not enroll in fewer than three quarter-courses except by permission of the dean of their school. Permission is given only in extraordinary circumstances.
- In Weinberg College, undergraduate students may not enroll for more than four quarter-courses except by permission of the dean's office. This regulation applies

to total credit for courses taken in other institutions in addition to credit obtained in residence at Northwestern. Additional tuition may be charged for excess registration (see Undergraduate Residence Requirement).

### Changes of Registration

Changes in registration in fall, winter, and spring quarters are subject to the following provisions:

- In no case may a course be added after the fifth day of classes. No course may be dropped after the sixth Friday of classes.
- Undergraduate students may change registrations from grade to the pass/no credit (P/N) option or vice versa through the third Friday of the quarter. Check regulations of the individual schools for specific information on the P/N option.
- To add a class, students must log on to CAESAR and add the course to their record. Consent of the department or instructor may be required. See the class schedule for specific course information.
- To drop a course, students must log on to CAESAR and drop the course from the record. In most cases no special consent is required.
- Changes in ungraded sections (laboratory or discussion) are made in the departments and do not require notifying the registrar.
- A course dropped by the sixth Friday of a quarter does not appear on the permanent academic record, and no grade is recorded.
- Failure to drop a course within the time allowed is regarded as a failure and is recorded with a grade of F.  
(See also Withdrawal from the University: Refunds and Change of Registration under Financial Regulations.)

### Registration in the School of Continuing Studies

The School of Continuing Studies, with locations in Evanston, Chicago, and the Chicago Loop, operates on the quarter system. SCS courses are designed primarily for working adults, and enrollment caps limit the registration of students enrolled in an undergraduate school. Undergraduates may take SCS courses only with the approval of the office of the dean of their school and only when the courses are not given during the day or when there are clear cases of conflict. Priority is given to students who need a course to complete a major. Such work is counted as a regular part of a student's registration.

To register for SCS courses, students must

- pick up a Dual Registration Form from the Office of the Registrar in Evanston
- secure approval from the office of the dean of their school
- turn in the form at the Office of the Registrar in Evanston before the first meeting of the class

To drop an SCS course, students must log on to CAESAR and drop the course.

### Interschool Transfers

Undergraduate students who wish to transfer from one school or college of the University to another must have an interschool transfer approved by the dean's office of each school. A return to the original school must be approved in the same way. Approval of an interschool transfer is usually contingent on satisfactory performance in the original school. The policy concerning interschool transfer may be found at [www.registrar.northwestern.edu/student\\_info/transfer.html](http://www.registrar.northwestern.edu/student_info/transfer.html). Consult the academic calendar at [www.registrar.northwestern.edu/calendar](http://www.registrar.northwestern.edu/calendar) for appropriate dates to process an application for interschool transfer.

### Cancellation of Registration

Students who complete advance registration for a quarter and later decide not to attend classes that quarter must notify the Office of the Registrar in writing before the first day of classes of the quarter to avoid being charged the applicable tuition and fees.

### Withdrawal from the University

Students who wish to withdraw from the University after registering for classes in any quarter must file a withdrawal form (available at the Office of the Registrar). The withdrawal takes effect the day the completed form, bearing the required signatures, is received at the Office of the Registrar. Students who have taken the final exam may not withdraw and must take the grade they earned. (See also Withdrawal from the University: Refunds under Financial Regulations.)

### Readmission to the University

Undergraduate and graduate students who have not registered for one or more quarters of an academic year must file at the Office of the Registrar an application to reenter no later than six weeks before the first day of registration of the quarter in which they plan to return.

Students are not required to file the application to reenter if they

- have registered during the spring quarter and intend to return in the fall
- have registered in the spring quarter and intend to return during Summer Session of the same year
- are students in the Graduate School who have attended the preceding Summer Session and intend to register during the next Summer Session and have not registered during the academic year

Students must obtain advance approval from the dean of their school if they wish to transfer credit for work taken elsewhere during an absence from Northwestern. An official signed and sealed transcript of that work must be furnished to the Office of the Registrar before the end of the next quarter in residence at Northwestern, or credit for such work is not allowed.



If a student interrupts a program of study for an extended period of time and if degree requirements are changed during this period, the new requirements normally must be met. Any modification of the requirements is made by the appropriate administrative officers of the school in which the student is registered.

### Work at Other Institutions

After enrolling at Northwestern, students who want to study at other accredited institutions and transfer credit for that work to Northwestern must obtain advance approval of their proposed study. Forms for obtaining such approval are available at [www.registrar.northwestern.edu/student\\_info/coll\\_credit.html](http://www.registrar.northwestern.edu/student_info/coll_credit.html). The McCormick School Academic Services Office also has forms available for engineering students, and the Medill Office of Student Life has forms available for journalism students. Students in Weinberg College should secure the appropriate Weinberg College forms (and a copy of the regulations governing study away from Northwestern) in the Weinberg College Office of Undergraduate Studies and Advising. Students also should check the regulations for the Undergraduate Residence Requirement.

If courses are taken elsewhere during an absence from Northwestern (or during the summer), an official transcript of the work must be on file in the Office of the Registrar before the end of the next quarter in residence at Northwestern, or credit for such work is not allowed.

Students may not register concurrently at Northwestern and at another institution and receive transfer credit for work taken at the other institution unless permission is granted in advance by the office of the dean of their school. This applies to evening courses as well as to regular courses in residence.

### Application for a Degree

Undergraduates must file a degree application one calendar year before anticipated graduation. Students in Weinberg College, the Schools of Communication and Education and Social Policy, the Medill School of Journalism, and the Bienen School of Music must file their applications with the Office of the Registrar. McCormick School students must file with that school's Academic Services Office.

### Academic Advising

Academic advising is an essential component of an undergraduate education. All freshmen are assigned an academic adviser through their school. Upperclass students may obtain academic advice through their major department, from the dean's office of their school, and — for issues that transcend school boundaries — through the University-wide Academic Advising Center. For specialized academic advice — such as study abroad or field studies opportunities — consult the appropriate sources listed in the index.

### Classification of Students

Students are classified as follows:

- senior: has completed at least 33 quarter-courses
- junior: has completed at least 22 but less than 33 quarter-courses (engineering co-op students are considered pre-seniors when they have completed 32 quarter-courses and seniors when they have completed 40 quarter-courses)
- sophomore: has completed at least 11 but less than 22 quarter-courses
- freshman: has completed less than 11 quarter-courses
- graduate student: has a bachelor's degree or equivalent and has been admitted to a graduate program
- special student: is not working toward a degree at Northwestern but is working for credit
- auditor: attends classes and listens to lectures but is not eligible to participate in class discussions or exercises and does not receive credit (not available to degree-seeking students)

For loan deferment and enrollment verification purposes, student status is defined as follows:

- full-time: enrolled in at least three quarter-courses or the equivalent
- half-time: enrolled in at least two but fewer than three quarter-courses or the equivalent
- part-time: enrolled in fewer than two quarter-courses or the equivalent (also referred to as less than half-time)

### Grading Policies

The following grading system is used in computing the grade point average:

<i>Grade</i>	<i>Grade Points</i>
A	4.0
A–	3.7
B+	3.3
B	3.0
B–	2.7
C+	2.3
C	2.0
C–	1.7
D	1.0
F	0
X Failed to earn credit: missed final examination	0
Y Failed to earn credit: work incomplete	0

The following notations are ignored in computing the grade point average:

- P Pass with credit
- N No grade, no credit
- K In progress
- S Satisfactory: noncredit course
- U Unsatisfactory: noncredit course
- W Withdrawn by permission

At the end of a quarter a grade of X or Y will be given only if the instructor believes the student has a reasonable chance of passing the course by taking an examination or turning in the required work, or both. Some undergraduate schools prohibit the posting of X or Y grades without the approval of the dean's office. Students should contact their school for its regulations concerning X and Y grades.

If a grade of X or Y is to be changed and credit established, the deficiencies must be made up before the end of the next quarter in which the student is in residence in any school of Northwestern, or credit is forfeited. A notation of K must be resolved before graduation. An unresolved K will be changed to Y and the grade point average recomputed.

Northwestern University does not rank its students.

### **Class Attendance and Absence**

Students are expected to attend all sessions of the courses for which they are registered. Excessive absence is cause for failure in the course. Some courses require attendance at the first class meeting; students may be dropped for nonattendance (see the online class schedule at [www.northwestern.edu/caesar](http://www.northwestern.edu/caesar)).

### **Grade Reports**

Quarterly grades are not mailed but are delivered through CAESAR ([www.northwestern.edu/caesar](http://www.northwestern.edu/caesar)). A printout of the CAESAR record may be made for verification purposes. Notices of deficiencies in scholarship may be reported to the student before the end of the quarter, but the University does not assume the responsibility of issuing such warnings.

### **Transcripts**

Students who have satisfied all financial obligations to the University are entitled to an official transcript of their academic record, which they may order from the Office of the Registrar. A fee is charged for all transcripts (see Service Fees under Tuition and Fees).

Except for internal educational uses or as otherwise required by law, Northwestern issues official transcripts only upon written authorization of the student concerned. Because of the confidential nature of a student's record, telephone or e-mail requests for transcripts will not be accepted. Written requests should be submitted to the Office of the Registrar.

Requests for transcripts initiated by persons or agencies other than the student or appropriate educational agencies will not be filled until written authorization has been secured from the student. When these requests can be anticipated, students can avoid delay by providing such authorization in advance. Complete information about obtaining an official transcript may be found at [www.registrar.northwestern.edu/transcripts/index.html](http://www.registrar.northwestern.edu/transcripts/index.html).

Current students can print unofficial copies of their transcripts by accessing their student records on CAESAR.

Former students who no longer have access to CAESAR should follow the procedures at [www.registrar.northwestern.edu/transcripts/index.html](http://www.registrar.northwestern.edu/transcripts/index.html).

Northwestern University does not release or certify copies of transcripts received from other schools or institutions. Students needing official transcripts from study abroad experiences must request such transcripts from the institution or program attended.

### **Access to Student Records**

Under the Family Educational Rights and Privacy Act (FERPA), all students have certain rights with regard to their educational records. A copy of Northwestern's student records policy is available at [www.registrar.northwestern.edu/ferpa](http://www.registrar.northwestern.edu/ferpa).

FERPA grants students various rights, including the rights to

- inspect and review their educational records at Northwestern University
- request an amendment of their records to ensure that the records are not inaccurate, misleading, or otherwise in violation of privacy or other rights
- consent to release or to restrict disclosure of personally identifiable information contained in their educational records, except under certain limited circumstances when, by law, consent is not required
- file a complaint with the U.S. Department of Education concerning alleged failures by Northwestern University to comply with FERPA requirements

### **The University's Use of E-mail**

E-mail is the University's mechanism for official communication with students, and Northwestern has the right to expect that students will read official e-mail in a timely fashion.

All students are assigned a [u.northwestern.edu](mailto:u.northwestern.edu) address that is maintained in the University e-mail directory. Northwestern provides a convenient mechanism for students who want to forward e-mail from the University address to another e-mail address of their choice, but students assume the risk of forwarding e-mail. Failure to receive or read University communication that was sent to the [northwestern.edu](mailto:u.northwestern.edu) address does not absolve a student from knowing and complying with the content of the communication.

Faculty may use e-mail for communicating with students registered in their classes so that all students will be able to comply with course requirements.

### **Academic Integrity**

Academic integrity at Northwestern is based on a respect for individual achievement that lies at the heart of academic culture. Every faculty member and student, both graduate and undergraduate, belongs to a community of scholars in which academic integrity is a fundamental commitment.

Students enrolled at Northwestern are expected to adhere to the University's standards of academic integrity. Questions about the acceptability of specific behavior should be addressed to the appropriate faculty member or school dean. The following is a nonexhaustive list of types of behavior that violate the standards of academic integrity:

- *cheating*: using unauthorized notes, study aids, or information on an examination; altering a graded work after it has been returned, then submitting the work for regrading; allowing another person to do one's work and submitting that work under one's own name; submitting identical or similar papers for credit in more than one course without prior permission from the course instructors
- *plagiarism*: submitting material that in part or whole is not entirely one's own work without attributing those same portions to their correct source (material discussing the use and acknowledgment of sources is available in the Office of the Provost)
- *fabrication*: falsifying or inventing any information, data, or citation; presenting data that were not gathered in accordance with standard guidelines defining the appropriate methods for collecting or generating data and failing to include an accurate account of the method by which the data were gathered or collected
- *obtaining an unfair advantage*: stealing, reproducing, circulating, or otherwise gaining access to examination materials prior to the time authorized by the instructor; stealing, destroying, defacing, or concealing library materials with the purpose of depriving others of their use; unauthorized collaborating on an academic assignment; retaining, possessing, using, or circulating previously given examination materials, where those materials clearly indicate that they are to be returned to the instructor at the conclusion of the examination; intentionally obstructing or interfering with another student's academic work; otherwise undertaking activity with the purpose of creating or obtaining an unfair academic advantage over other students' academic work
- *aiding and abetting dishonesty*: providing material, information, or other assistance to another person with knowledge that such aid could be used in any of the violations stated above; providing false information in connection with any inquiry regarding academic integrity
- *falsification of records and official documents*: altering documents affecting academic records; forging signatures of authorization or falsifying information on an official academic document, grade report, letter of permission, petition, ID card, or any other official University document
- *unauthorized access to computerized academic or administrative records or systems*: viewing or altering computer records; modifying computer programs or systems; releasing or dispensing information gained via unauthorized access; interfering with the use or availability of computer systems or information

It is the responsibility of every member of the academic community to be familiar with the specific policies of his or her school. A student who violates these policies may be subject to sanctions, including but not limited to one or more of the following: a letter of warning; a defined period of probation with the attachment of conditions; a period of suspension with or without the attachment of conditions; course failure; notation on the official record; exclusion from the University, with notation on the transcript; or revocation of an awarded degree. A student may not change his or her registration in a course in which a violation of academic integrity has been alleged, regardless of whether the allegation has been referred to the designated school official. Nor may a student receive a University degree while a finding is pending or while a suspension has been imposed pursuant to a finding. Information on procedures that will be followed in cases of alleged dishonesty can be obtained from the dean's office of each school. A complete statement of the University's principles regarding academic integrity can be obtained from the Office of the Provost.

The student-faculty Undergraduate Academic Conduct Committee works to maintain a high level of academic integrity at Northwestern; on the request of the provost, that committee also hears appeals from students of school decisions concerning academic dishonesty. Such appeals must be in writing and include a detailed statement setting forth the grounds for the appeal. Appeals to the provost are limited to alleged errors in procedures, interpretation of regulations, or the question of whether a finding or sanction appears manifestly contrary to the evidence. The provost will receive appeals only after a sanction has been specified for the alleged violation and the appropriate appeal process at the school level has been exhausted; an appeal to the provost may concern the finding and/or the proposed sanction.

## Regular Examinations

Regular course examinations are held during the last week of each quarter at the times indicated in the quarterly class schedule and online at [www.registrar.northwestern.edu/registration](http://www.registrar.northwestern.edu/registration). Summer Session examinations are usually held at the last class meeting. Students are responsible for knowing the time and location of each examination. Early examinations are not permitted. Permission to be absent from the final examination is given by the instructor and the dean only for cause beyond the student's control. Normally such permission must be secured in advance of the date of the examination. Any deficiency must be made up before the end of the next quarter in which the student is in residence in any school of Northwestern, or credit is forfeited. In no case may such a grade be made up after a lapse of one year.

## Makeup Examinations

All undergraduate students in residence in any school of Northwestern University must make up grades of X

(absent) and Y (incomplete) before the end of the next quarter, or credit is forfeited. Students not in residence may apply for a makeup examination. All such grades, however, must be made up within one year after the course was taken, or credit is forfeited. Permission to take a makeup examination to remove a grade of X must have the written approval of the instructor and the dean. Makeup examinations are conducted by the departments concerned early in each quarter. An application for a makeup examination must be filed several weeks in advance at the office of the school in which the course is offered. (See the academic calendar at [www.registrar.northwestern.edu/calendar](http://www.registrar.northwestern.edu/calendar) for exact dates the applications are due.)

### Academic Standing

The decision concerning the academic standing of a student is the responsibility of the faculty of the school in which the student is registered.

Academic probation constitutes notice of unsatisfactory academic performance; it is a warning that minimum standards for graduation are not being met. Unless a student demonstrates significant scholastic improvement during the period of probation and thereby indicates ability to fulfill degree requirements within a reasonable period of time, the student may be dismissed from the University. A student will be notified in writing no later than the middle of a term that, because of unsatisfactory work in a previous term or terms, he or she will be excluded in the event of unsatisfactory work during the term for which the notice is issued.

### Academic Probation

The following are ordinarily placed on academic probation:

- students who have received final grades below C in two or more courses in any quarter or Summer Session
- sophomores, juniors, or seniors who have a cumulative academic record below a C average on all work attempted at Northwestern University
- students who have failed to complete at least three quarter-courses or the equivalent in each of two consecutive quarters
- students who, on account of dropped courses, failure, or uncompleted courses, have failed to earn credit for an average of three quarter-courses per quarter after 6 quarters of residence
- students who have failed to maintain a C average in the major or a professional field of study

The faculty of each school may impose such additional conditions of academic probation as they may deem appropriate.

### Removal from Academic Probation

Students on academic probation are ordinarily removed from probation if the deficiencies that resulted in probation have been remedied during the next succeeding quarter in

residence. Students are rarely removed from probation on the basis of a program consisting of less than four courses graded on a basis other than the pass/no credit option.

If students on probation who receive grades of X or Y are not dismissed, probation continues until they have completed all courses or until the end of the next quarter in residence, when the students' records are again subject to scrutiny.

In no case are students removed from probation at the end of a quarter in which they have failed any course.

### Academic Dismissal

The following is a partial list of categories of students who may be dismissed for academic deficiencies (in every case the decision is determined in part by the student's cumulative academic record):

- students on academic probation whose academic records have not improved significantly during the period of probation (which will not normally exceed two consecutive quarters)
- students not on academic probation who fail in half the work in any quarter or Summer Session
- students who demonstrate flagrant neglect of academic work at any time
- students who do not make satisfactory progress toward completion of degree requirements

As a matter of general policy, the probation period for a freshman may be extended to the third quarter of residence if such extension appears to be in the best interests of the student and the University. Such consideration is not granted to a freshman whose record clearly discloses lack of aptitude or flagrant neglect of work.

### Disciplinary Dismissal

Students suspended from Northwestern by the University Hearing and Appeals Board or the Sexual Assault Hearing and Appeals System may not receive Northwestern credit for academic work at any other institution during the period of suspension.

## HONORS AND PRIZES

### Academic Honors

Degrees with honors are awarded to the top 16 percent of the graduating class of each undergraduate school, as determined by grades in all work at Northwestern University. Students in the highest 3 percent of the class are awarded degrees *summa cum laude*; those in the next 5 percent, *magna cum laude*; and those in the next 8 percent, *cum laude*. Graduation honors are not announced before Commencement.

Departmental honors may be granted to graduating seniors who have done outstanding work in a department in connection with a research project or work of an integrative nature. Students are nominated for these honors

by their departments. The faculty of the school concerned makes the final awards.

### Prizes

Prizes established through gifts and endowments are awarded to undergraduate students at Northwestern. Some are all-University prizes, and others are available only to students registered in the school, department, or program that administers the awards.

### Honorary Organizations

Students who qualify by reason of superior scholarship or outstanding achievement are eligible for membership in certain honorary societies. New members of the following organizations are announced in the annual Commencement program:

- Arts and Sciences: Phi Beta Kappa
- Communication: Lambda Phi Eta
- Continuing Studies: Alpha Sigma Lambda
- Engineering: Eta Kappa Nu, Kappa Theta Epsilon, Omega Chi Epsilon, Tau Beta Pi
- Journalism: Kappa Tau Alpha

Other honorary organizations in various fields include Alpha Kappa Delta, Alpha Lambda Delta, Deru, Mortar Board, Norleggama, Orchesis, Phi Delta Kappa, Phi Eta Sigma, Pi Mu Epsilon, Sextant, and Shi-Ai.

## ACADEMIC OPTIONS

For more information about the following programs, see the relevant school sections of this catalog.

### Accelerated Degree Programs

#### *Honors Program in Medical Education*

The Honors Program in Medical Education (HPME) provides an opportunity for highly talented high school seniors to be admitted to an undergraduate program and to the Feinberg School of Medicine and to complete their formal premedical and medical studies in seven or eight years. Applicants should be able to qualify for advanced placement in chemistry and mathematics. Each year a small number of students are admitted to the program and to Weinberg College, the School of Communication, or the McCormick School. Only candidates applying directly from high school are considered.

The first three or four years of the program are spent in undergraduate programs, during which students must complete 36 courses that meet HPME requirements and satisfy an Undergraduate Residence Requirement of 9 full-time quarters. Only courses taken at Northwestern or on an approved study abroad program may be used to satisfy this enrollment policy.

During the years in Weinberg College, students take required courses in chemistry, physics, and the biological sciences. In addition, they take elective courses in the humanities, social sciences, and arts.

The third year is usually devoted to completing the requirements for a BA degree in Weinberg College by doing advanced course work in the major and/or studying abroad in a Northwestern-affiliated program. Students may also take an additional undergraduate year at Northwestern.

Students in the McCormick School spend three or four years pursuing an in-depth education in mathematics, the sciences, and engineering while taking core courses in biomedical engineering. To supplement their technical courses, students also take courses in the humanities and the social sciences.

School of Communication students spend three or four years in communication sciences and disorders, studying the anatomy and physiology of hearing, speech, and the central nervous system as it relates to cognition and memory. They have opportunities to learn how people of all ages hear, speak, and learn — both normally and in the presence of disabling conditions. They also take courses in chemistry, physics, the biological sciences, the social sciences, and the humanities.

After completing the first three or four years, HPME students move to the Chicago campus as members of the first-year Feinberg School of Medicine class, which includes students who have completed the traditional four years of premedical education. After successfully completing their first year at the Feinberg School, Weinberg College students who have not received a BA degree qualify for a bachelor of science in medicine, and School of Communication students qualify for a bachelor of science in communication. After the second year of medical school, McCormick School students qualify for a bachelor of science in medical engineering. At the end of seven or eight years, HPME students qualify for the doctor of medicine degree from the Feinberg School.

Students who wish to be considered candidates for the HPME must indicate their interest by completing the HPME form included in the undergraduate application before December 1, reporting their test scores, and requesting an HPME application. If the request is approved, the student must complete the special HPME application, in addition to the regular Application for Admission to Weinberg College, the School of Communication, or the McCormick School, by the appropriate deadlines (see the Application and Testing Deadlines table on page 18).

#### *Integrated Science Program*

Northwestern University offers a highly selective undergraduate program of integrated science studies within Weinberg College. The Integrated Science Program (ISP) is designed for students with superior high school records and strong motivation in science and mathematics. Its special curriculum provides a thorough and rigorous background in the major scientific disciplines and mathematics and offers special research opportunities. ISP can lead to a bachelor's degree in three years or, after a fourth year at



Northwestern, to a double major or an advanced degree. Graduates of the program are well prepared for professional and graduate study leading to careers in science, medicine, and business.

Enrollment in ISP is limited to ensure small class sizes. Selection is made on the basis of scholastic record, test scores, and recommendations. Background requirements are a year of calculus, a year of chemistry, and a year of physics. To be considered for ISP at the time of their admission to Northwestern, students request the special ISP application and brochure in addition to the regular application from the Office of Undergraduate Admission (see Integrated Science Program in the Weinberg College section of this catalog).

### *Accelerated Master's Programs*

Combined bachelor's/master's degree programs enable exceptional undergraduates in Weinberg College and the McCormick School to receive both degrees in less than the usual time. The programs are highly demanding intellectually and require early commitment to a discipline and careful planning.

In the McCormick School, a BS/MS program in engineering allows advanced students who are able to complete the BS requirements early (usually through Advanced Placement/International Baccalaureate or transfer credit) to accelerate study toward a master's degree. See Concurrent BS/MS in the McCormick School section of this catalog.

In Weinberg College, students receive permission to double-count some courses toward both bachelor's and master's degrees so that both degrees can be completed in four years. Students should consult with the relevant departments for details.

The following departments and programs in Weinberg College have combined degree programs approved by the Graduate School:

- chemistry
- earth and planetary sciences
- economics
- French
- linguistics
- sociology
- statistics

The approved departmental programs vary, but they share a common goal: the selection and training of exceptional students. The programs also share several underlying premises. First, each department invites students to participate in the program. Students do not select themselves, though they may, of course, inquire about their eligibility. Second, selection by a department is a recommendation to the Graduate School for admission. Students are officially admitted to the Graduate School only after their credentials have been thoroughly reviewed and approved by the dean of the Graduate School.

For these reasons, students should be aware of guidelines used by the dean of the Graduate School and other guidelines affecting the operation of the program:

- No particular grade point average, however high, automatically entitles a student to participate in a combined degree program.
- Only one academic year — three quarters or two semesters or less — of transfer credit from another institution may be applied as credit toward the bachelor's portion of the combined degree, including credit for a junior year abroad. Any participating department may impose a more restrictive standard if it desires.
- A combined degree program requires a minimum of 12 full quarters of work. The master's portion must be completed during the final three contiguous quarters of registration, beginning with the fall quarter. In schools or departments of the University that operate on a four-quarter system, that is, that offer a full program during Summer Session staffed by the regular faculty, one Summer Session only may be counted toward fulfillment of the 12-quarter requirement. In schools of the University that do not operate on a four-quarter system, cases of one summer of credit will be considered on an ad hoc basis by petitioning the dean of the Graduate School.
- All requirements, both undergraduate and graduate, must be met by the conclusion of the fourth academic year. The bachelor's and master's degrees are awarded simultaneously.
- Both degrees will appear on a single transcript, as will the results of all work completed for both degrees.
- Continuation of graduate work at Northwestern by those who complete a combined degree program must receive separate approval by the department and the dean of the Graduate School.

### *Accelerated Master's Program in Journalism*

Students who exhibit exceptional ability in undergraduate work in the Medill School of Journalism may apply to that school's graduate division for early admission to the graduate editorial program. This program allows students to qualify for bachelor of science in journalism and master of science in journalism degrees in 12 to 15 quarters of full-time study. Students apply for this program during their junior year; however, interested students are encouraged to begin planning for this option early in their undergraduate careers. Information and admissions materials are available from the Medill Office of Graduate Admissions and Financial Aid (see Accelerated Master's Program in the Medill School section of this catalog).

## **Combined Bachelor's Programs**

### *Combined Liberal Arts and Engineering Program*

Qualified students may undertake a program to earn both a bachelor of arts in a liberal arts discipline from Weinberg College and a bachelor of science in an engineering field

from the McCormick School. Students in this BA/BS program, which takes five years, must complete all requirements of both schools as well as the Undergraduate Residence Requirement. To do the necessary planning, interested students should consult with the Weinberg Office of Undergraduate Studies and Advising and the McCormick undergraduate engineering dean's office as soon as possible after enrolling at Northwestern (see Five-Year BA/BS in the McCormick School section of this catalog).

#### *Combined Liberal Arts and Music Program*

Students accepted into the combined Weinberg College–Bienen School of Music program may simultaneously earn a bachelor of arts degree from Weinberg College and a bachelor of music degree from the Bienen School. They must complete all Weinberg College degree requirements, including at least 30 Weinberg College courses, as well as all Bienen School degree requirements, including at least 30 music courses. Fulfilling both Bienen School and Weinberg College requirements takes five years of full-time study, and an Undergraduate Residence Requirement of 15 quarters is obligatory (see Undergraduate Education section of this catalog).

Participants in this combined program must be accepted by both the Bienen School and Weinberg College. Interested students should consult with the associate dean for undergraduate studies in Weinberg College and the assistant dean for admission and student affairs in the Bienen School.

#### *Combined Music and Engineering Program*

Students accepted into the combined McCormick School–Bienen School of Music program may simultaneously earn a bachelor of science degree from the McCormick School and a bachelor of music or bachelor of arts in music degree from the Bienen School. They must complete all McCormick School degree requirements, including at least 36 McCormick courses, as well as all music school degree requirements, including at least 30 music courses. Fulfilling both music and engineering requirements usually takes five years of full-time study, and an Undergraduate Residence Requirement of 15 quarters is obligatory (see Undergraduate Education).

Participants in this combined program must be accepted by both the McCormick School and the Bienen School. Interested students should consult with the undergraduate engineering dean's office in the McCormick School and the assistant dean for admission and student affairs in the Bienen School.

#### *Combined Music and Journalism Program*

Northwestern offers extremely talented students the opportunity to earn in five years both a BSJ from the Medill School of Journalism and a BMus or BAMus degree

from the Bienen School of Music. The joint program is intended to prepare exceptional students for journalism careers emphasizing music and arts reporting. Prospective students typically apply to this joint program while applying for undergraduate admission to Northwestern.

#### **Interdisciplinary Study**

##### *Mathematical Methods in the Social Sciences Program*

The Program in Mathematical Methods in the Social Sciences (MMSS) in Weinberg College enables students to combine the study of social sciences with training in formal analytical methods. The program is intended for students with high mathematical aptitude and strong interest in social problems and issues, including policy and research implications.

Admission to the MMSS is very selective; it is limited to entering freshmen and students beginning their sophomore year who have earned superior academic records and demonstrated strong aptitude in mathematics. Prerequisite for admission consideration is a full-year course in calculus. (See Mathematical Methods in the Social Sciences in the Weinberg College section of this catalog.)

##### *Integrated Science Program*

See Accelerated Degree Programs.

#### *Cross-School Programs*

Students in any undergraduate school may enroll in the Undergraduate Leadership Program and the Service Learning Certificate Program. All undergraduates may enroll in the International Studies and Legal Studies Programs as adjunct majors. All undergraduates may apply for admission to the Certificate Program in Financial Economics and the Certificate Program in Managerial Analytics. The Music Theatre Program is open by audition to Bienen School of Music voice majors and School of Communication theater majors.

Undergraduates in any school may earn an adjunct major in animate arts or a minor in transportation and logistics. Majors in the School of Communication and the Bienen School may earn a certificate in sound design; majors in Weinberg College may earn a minor in sound design.

Undergraduates in schools other than Weinberg College may enroll in that college's major and minor programs.

#### *Center for the Writing Arts*

Northwestern's Center for the Writing Arts sponsors a number of programs as well as courses designed to highlight the University's commitment to excellence in writing. Several of the courses are taught by visiting professional writers. (See the Cross-School Programs section of this catalog.)

## McCormick School Honors Programs

### *Honors Program in Undergraduate Research*

The Honors Program in Undergraduate Research in the McCormick School provides an unusual opportunity for prospective freshmen with superior motivation and scholastic credentials to be admitted to work with an engineering faculty mentor/adviser in a challenging research project beginning in the first year and continuing throughout the undergraduate years.

Students may request the names and current research interests of participating faculty, enabling them to apply to a project of their choice. With the participation of a faculty sponsor, students will be selected for the program based on their high school records; SAT Reasoning Test or ACT, SAT Subject Tests, and Advanced Placement test scores; and, usually, an interview. Interested students may request an application and additional information from the undergraduate engineering dean's office in the McCormick School. (See Honors Program in Undergraduate Research in the McCormick School section of this catalog.)

### *Honors Program in Engineering and Journalism*

The Honors Program in Engineering and Journalism is intended to prepare exceptional students for journalism careers emphasizing engineering, science, and technology. This joint program with the Medill School of Journalism involves completing a BS in engineering and an MS in journalism. Some journalism courses are required at the undergraduate level before students enter the graduate program. Prospective students apply for this joint program while applying for undergraduate admission to Northwestern. (See Honors Program in Engineering and Journalism in the McCormick section of this catalog.)

## Weinberg College Honors Programs

The Honors Program in Medical Education, the Integrated Science Program, and the Program in Mathematical Methods in the Social Sciences are described above.

Several Weinberg College majors, e.g., American studies and the English major in writing, are special-admission majors. See the Weinberg College section of this catalog for full descriptions of Weinberg honors opportunities.

## Formal Options

### *Pass/No Credit (P/N)*

The P (pass) or N (no credit) option allows full-time students to explore fields beyond the areas of their specialization without concern about grade point average. Many undergraduate courses are open to the P/N option. For information about a particular school's P/N policy, see that school's section in this catalog.

### *Student-Organized Seminars (SOS)*

Students who wish to pursue studies not included in the catalog can plan and initiate their own courses under the supervision of sponsoring faculty members. SOS credit courses may be developed in all undergraduate schools except the Medill School of Journalism.

### *Residential College Tutorials*

With the sponsorship and participation of a faculty member, students in a Residential College may organize a course on a topic of special interest. Proposals must be approved by the dean's office of the appropriate school, and enrollment is normally limited to up to 10 members of the Residential College.

### *Independent Study (399)*

Many departments offer undergraduate seminars and independent studies for qualified students. A 399 course in any department enables a student to engage in individual special study and research, which may involve work in a laboratory or library, fieldwork outside the University, or the creation of a work of art. The maximum credit a student may receive for 399 (or equivalent independent study) during any one quarter is two units.

### *Double Major*

A double major is available to all students who complete the full major program in two departments.

### *Self-Designed Major*

A self-designed major permits students, with the permission of the school's curriculum committee or dean, to concentrate advanced study in an area other than one of those recognized through a departmental or interdisciplinary major. This option is identified as an ad hoc major in Weinberg College, the interdepartmental studies major in the School of Communication, and the Combined Studies Program in the McCormick School.

### *Departmental Honors Programs*

Departmental honors programs are available to students through most departments of Weinberg College, most departments in the School of Communication, and all departments of the McCormick School and the School of Education and Social Policy. They involve advanced study through special undergraduate seminars or graduate courses and/or independent work under faculty supervision.

## Teaching Certification

Weinberg College students also may complete the requirements of the secondary teaching program and qualify for Illinois state certification. (See Teacher Certification at Northwestern in the School of Education and Social Policy section.)



## Study Abroad

Northwestern encourages qualified students to study abroad when such study promises to enrich their academic programs. With early planning, most students, regardless of school or major, should be able to study abroad during the academic year and still graduate within four years.

Students may also study abroad during the summer in one of Northwestern's summer programs or on an approved outside program.

The Study Abroad Office provides information and advising services to all students interested in study abroad. Approval from the University Study Abroad Committee and the Study Abroad Office is required before the study abroad experience. Students must submit a study abroad application, including signatures from school advisers and, in many cases, department advisers, to the Study Abroad Office. All students approved by Northwestern to study abroad remain registered at Northwestern while abroad.

Most Northwestern students studying abroad do so on one of more than 100 programs administered by or affiliated with the University. Students participating in University exchange programs continue to pay Northwestern tuition. For all other programs, students pay the program fee plus a Northwestern administrative fee. Students participating in affiliated programs may apply for financial aid, including Northwestern grant assistance, to help offset the cost of their programs.

Students who wish to participate in unaffiliated programs must petition to have their programs preapproved by the Study Abroad Office. No financial aid is available from the University for students in unaffiliated programs, and Northwestern cannot process their outside aid.

Since study abroad often requires special language or other preparation, interested students should consult with the Study Abroad Office early in their Northwestern careers. The office hosts regular information sessions and has an extensive resource library with detailed information on affiliated programs and study abroad policies. For more information please see its web site at [www.northwestern.edu/studyabroad](http://www.northwestern.edu/studyabroad).

Projects entailing international research travel are eligible for additional funds. Each spring the Office of the Provost organizes an Undergraduate Research Symposium to showcase student research and creative projects funded through the program.

## Northwestern Immersion Experience Program

Open to all Northwestern undergraduates, the Northwestern Immersion Experience allows students to focus intensively on one project for one quarter or longer. Limited only by the student's interests and imagination, the project may be pursued on campus or off, in the United States or abroad. As part of the program, the Office of the Provost offers language grants of \$2,000 each to fund intensive summer language study at approved centers around the country and the world.

## Undergraduate Research Grants Program

Northwestern promotes independent undergraduate research for academic and creative projects in all fields and disciplines through the Undergraduate Research Grants Program. Coordinated and administered by the Office of the Provost, the program offers three types of support for which any undergraduate student in any discipline may apply: academic-year grants of up to \$1,000 to fund quarterlong research projects; summer grants of \$3,000 to cover research and living expenses for full-time (eight-week) summer projects; and conference travel grants of up to \$500 for the development and presentation of creative productions or research findings at an academic meeting.

## Undergraduate Schools and Courses

### KEY TO COURSE NUMBERS

Although the course numbers in this catalog are as complete and exact as is possible at the time of printing, some changes may occur later, and courses may be dropped or added. The class schedule is issued for each quarter at [www.northwestern.edu/caesar](http://www.northwestern.edu/caesar) and contains a complete and updated listing of classes for that quarter. The University reserves the right to cancel classes for which registration is not sufficient.

### Course Credits and Quarters

Daytime work in all the schools on the Evanston campus is on the quarter system. A quarter-course, the unit of instruction, is the work done in a class meeting at least three hours per week and carries the value of one unit of credit. Exceptions are courses meeting less than three hours per week, which may carry less than one unit, and 15-week courses, which carry 1.5 units. A quarter-course is the equivalent of  $2\frac{2}{3}$  semester hours. (For transfer to other institutions or for certification stated in credit hours, undergraduates may consider a quarter-course equivalent to four quarter hours of credit.)

### Numbering System

Three sets of characters denote all courses:

- The first set is the subject code indicating the area of study.
- The second set is a three-digit course number:
  - 100-level* courses are primarily for freshmen and sophomores, usually without college prerequisite.
  - 200-level* courses are primarily for freshmen, sophomores, and juniors, sometimes with the prerequisite of a 100-level course in the same or a related department.
  - 300-level* courses are primarily for upperclass students, with the prerequisite of junior standing or a 100- or 200-level course in the same or a related department.
  - 400-level* courses or seminars, in which the major part of the work is not research, are primarily for graduate students; they may be open to advanced undergraduate students with permission.
  - 500-level* courses or seminars are graduate courses in which the work is primarily research.
- The third set (one, two, or more numbers) usually indicates whether the course is part of a sequence.
  - 0 = one-quarter course
  - 1,2 = two-quarter sequence
  - 1,2,3 = three-quarter sequence

Special characters may identify certain groups of courses. See departmental listings for details.

If a course carries less or more than one unit of credit, the number of units follows the course title in parentheses — e.g., (1.5) or (1.5 units) = 1.5 units of credit.

## Cross-School Programs

Each of Northwestern's six undergraduate schools has its own unique curriculum. In most of the schools, many majors and minors are open to all students, regardless of what school they are enrolled in. Several of the schools also have field studies opportunities open to all students. In addition, all six schools, as well as the graduate and professional schools and departments and programs within the schools, are continually developing new programs that build pedagogical and intellectual bridges between disciplines and across schools to create interdisciplinary opportunities for undergraduates.

Northwestern currently offers five kinds of cross-school programs:

- Interschool majors or minors
- Interschool certificates
- A center offering undergraduate courses
- Military programs
- Field study

## INTERSCHOOL MAJORS OR MINORS

### Animate Arts

Open to all Northwestern undergraduates, the adjunct major in animate arts provides an interdisciplinary approach to studying and creating new digital media. Its curriculum tightly integrates education in the arts and in technology, particularly computer programming. The program's flagship 4-unit course sequence in computer-based art and new media introduces students to 2-D and 3-D design and visual literacy, acoustic theory, sound processing, and narrative theory, as well as computer science and cognitive science. A primary focus of this sequence is to provide students with multiple opportunities to actively integrate various art forms with technology in developing creative projects. Pieces are critiqued both as works of art and as engineering. The interaction between art practice and art theory is addressed through discussions, critiques, and readings, examining issues in the interpretation, understanding, and production of art and visual culture.

The goal of this major is to create a community of creative thinkers and makers that transcends cultural barriers between and among disciplines.

For courses taken for the adjunct major,

- No course may be taken P/N
- A grade of C or above is required in all courses used to fulfill major requirements

- Students may double-count 2 courses toward another or from another major or minor, provided that the rules of that major/minor allow the double-counting.

### *Requirements for the Adjunct Major (10 units)*

- 4 core courses: ANIM ARTS 101, 201, 301, 302
- 2-quarter senior project: ANIM ARTS 396-1,2
- 4 electives chosen from a list published on the animate arts web site every academic year; other courses may be allowed upon petition by the student

### *Courses*

#### **ANIM ARTS 101 Perceptual and Mathematical Spaces**

Emphasis on developing basic seeing, listening, and critiquing skills as well as the fundamentals of software design. Topics include visual design and sound design, functional programming and 2-D graphics, art theory and cultural theory, basic photography, and audio editing.

#### **ANIM ARTS 201 Perception and Programming in Time**

Introduction to the basic principles and practice of time-based media. Topics include narrative theory, rhythm, composition of moving images, film and video editing, imperative programming, and computer game design.

**ANIM ARTS 301 Interaction and Interactivity** Introduction to the design of interactive 2-D and 3-D graphical systems. Topics include dynamical systems theory, animation, sculptural design, and 3-D modeling.

**ANIM ARTS 302 Culture and Connectivity** Seminar course in contemporary issues in culture and new media. Topics include mass culture and the avant-garde, the role of the market in art and media, computer networking protocols and technologies, web development, and C-style programming languages. Emphasis on projects and in-class discussion of readings.

**ANIM ARTS 396-1,2 Senior Design Project** A capstone course in which students develop a large-scale group or individual work over two quarters. Emphasis on outside project work. Class meetings involve group and individual critiques as well as issues in project planning and management. Prerequisite: 302 or consent of instructor.

### **Environmental Science, Engineering, and Policy**

The program in environmental science, engineering, and policy is designed to provide students with an interdisciplinary understanding of the biological, chemical, and physical environment, the relations of humans to the environment, and the impacts of past, current, and

possible future interventions. Although many aspects of environmental problems lie within the purview of the natural sciences and engineering, others are addressed in the social sciences and humanities. Effectively confronting environmental issues requires broad training and collaboration among experts in diverse fields. Environmental science students are prepared to tackle complex environmental problems in a rigorous way and with an appreciation of the related science, engineering, and policy issues. Similarly, environmental engineering involves an understanding of engineering analysis and design combined with an understanding of human use of and effects on the environment. The development and implementation of effective environmental policy require understanding of relevant aspects of human behavior, the natural world, and their interactions.

The program in environmental science, engineering, and policy is coadministered by the Weinberg College of Arts and Sciences and the McCormick School of Engineering and Applied Science. It offers two majors:

- Environmental sciences (see the Weinberg College section of this catalog for a detailed description)
- Environmental engineering (see the McCormick School section of this catalog for a detailed description)

## Transportation and Logistics

The interschool Transportation and Logistics Program offers a minor that is available to all undergraduates.

Passenger and freight transportation represents nearly a fifth of the U.S. gross domestic product and influences every aspect of our lives: where we live, where we work, and the goods we can purchase. The study of transportation and logistics is inherently interdisciplinary, reaching across disciplines, schools, and departments. Northwestern offers relevant courses through the Departments of Civil Engineering and Industrial Engineering and Management Sciences in the McCormick School and the Department of Economics and other social science departments in Weinberg College. This minor offers undergraduates the opportunity to obtain a more rounded education in transportation and logistics than that offered within their selected majors. The curriculum equips students with a broad understanding of the economics, engineering, and operations of transportation and logistics systems and the role of public policy.

The minor is administered by the Transportation Center, an interdisciplinary research center founded in 1954. The center's affiliated faculty are drawn from many of the participating departments. Additional information about the program is available from the Transportation Center.

## Minor in Transportation and Logistics

Students are required to complete 7 courses, of which 1 is a required course. The other 6 courses must include at least 3 core courses, at least 2 of which must be outside the school in which the student is majoring.

Students in the McCormick School may double-count a maximum of 2 courses from their major program toward the minor. Students from other schools are not allowed to double-count courses that are part of their major but may count courses that fulfill related course, distribution, or social science and humanities requirements. It is assumed that students will already have taken courses in calculus and in probability and statistics as part of their major.

### Requirements for Minor in Transportation and Logistics (7 units)

- **Required course:** TRANS 310
- **Core courses:** ECON 310-1, 355; CIV ENG 371, 376, 382; IEMS 310 or 313, 381, 383. No substitutions are allowed for core courses.
- **Elective courses:** TRANS 390; ECON 309, 337, 349, 350, 354, 361, 370, 381-1,2; GEOG 341, 343; HISTORY 322-2; POLI SCI 221, 321, 329; SOCIOL 301, 312; CIV ENG 304, 338, 360; IEMS 315, 317; either IEMS 326 or ECON 360; IEMS 382; 1 unit of approved independent study. Other courses may be considered for credit toward the minor if appropriate to the student's program of study and approved by the program committee. A full list of approved elective courses is available from the program office.

### Courses

#### TRANS 310-0 Seminar in Transportation and Logistics

Yearlong senior seminar on the structure of the transportation and supply-chain industries and evaluation of relevant public policy. Students receive 1 credit in the spring quarter of their senior year.

**TRANS 390-0 Perspectives in Transportation** The industrial structure of transportation and its associated logistics activities. The effects of government regulation, globalization, and other contemporary challenges on carriers and their customers.

**TRANS 399-0 Independent Study** Advanced work chosen by mutual agreement with a faculty member. Only 1 unit may count toward the minor. Consent of faculty required.

## INTERSCHOOL CERTIFICATES

### Financial Economics and Managerial Analytics

The J. L. Kellogg School of Management offers two business-related undergraduate certificate programs in cooperation with Weinberg College and the McCormick School. Both certificate programs consist of 4 courses

taught at an advanced level by Kellogg professors. The programs build on students' existing analytical skills and prepare them for careers in the financial services and consulting industries and/or for continuing their education in doctoral or professional school programs.

Acceptance to the certificate programs is through a competitive application process. To apply, students must be enrolled at Northwestern and must meet rigorous course prerequisite requirements in advanced calculus and linear algebra, intermediate probability and statistics, advanced econometrics, and microeconomics. Each program accepts about 50 students annually. Students may apply at the end of their sophomore or junior year for participation during the following school year. Applications are due at the end of the spring quarter.

In addition to taking the 4 certificate program courses, participating students who start the program during their junior year may spend the summer before their senior year conducting a research project with a Kellogg faculty member or completing an internship at a company. A dedicated career services professional helps certificate students with career planning and preparation and securing a summer internship.

#### *Certificate Program in Financial Economics (4 units)*

This certificate program is offered in cooperation with Weinberg College, although all Northwestern students who meet the prerequisite requirements are eligible to apply; for prerequisites, see [www.kellogg.northwestern.edu/certificate](http://www.kellogg.northwestern.edu/certificate). All financial economics certificate students take the following 4 courses.

**KELLG FE 310 Principles of Finance** Foundation course for the program; taken in the fall. Basic principles of finance, focusing on the effects of time and uncertainty on value. First half emphasizes valuation, including discounted cash flows, equity and debt valuation, the term structure of interest rates, portfolio theory, asset pricing, and efficient market theory. Second half examines firms' financing decisions, including capital budgeting, capital structure, and payout policy.

**KELLG FE 312 Investments** Active portfolio strategies in bonds and stocks, optimal portfolio selection from the perspective of individual and institutional investors, and the role of style and performance benchmarks in portfolio management. Other special topics, including performance evaluation and trading costs.

**KELLG FE 314 Derivatives** Use and pricing of forwards and futures, swaps and options. Strategies for speculation and risk management, no-arbitrage pricing for forward contracts, the binomial and Black-Scholes option pricing models, and applications of pricing models in other contexts.

**KELLG FE 316 Topics in Financial Economics** Examines different topical finance issues each year.

#### *Certificate Program in Managerial Analytics (4 units)*

This certificate program is offered in cooperation with the McCormick School, although all Northwestern students who meet the prerequisite requirements are eligible to apply; for prerequisites, see [www.kellogg.northwestern.edu/certificate](http://www.kellogg.northwestern.edu/certificate). All managerial analytics certificate students take the following 4 courses.

#### **KELLG MA 320 Analytical Decision Modeling on Spreadsheets**

Foundation course for the program; taken in the fall. Structuring, analyzing, and solving business decision problems on Excel spreadsheets and examining problems involving resource-allocation decisions and risk analysis of decisions under uncertainty. Some data analysis and demand forecasting. Topics include analysis of resource-allocation decisions by Solver optimization; risk analysis of decisions involving uncertainty by Monte Carlo simulation; modeling and analysis of sequential decisions by decision trees; data analysis by pivot tables and filters; demand forecasting by time series analysis.

**KELLG FE 310 Principles of Finance** See Certificate Program in Financial Economics.

**KELLG MA 322 Pricing** Comparison of the three main ways to set prices (haggling/negotiation, posted price, and auctions) and how to choose the best method in a given situation. Customizing the price of the same product or service to different segments, using optimization models to set prices when volume is uncertain, as well as pricing multiple products. Introduction to some of the main techniques (regression, conjoint analysis, EVC) for gathering information about buyer valuations and demands.

#### **KELLG MA 324 Operations and Supply Chain Strategy**

Provides framework for determining what key capabilities an operation and a supply chain must develop to support the business strategy of a firm and the relationship between the desired capabilities and the structure of a supply chain. Exposure to methodologies and analysis that support operations and supply chain strategy and planning decisions. Analysis uses case studies and development of analytical spreadsheet models.

#### **Integrated Marketing Communications**

The 5-unit IMC certificate program prepares students for entry-level marketing communications positions in such fields as advertising, public relations, corporate communications, and direct, database, e-commerce, and interactive marketing. The program focuses on effective marketing communications strategies, tactics, and tools in an increasingly consumer-controlled environment. All Northwestern students are eligible to apply to the certificate program, although qualified Medill BSJ students receive priority. See the Medill section of this catalog for a detailed description.

## Music Theatre

The Certificate in Music Theatre provides the opportunity for School of Music students majoring in voice and School of Communication students majoring in theatre to create a second area of specialization that is important to their development as musical theatre artists. For voice majors the program provides training in acting and other theatre courses. Theatre majors have weekly voice classes and exposure to other music offerings.

The prescribed sequence of courses is open only to students accepted into the program through audition. The auditions are held annually in the spring quarter and are limited to freshman and sophomore theatre and voice majors. Auditionees are required to perform a vocal selection and a monologue and to participate in a dance audition.

### *Certificate Requirements for Voice Majors (8 units)*

- THEATRE 243-1,2,3 Acting I: Principles of Characterization (3 units)
- THEATRE 352-1,2 Music Theatre Techniques (2 units)
- THEATRE 367 History of the Lyric Theatre (1 unit)
- Design, dance, or acting elective (1 unit)
- 3 dance classes (.33 unit each; 1 unit total)

It is also recommended that sophomores enroll in THEATRE 272 Special Topics: Music Theatre.

### *Certificate Requirements for Theatre Majors (9 units)*

- VOICE 102 Beginning Voice (1.5 units)
- MUSIC 127 Keyboard Skills (1 unit)
- VOICE 202 Intermediate Voice (1.5 units)
- THEATRE 352-1,2 Music Theatre Techniques (2 units)
- THEATRE 367 History of the Lyric Theatre (1 unit)
- 6 dance classes (.33 unit each; 2 units total)

It is also recommended that sophomores enroll in THEATRE 272 Special Topics: Music Theatre.

## Service Learning

The Service Learning Certificate Program is a two-year, five-academic-quarter program open to all undergraduate students. The program not only allows students to earn credit for their interest in community service but also provides a structured and effective approach for fostering continued civic engagement. The program requires students to complete 5 credits of course work:

- SESP 202 Introduction to Community Development
- COMM ST 395 Topics in Communication Studies or SESP 351 Special Topics: Leadership and Community Decision Making
- 1 additional elective course that reflects the principles of the program
- SESP 299-1 Capstone Research and SESP 299-2 Capstone Project, independent study courses leading to completion of a capstone project

Students are required to perform 100 hours of community service and attend five quarters of biweekly facilitated reflection seminars. The certificate is awarded upon completion of a capstone project that requires both challenging scholarship and relevance to a community organization. For more information and an application, contact the Office of Student Affairs in the School of Education and Social Policy.

## Sound Design

Funded by a cross-school initiative and involving faculty from the School of Communication, the Bienen School of Music, and Weinberg College, the Program in Sound Design offers a certificate in sound design to Communication and Bienen School students and a minor to Weinberg students who are accepted and complete the required 7 courses (see below).

Among the visiting artists recently hosted by the program are Andre Pluess (*Eleven Rooms of Proust, I Am My Own Wife*), Midge Costin (*Broken Arrow*), Shawn Decker (professor of sound at the School of the Art Institute of Chicago), James O'Brien (*The Good Girl* and the BMW film series), Steven Streibig (president, iontank.com, and creative director of a schizophrenia VR environment featured on NPR), John Corbett (sound artist, critic, radio personality, and professor of sound at the School of the Art Institute of Chicago), and Mike Knobloch (vice president of film music for Fox). Additional information, an application, course listings, and samples of student work can be found at [www.sounddesign.northwestern.edu](http://www.sounddesign.northwestern.edu). Applications may be submitted in November and May. The program is open to students of sophomore rank or higher. Up to 12 students per year are accepted.

Students are required to take 3 core courses to acquire a broad foundation in theory, production, and practice. Electives then allow them to specialize in a particular domain (sound design for film, sound design for theatre, sound design for radio, sound design for new media, sound design for installations), but students may opt to continue studying sound as it relates to a broad range of media.

Under the guidance of a faculty mentor, students may receive credit for designing the sound for film/video, new media, installation/exhibition, radio, and theatre projects. Pending faculty approval, students may receive credit for designing sound for Niteskool and Studio 22 film/video projects. Mentors are drawn from faculty participating in the program or other interested faculty.

Practicums might involve faculty-led research projects or artistic collaborations between a faculty member and student(s). Students may also participate in sound-oriented internships at a sound house, a theater company, a production house, a radio station, or another appropriate venue. With the consent of the program director, a practicum or internship or series of practicums or internships may be counted as one of the required electives.



*Certificate Requirements (7 units)*

- RTVF 384-0 Foundations of Sound Design
- 2 of the following courses in basic audio production and processing techniques:
  - MUS TECH 321 Producing in the Virtual Studio
  - MUS TECH 322 Recording and Basic Audio
  - MUS TECH 340 Composing with Computers
  - MUS TECH 342-1,2 Computer Sound Synthesis
  - RTVF 383 Sound Production
- 4 electives at the 300 level or above; possible electives include (but are not limited to) production courses listed above that are not selected as part of the core sequence as well as ART 340, 390-1; CSD 306; EECS 330, 351; MUS TECH 337, 338, 343, 345, 348; RTVF 330, 341, 360, 379, 398; THEATRE 353, 363

**Undergraduate Leadership**

The Undergraduate Leadership Program is an inter-school certificate program open to first- and second-year undergraduates. Initially supported by the W. K. Kellogg Foundation, the program helps students understand the nature of leadership and prepares them to become leaders on campus, in the community, and in their professions. Through course work, retreats, and self-study, participants learn the theories of leadership, experience the challenge of leading others, and create a sense of community with each other and members of participating organizations.

*Certificate Requirements*

Students are required to take the first ULP course, GEN CMN 204 Paradigms and Strategies of Leadership, during their first or second year as undergraduates. Following that introductory course, a second macro-level course is required; this class complements GEN CMN 204, providing students with a macro-level exploration of leadership. Students may choose from a preapproved list of courses that touch on macro-level leadership issues or may petition to take a related course of their choosing. The program also requires 2 quarters of the noncredit GEN CMN 206 Leadership Education Seminar.

In addition, students attend two retreats as part of the program. The first, an outdoor adventure education retreat, takes place during the Paradigms and Strategies of Leadership course. The second, a retreat in Chicago neighborhoods, takes place the following fall quarter. Finally, students engage in self-study consisting of two externships and a self-interview. This is designed so that students can reflect on their learning during the program and explore possible career opportunities. The program offers additional courses and opportunities to further explore leadership beyond the certificate.

*Courses***GEN CMN 204-0 Paradigms and Strategies of Leadership**

This course introduces students to theoretical models of leadership and to research on related topics such as group vision, creative problem solving, and decision making. In addition to weekly lectures, students work in a lab group with six peers. Students are videotaped taking turns facilitating lab meetings, discussing leadership concepts, and working to produce a final project. Students also attend an experiential education retreat. Extensive personal and group feedback is provided throughout the quarter.

**GEN CMN 206-1,2 Leadership Education Seminar (0 units)**

Presents students with a number of experiences during fall and winter quarters from which they may draw whatever leadership lessons they choose. Students have the option of attending weekly lectures led by leaders from school, community, and corporate sectors; attending various workshops; or attending lectures by other speakers on campus and beyond.

**CENTER OFFERING UNDERGRADUATE COURSES****Center for the Writing Arts**

The Center for the Writing Arts was established in 1994 to highlight Northwestern's strengths in the teaching of writing and to provide a focal point for continuing efforts to fulfill the University's commitment to excellence in writing. The center sponsors a number of programs, including courses for advanced creative writers taught by distinguished visiting writers-in-residence, innovative writing-intensive courses for freshmen, and a variety of colloquia for the entire campus community on topics related to writing.

*Courses*

Center for the Writing Arts courses 301, 302, and 303 are taught by visiting writers-in-residence. Consult with a member of the Center for the Writing Arts for more information about its courses and admission requirements.

**WRITING 115-5,6 Modes of Writing** A team-taught course, designed specifically for freshmen, that combines rigorous exploration of a lively intellectual theme with close attention to helping students become strong writers. The format alternates between large-group lecture and discussion sessions led by an accomplished lecturer and small, intensive seminar meetings led by a skillful teacher of writing. Themes explored typically have the spark of controversy and sharp focus characteristic of topics for successful freshman seminars, but also the broader historical or theoretical scope characteristic of distribution requirement courses. Recent themes have included time and chance, the Bible and its transformations, and language and social policy.

Weinberg students earn distribution requirement credit for the first quarter and freshman seminar credit for the second quarter. Students are expected to enroll for both quarters; the first quarter is a prerequisite for the second. May not be taken P/N.

**WRITING 301-0 The Art of Fiction** Fundamental skills of narrative in the creation of fictional works. Extensive writing exercises. Prerequisites: background in writing, a writing-intensive course, and submission of a manuscript of 5–15 pages.

**WRITING 302-0 The Art of Poetry** Writing of poetry in the light of the poetic, linguistic, and historical tradition. Extensive writing exercises. Prerequisites: serious interest in poetry, a writing-intensive course, and submission of sample poems.

**WRITING 303-0 The Art of Nonfiction** Writing as a fundamental skill in a particular field such as science, law, journalism, literature, or political commentary. Extensive writing exercises. Prerequisites: background in writing, a writing-intensive course, and submission of a manuscript of 5–15 pages.

## MILITARY PROGRAMS

The military studies programs are administered by the Office of the Provost.

### Naval Science

The Northwestern University Naval Reserve Officers Training Corps (NROTC) Unit was established in 1926 by congressional authorization when Northwestern became one of the original six universities to create a naval science department. The professor of naval science chairs Northwestern's Department of Naval Science. Department faculty members are commissioned officers serving on active duty in the U.S. Navy or Marine Corps. They are selected and nominated by their respective services and screened and approved by the University. The unit is located at 617 Haven Street, Evanston, Illinois 60208-4140, phone 847-491-3324.

#### *Naval ROTC Programs*

NROTC offers young men and women the opportunity to obtain leadership and management experience as commissioned officers in the U.S. Navy (Navy option) or Marine Corps (Marine Corps option) after graduation from Northwestern, through either the Scholarship Program or the nonscholarship College Program.

At Northwestern, NROTC midshipmen lead essentially the same campus life as other students. They make their own arrangements for room and board and participate in campus activities of their choice, including the opportunity for University-sponsored overseas study. There are no prescribed academic majors for NROTC

students, although scientific and technical studies are encouraged. NROTC students are required to complete the naval science curriculum, attend a weekly two-hour laboratory, and participate in four to six weeks of active duty for summer training at sea or ashore. NROTC students are required to abide by the Midshipmen Regulations issued by the unit. Under certain conditions, students may enroll in the NROTC program at any time from the beginning of their freshman year until the end of their sophomore year.

#### *Courses*

In addition to the required courses listed below, participants in the NROTC program must satisfactorily complete a number of other courses prescribed by the Department of the Navy, which are offered by other departments of the University. Current information on those course requirements is available from the NROTC unit.

With the exception of 110, 230, and 355, Northwestern course credit is granted for successful completion of naval science courses; applicability to graduation requirements is subject to limitations imposed by the responsible University faculty committees and by the undergraduate schools. For more information on credit availability, consult the dean of each school. Naval science courses are open to non-NROTC students with department approval. Courses with an asterisk (\*) are not required for Marine Corps option students.

#### **NAV SCI 110-0 Introduction to the Organization and Culture of the Naval Services**

Composition and organization of the Naval Services; diverse missions, makeup, and manning of naval sea services with emphasis on duties and responsibilities of officers, rank and enlisted rating structure, training of subordinates, promotion and advancement, and military courtesy. Students gain a fundamental understanding of the formal and informal structures of the main warfare communities and how each contributes to attaining the U.S. Navy and Marine Corps mission.

**NAV SCI 120-0 Seapower and Maritime Affairs** A survey of U.S. naval and maritime history in the context of world maritime development, including the historical evolution of American sea power and the role of U.S. naval forces in an era of geopolitical change.

**\*NAV SCI 210-0 Marine Navigation** An in-depth study of marine navigation from the perspective of a deck officer aboard a naval warship. Focus on piloting, electronic navigation, and the rules governing the conduct of vessels on the high seas. Students become familiar with the proper use of navigational charts, publications, and various aids to navigation and gain understanding of the influence of environmental factors (e.g. weather, tides, and currents) on ship operations.

**\*NAV SCI 220-0 Naval Ship Systems II (Naval Weapons Systems)** Theory and employment of the Navy's weapons, navigation, and communications systems. Processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Topics include fire control systems and major weapons types, including capabilities and limitations; physical aspects of radar and underwater sound; tactical and strategic significance of command, control, communications, computers, and intelligence with respect to weapons system integration. Supplemental review/analysis of case studies involving the moral and ethical responsibilities of leaders in employing weapons.

**\*NAV SCI 230-0 Leadership and Management Seminar for Naval Officers** Addresses leadership, management, and organizational behavior issues facing naval officers in a stressful environment, including strategic planning, time management, communication, counseling, team building, and decision making.

**\*NAV SCI 331-0 Naval Operations** Introduction to basic concepts and tools required for safe and proper operation of naval vessels. Students become proficient at maneuvering boards, concentrating on interception, pass-no-closer-than, and wind problems. Formation operations, external communications, replenishment at sea, and ship handling.

**NAV SCI 336-0 Evolution of Warfare** (Marine Corps option only) Evolution of warfare from 600 B.C. to present. Students develop understanding and knowledge of the classic principles of war, the changes in conduct of war through time, and the actions and decisions of battlefield commanders and their soldiers.

**NAV SCI 341-0 Naval Leadership and Ethics** An academic, discussion-oriented course intended to provide future leaders with a broad understanding of the various moral, ethical, and leadership philosophies that help strengthen junior-officer character.

**\*NAV SCI 345-0 Naval Ship Systems I (Naval Engineering)** Provides an elementary overview of naval engineering systems and a detailed knowledge of the principles behind ship construction. Taught from a systems engineering standpoint. Topics include ship design, stability, and structural engineering; hydrodynamic forces; air and water systems; electrical theory, generation, and distribution systems; thermodynamics; damage control; hydraulics and ship control; theory and design of steam, nuclear, gas turbine, and diesel propulsion.

**NAV SCI 346-0 History of Amphibious Warfare** (Marine Corps option only) Evolution of amphibious warfare from the battle of Marathon to present. Students develop understanding and knowledge of the evolution of amphibious warfare doctrine, the impact of significant events in history relating to amphibious operations, and the problems and advantages relative to employing amphibious forces in the modern era.

**NAV SCI 350-0 Naval Science Laboratory** A two-hour weekly laboratory required each quarter for all NROTC students. The laboratories serve to develop students' professional leadership skills, provide a basic understanding of the U.S. Navy and Marine Corps as part of the U.S. armed forces, and further challenge, test, and evaluate students on their potential to become commissioned officers in the U.S. Navy or Marine Corps.

**NAV SCI 355-0 Directed Study** Provides midshipmen with an opportunity to work under the supervision of an officer-instructor on projects related to professional development. Prerequisite: consent of department.

## Aerospace Studies

Northwestern students may participate in the programs of the Air Force Reserve Officers Training Corps through a cross-enrollment agreement with the Illinois Institute of Technology (IIT). Within the limits of the Northwestern school in which the student is registered, credits earned in approved aerospace studies courses at IIT may be counted toward the degree requirements at Northwestern. Further information may be obtained from Air Force ROTC Detachment 195, Illinois Institute of Technology, 10 West 31st Street, Chicago, Illinois 60616, phone 312-567-3525. For course descriptions, see <http://afrotc.iit.edu>.

## Military Science

Northwestern students may participate in the programs of the Army Reserve Officers Training Corps through a cross-enrollment agreement with the University of Illinois at Chicago (UIC). Credits earned in approved military science courses at UIC may be counted toward degree requirements within the limits of the Northwestern school in which the student is registered. Further information can be obtained from the Department of Military Science, University of Illinois at Chicago, 728 West Roosevelt Road, M/C 252, Chicago, Illinois 60607, phone 312-996-3451.

## FIELD STUDY

Many off-campus field studies, internships, and research opportunities sponsored by various schools and departments are available to Northwestern students. The programs vary greatly: Some carry academic credit; some are undertaken in conjunction with a class or seminar; some make provision for a stipend; some entail living away from campus.

Following is a representative list of field studies programs with their sponsoring school, department, or program:

- Business Institutions Program (arts and sciences)
- Chicago Field Studies Internship (arts and sciences, business, law, and social justice)

- Education and Social Policy Practicum (education and social policy)
- Field study in San Francisco or Washington, D.C. (education and social policy; open to all majors)
- Internships in the Arts (art history)
- Internships in Environmental Sciences (environmental sciences)
- Internships in the Humanities (Alice Kaplan Institute for the Humanities)
- Internship in Women's Services (gender studies)
- Journalism Residency (journalism)
- Los Angeles Internship Program (communication)
- New York Internship Program (communication)
- Northwestern Archaeological Field School (anthropology)
- Political Campaigning (political science)
- Professional Apprenticeship in Music Education (music)
- School of Communication Internship Program
- Teaching Practicum (education and social policy)
- Walter P. Murphy Cooperative Engineering Education Program (engineering)

## Judd A. and Marjorie Weinberg College of Arts and Sciences

The Judd A. and Marjorie Weinberg College of Arts and Sciences — oldest of Northwestern's 11 schools — has been the center of the University's academic and intellectual life since 1851. Weinberg College offers a liberal arts education that combines broad exposure to the insights and methods of the principal academic disciplines with focused study in one or more areas. The college faculty of approximately 500 women and men is dedicated to superior teaching informed by advanced research. Nearly all members of the faculty, including the most senior, regularly teach undergraduates in a curriculum consisting of more than 2,000 courses as well as tutorials, laboratory rotations, internships, and other individualized forms of instruction. The 3,800 undergraduates and 900 graduate students in arts and sciences enjoy a great deal of choice, with access to 25 departments and 28 programs offering 36 majors, 8 adjunct majors, and more than 50 minors. Among these are several majors and minors that are interdisciplinary within Weinberg and a growing number that represent curricular collaboration across schools.

A liberal arts education in Weinberg College emphasizes the ability to reason clearly, to extract the essential significance of large bodies of information, to apply general principles in new contexts, to communicate effectively, and to be sensitive to human creativity and morality. Required course work in several disciplines provides an overview of the complexity of the world and different ways of apprehending and solving problems. These courses examine how scholars from many backgrounds confront fundamental issues and how social conditions shape their inquiries. Proficiency in composition and competence in a foreign language build communication skills and expand the capability to study another culture, while intensive course work in a required major and optional minor develops an understanding of advanced concepts and lays the groundwork for original research. Many areas of the curriculum encourage interdisciplinary study that integrates the approaches of different fields and enhances the ability to address questions that cross traditional academic boundaries. A period of study abroad is encouraged to develop firsthand knowledge of other cultures and greater intellectual and personal independence. Students are also encouraged to undertake independent research projects that help them move beyond course work and synthesize what they learn in their majors.

Weinberg College promotes participatory learning that begins in the first year of study in required freshman

seminars and continues in professional linkage and honors seminars, laboratory experiences, internships, and other small-group or individualized instruction. Students can experience the excitement of discovery in the sciences, humanities, and social sciences not only through lectures by faculty working at the forefront of their fields but also through special projects developed under faculty guidance or by assisting faculty in their research. Northwestern's strong undergraduate preprofessional schools and its graduate and professional schools offer liberal arts students unusual opportunities to extend their interdisciplinary studies and to pursue applied work in several areas, in some cases leading to a special concentration or certification. The University's outstanding libraries and its research centers further support and enrich the educational pursuits of liberal arts undergraduates.

### ACADEMIC POLICIES

#### Program of Study for the Degree of Bachelor of Arts

Weinberg College offers courses of study in the arts and sciences leading to the degree of bachelor of arts. Students have extensive flexibility in structuring their academic programs within the framework of general education and major requirements specified in the following section. Guidance in planning a coherent personal curriculum is available in several places.

General advising is centered in the college's Office of Undergraduate Studies and Advising, where faculty advisers are available throughout the year to assist students in all aspects of academic and career planning. Each freshman is assigned a freshman adviser who in nearly all cases is the student's instructor in a fall-quarter freshman seminar. At the end of freshman year each student is assigned a Weinberg College adviser, who will continue to be that student's adviser through graduation. In addition, each Weinberg department and program has a corps of faculty advisers who counsel all undergraduates about course selection, majors and minors, and career opportunities in their particular area.

#### Requirements for the Degree of Bachelor of Arts

Candidates for the bachelor of arts degree must complete 45 quarter-courses and fulfill the residence and grade requirements described below. First-year students must take 2 freshman seminars. Before graduation, all students

must demonstrate proficiency in writing and competence in a classical or a modern foreign language. They must satisfy distribution requirements in six major areas of intellectual inquiry and complete the requirements of a major in one of the departments or programs of Weinberg College.

### *Freshman Seminar Requirement*

Freshman seminars, offered by nearly all departments in Weinberg College, are small, discussion-oriented courses designed to develop basic intellectual skills: how to read critically, think logically, and communicate effectively, typically through the investigation of a specific theme or issue. Freshman seminars are limited to 15 or 16 students to encourage discussion, and each seminar requires considerable expository writing — usually a minimum of 15–20 typed pages per quarter. These seminars ordinarily supplement rather than replace standard introductory courses and usually do not provide the preparation necessary for advanced work in a departmental program.

Every Weinberg freshman is required to complete 2 freshman seminars. Except for students in special programs (BA/BMus, HPME, ISP, and MMSS), who take their seminars in winter and spring, incoming freshmen are assigned to a fall seminar based on preferences they submit to the Weinberg Office of Undergraduate Studies and Advising during the summer. The fall-seminar instructor also serves as the academic adviser for the year. Also during the summer, freshmen are informed of the quarter in which they are to take their second seminar. Freshmen also have the opportunity through the Kaplan Humanities Scholars Program to take small seminars linked to larger lecture courses focusing on a common broad theme.

### *Writing Proficiency Requirement*

Students are required to demonstrate proficiency in writing. This may be achieved in a number of ways. Freshman seminar instructors make the initial evaluation of writing in courses. Students who do not write well in their freshman seminars or in other courses may be asked to take ENGLISH 105 Expository Writing. Courses in expository writing and intermediate composition are available for all students who wish to increase their skill and confidence in writing.

### *Foreign Language Requirement*

Before graduation students must demonstrate proficiency in a classical or modern foreign language equivalent to the work covered in a second-year college-level course. Language proficiency may be shown in any one of three ways:

- Achieving a score designated by the Weinberg College Council on Language Instruction on a College Entrance Examination Board Advanced Placement Examination
- Passing a proficiency examination given online during

the summer or at Northwestern during New Student Week and periodically during the school year (language departments may limit the number of times a proficiency examination may be taken)

- Successfully completing designated course work (these courses may not be taken under the pass/no credit option, and a grade of C– or higher must be earned in the last course in a sequence fulfilling the foreign language requirement)

Students who believe they are proficient in a language not regularly taught at Northwestern may petition the Council on Language Instruction for a proficiency examination in that language. Petitions are available in the Office of Undergraduate Studies and Advising and must be filed during a student's first quarter.

Students with professionally diagnosed disabilities related to foreign language acquisition should contact the Office of Services for Students with Disabilities about possible accommodations.

### *Distribution Requirements*

To ensure breadth of education, Weinberg College students must take 2 quarter-courses in each of the six distribution areas listed below. The list of courses that satisfy the distribution requirements is established by a Weinberg College faculty committee. A current list is available in the Office of Undergraduate Studies and Advising.

- I. Natural sciences  
Courses introduce methods of inquiry and fundamental concepts in the natural sciences.
- II. Formal studies  
Courses introduce concepts, methods, and use of formal rules of inference in mathematics, statistics, computer science, logic, linguistics, and cognate areas by showing how objects of thought and experience and their relationships can be analyzed in formal terms.
- III. Social and behavioral sciences  
Courses introduce the theories, methods, and findings of empirical research on human behavior and its relation to social, cultural, economic, and political groups and institutions.
- IV. Historical studies  
Courses introduce the chronological development and historical relationships in cultural, social, political, economic, and military affairs in a broad temporal perspective.
- V. Ethics and values  
Courses introduce the analysis of moral, social, and religious values and how they have developed.
- VI. Literature and fine arts  
Courses foster understanding of how the attitudes, ideas, and values of individuals, groups, societies, or cultures are represented in their literature, arts, and creative activities.



Some of these distribution requirements may be satisfied by achieving sufficient scores on College Entrance Examination Board Advanced Placement or higher-level International Baccalaureate examinations. A list of qualifying scores and tests as well as detailed information concerning the distribution requirements are available from the Office of Undergraduate Studies and Advising.

### *Major Study Requirement*

All students must fulfill the requirements of a major, which should be declared by the end of the sophomore year. Majors are declared by meeting with the designated adviser in the department or program offering the major; at that meeting a course plan is developed and a Declaration of Major Form is completed. All courses applied to the major requirements must be passed with grades of C- or higher. Grades of P (pass) are not acceptable in major and related courses. (See also Grade Requirements.)

Students may pursue two or more majors by completing each department's major requirements. With limited exceptions, the same course may not be applied to the major requirements of two departments. However, a course used as a major course in one department may also fulfill a related course requirement for another major program.

A student may elect a major from among the following options:

- **Departmental major**  
Each department offers one or more programs of specialization, which are described in detail preceding the departmental course offerings in this catalog.
- **Area or interdisciplinary major**  
The college offers a number of interdisciplinary majors that apply the approaches of several departments to certain scientific, cultural, and political areas. These programs, described in the corresponding entries, are American studies, Asian and Middle East studies, cognitive science, comparative literary studies, computing and information systems, drama, environmental sciences, European studies, gender studies, geography, integrated science, international studies, legal studies, materials science, mathematical methods in the social sciences, and science in human culture. American studies, European studies, integrated science, legal studies, and mathematical methods in the social sciences are limited-admission majors that require a special application, as does the English department's writing major. Asian and Middle East studies, gender studies, geography, international studies, legal studies, mathematical methods in the social sciences, science in human culture, and urban studies are available only as adjunct majors in conjunction with a second major.
- **Ad hoc major**  
Occasionally students with well-defined interests are led to programs of study that do not fit neatly into the

mold of a traditional major. They may develop an ad hoc major in African studies or computational chemistry, for example, by bringing together courses from various departments. Ad hoc majors must be approved by the faculty's Curricular Review Committee. For more information, see the assistant dean for advising in the Office of Undergraduate Studies and Advising.

### *Residence Requirement*

Of the required 45 quarter-courses, the last 23 must be taken while students are enrolled as undergraduates at Northwestern. During the last three quarters preceding the granting of the BA degree, students must be enrolled as degree candidates in Weinberg College. In addition, students returning from study abroad are expected to be enrolled in course work on the Evanston campus for at least one quarter after returning and before graduating.

In addition to and independent of the requirements set by Weinberg College, all students must satisfy the Undergraduate Residence Requirement (see Undergraduate Education section of this catalog). This requirement addresses the number of quarters for which a student must be in residence at Northwestern.

### *Grade Requirements*

Students must achieve a grade point average of C (2.0) or higher in courses offered to meet degree requirements. No work passed with a grade of D or P counts toward a major or minor (including any course prerequisite to a course required in the department or program as well as any related course). Transfer students must normally complete the equivalent of at least 4 one-quarter upperclass (300-level) courses at Northwestern in the department of their major.

Full-time students in Weinberg College are permitted to enroll in a limited number of courses with the understanding that they will receive in place of a regular letter grade the notation P (pass) or N (no credit), neither of which counts in the student's grade point average. No more than 1 course per quarter and 6 courses in all may be taken under this P/N option; it is not permitted for courses taken to satisfy freshman seminar or distribution requirements or the foreign language requirement. No more than one-fifth of the total courses taken at Northwestern and offered for graduation may have grades of P or D.

While some other undergraduate schools of the University offer a Target Grade-P/N registration option, such registration is not available for courses offered by Weinberg College. Special rules govern registrations by Weinberg College students in courses of the undergraduate schools where this plan is available as well as by non-Weinberg College students who transfer into the college. Questions concerning this policy should be addressed to the Office of Undergraduate Studies and Advising.

### *Registration in Courses in Other Schools of the University and at Other Universities*

Weinberg students may take advantage of Northwestern's other schools to take as many as 11 of their required quarter-courses; of those 11, up to 3 may be instruction in applied music. School of Continuing Studies courses may be counted toward the BA degree only if approved by the Office of Undergraduate Studies and Advising; approved SCS courses in Weinberg disciplines do not count toward the 11-course limit. A student must obtain the advance consent of the Office of Undergraduate Studies and Advising to register for SCS courses.

No credit is given for shop work, individual instruction in speech, correspondence courses, or course work in music education or physical education.

No more than 4 of the required 45 quarter-courses may come from the military studies programs.

With the prior approval of the University Study Abroad Committee or the faculty, qualified students may study abroad.

Students should consult with the Office of Undergraduate Studies and Advising concerning limitations on the amount of non-Northwestern credit that may be used toward the BA degree and with the Office of the Registrar concerning limitations on the amount of such credit that may be used toward the Undergraduate Residence Requirement.

## ACADEMIC OPTIONS

### Minors

Students may choose from more than 50 minors offered by departments and programs; among these are inter-school minors (see Cross-School Programs section) and minors offered by some of Northwestern's other undergraduate schools. Minor requirements are listed under the appropriate headings in this catalog. Completion of a minor is optional and not a degree requirement, and no more than one minor may be pursued and listed on a student's transcript. Except as explicitly stated and in the case of related courses, courses used to fulfill requirements for the student's major(s) may not be used to fulfill the requirements for the minor.

### Undergraduate Seminars and Independent Study

By departmental invitation seniors may take 398 (a senior-year seminar) in one or more quarters, up to a maximum of 4 quarter-courses.

Students may also register for 399 Independent Study under the supervision of a faculty member. 399 is generally open to juniors and seniors, and department consent is required; in some cases sophomores may also qualify. During the quarter before enrolling in 399, students must submit to the department for approval a detailed

description of the work they will undertake and the basis for its evaluation. Upon completion of the course, they also must submit an abstract of the completed work to the department, where the description and the abstract are filed.

Students may not register for more than 2 credits of 399 in a quarter or take 399 to make up for credit they lack as a result of failure or uncompleted courses. No more than 9 units of 398 and 399 may be presented as credit for graduation. Certain independent study courses offered by some departments with course numbers different from 398 and 399 are also subject to these restrictions.

### Honors

Each major in Weinberg College offers an honors program leading to the award, at graduation, of departmental honors to seniors with outstanding achievement in connection with a research project or other integrative type of work. Although the detailed criteria vary somewhat by major (as shown in the listings of individual departments and programs), all share certain features.

Students recommended for departmental honors must have completed with distinction such regular courses as may be required of them by their major as well as at least 2 quarters of 398 or 399 or their equivalent, or 400-level courses, or some combination thereof. The honors project must result in a research report, thesis, or other tangible record; course work alone, such as completion of 400-level courses, is not sufficient. Simple data collection, computer programming, analysis of data with canned programs, and summaries of primary or secondary sources are not alone bases for the award of departmental honors.

Each major has an undergraduate honors committee responsible for administering its honors program and for preparing the final recommendations for honors that are submitted in May to the Weinberg College Committee on Superior Students and Honors. Students are proposed for honors by the faculty adviser, who writes a letter describing and evaluating the student project. Additional evaluative letters giving independent and substantive judgments of the project must be submitted by faculty members unconnected with the student's project. The departmental honors committee reviews all nominations for departmental honors in a given year during spring quarter and takes a separate recorded vote on each candidate. Procedures for students pursuing separate honors in two departments or programs or interdisciplinary honors spanning two majors are available from the Office of Undergraduate Studies and Advising. Approved nominations are forwarded to the Committee on Superior Students and Honors for final review.

### Professional Linkage Seminars

Undergraduates may take specially designed linkage seminars that approach social and work-related concerns

through the eyes of an accomplished nonacademic professional with an affinity for the liberal arts and a gift for intellectual inquiry. These seminars link liberal education to professional issues, illustrating how theory and practice affect and enrich one another. In this way, they focus on the transition from the academic to the nonacademic world. Topics have included professional ethics, science writing, gender issues in aid to developing countries, the history of business, and asylum issues in U.S. immigration law. Linkage seminars are announced to Weinberg College students before registration each quarter.

### **Preprofessional Study**

Weinberg College offers its students excellent preparation for subsequent training in professions such as law, medicine, and management. Each year many graduates pursue professional study in these areas. Other students enter the workforce directly.

All majors can furnish suitable preparation for professional schools, provided appropriate courses are included in the student's course of study. No major, however, is intended solely as preprofessional training. The college advisers in the Office of Undergraduate Studies and Advising help students design academic programs that combine the breadth of a liberal arts education with adequate preparation for further professional study.

### **Study Abroad**

Weinberg College students are encouraged to study abroad. The philosophy of the college is that the best foreign study experience combines continued work in a student's chosen course of study with significant opportunities for immersion in the culture of the host country. For example, an economics major might study NAFTA in Mexico; a political science student might study the European Union in France. The college encourages participation in full-academic-year programs that include extensive study of languages and culture. As early as freshman year, interested students should discuss study abroad plans with their Weinberg College and department advisers. Complete study abroad information is available from the Study Abroad Office.

### **Combined Bachelor's and Master's Degree Programs**

Exceptional undergraduates may be able to earn both a bachelor's degree and a master's degree in four years of study in the following departments: chemistry, earth and planetary sciences, economics, French, linguistics, sociology, and statistics. Students are admitted to these programs only by invitation of the department and with the approval of the Graduate School. (See Academic Options in the Undergraduate Education section of this catalog.)

### **Combined Weinberg College–Feinberg School of Medicine Program**

The Honors Program in Medical Education (HPME) is designed for unusually gifted high school students who seek a career in medicine or medical science. It provides a plan whereby students entering Northwestern are admitted simultaneously to Weinberg College and to the Feinberg School of Medicine. HPME students then participate in a challenging program, with the first three or four years in undergraduate study and the last four years in the Feinberg School. Thus, the period of formal training may be reduced by one year.

Students in HPME must successfully complete 36 quarter-courses while in Weinberg College and complete an Undergraduate Residence Requirement of 9 quarters. The course requirements include 11 prescribed science courses. Selection of the remaining 25 courses depends on the curriculum chosen by the student. Options include completion of a BA degree or a full year of study abroad in a Northwestern-affiliated or other program approved by the University Study Abroad Committee. Students must maintain designated grade point averages both in required science courses and overall.

### **Weinberg College–McCormick School of Engineering and Applied Science Dual-Degree Program**

A combined program in liberal arts and engineering is available to Northwestern undergraduates. For more information, see the entry on the five-year BA/BS degree in the Engineering and Applied Science section of this catalog.

### **Weinberg College–Bienen School of Music Dual-Degree Program**

Students accepted into the combined Weinberg College–Bienen School of Music program may simultaneously earn a BA degree from the college and a BMus degree from the music school. They must complete all Weinberg College degree requirements, including at least 30 Weinberg College courses, as well as all requirements for the bachelor of music degree in the Bienen School, including at least 30 music courses. Fulfilling both Weinberg College and Bienen School requirements takes five years of full-time study, and an Undergraduate Residence Requirement of 15 quarters is obligatory.

Participants in this combined program must be accepted by both the Bienen School and Weinberg College. Interested students should consult with the associate dean for undergraduate academic affairs in Weinberg College and the director of admissions in the Bienen School for current information.

## Teaching Certification

Students enrolled in a number of departments of Weinberg College may simultaneously pursue secondary teaching certification through the School of Education and Social Policy. Areas of certification are art, biological sciences, chemistry, economics with history, English, French, German, history, Latin, mathematics, physics, political science with history, sociology with history, and Spanish.

Majors in the certification areas who wish to be considered for teaching certification must apply, be admitted to, and complete all requirements of the Secondary Teaching Program as described in the School of Education and Social Policy section of this catalog. Application should be made with the Office of Student Affairs in the School of Education and Social Policy.

## Other Cross-School Options

Weinberg College students may participate in the interschool Undergraduate Leadership Program as well as other interschool programs, including those administered by the college through the Center for the Writing Arts and the Transportation Center (see the Cross-School Programs section of this catalog for more information). Certificates open to Weinberg undergraduates are offered through the McCormick School of Engineering and Applied Science, the Kellogg School of Management, and the Medill School of Journalism. Minors in several of Northwestern's undergraduate schools, as well as a concentration in music, are also open to Weinberg College students. Interested students should contact the schools through which the options are offered.

## GENERAL LIBERAL ARTS

These interdivisional courses are open to all qualified students.

**GEN LA 280-7 Residential College Tutorial** A seminar for members of a residential college on a theme of common interest, meeting in the residential college and often directed by one of its faculty associates. Enrollment is normally limited to nine students. Proposals for tutorials must be approved by the associate dean for undergraduate academic affairs of Weinberg College.

**GEN LA 290-0 Summer Research** (0 units) Required registration for students receiving summer research grants from Weinberg College or the Undergraduate Research Grants Committee. Grade of satisfactory will be entered after final report is submitted.

**GEN LA 298-0 Student-Organized Seminars** Students who desire to study topics in arts and sciences that are not covered in the college's course offerings may initiate their own courses under the supervision of sponsoring faculty members. Enrollment in these seminar courses is limited to 20 students. The student organizer or organizers must, in consultation with the faculty sponsor, prepare a plan

for the seminar and submit it to the associate dean for undergraduate academic affairs before the middle of the quarter preceding the quarter in which the seminar is held. The plan must include a topic description, a reading list, specification of the work that will be graded (such as term papers and written examinations), prerequisites, and the meeting schedule. The associate dean for undergraduate academic affairs forwards proposals to the Curricular Review Committee of the college, which must review and approve all seminars to be offered. Students may enroll in only 1 Student-Organized Seminar per quarter, and enrollment must be on the P/N basis. Weinberg College students interested in organizing a seminar should consult the associate dean for undergraduate academic affairs for further details.

## AFRICAN AMERICAN STUDIES

The study of the African American experience has a long and distinguished history in the United States. The field has developed exciting insights as well as firm intellectual and empirical foundations for the systematic study of the African American experience and, through such study, for a greater understanding of the larger American experience. From its beginnings the field has been strongly interdisciplinary, bringing the perspectives of different disciplines to bear on understanding black life. The Department of African American Studies exemplifies these traditions and strengths and, through its courses, provides opportunities to explore the richness and diversity of the African American experience in a meaningful and coherent way.

The department offers courses that focus on people of African descent in the United States and other regions of the Americas and the African diaspora — the communities created by the dispersion of peoples from the African continent. By comparing the black experience in various parts of the world, students learn to analyze identity, race, and racism as formations that change over time and space. This broad study of the African American experience is one of the key features of the department, distinguishing it from similar departments at other institutions. Major themes in the curriculum include the nature of colonization and its impact on the colonizer and the colonized; racism and its effects on society as well as on scholarship; the importance of oral language, history, and tradition in the African American experience; the roots and development of African American music, literature, and religious styles; analysis of key institutions such as the family; and the traffic of people, ideas, and artifacts throughout the African diaspora.

African American studies provides good preparation for graduate work in the social sciences, the humanities, and the professions, as well as for jobs and careers in a variety of fields. Education, law, journalism, urban

planning, health-care delivery and administration, business, social work, and politics are only a few of the fields for which African American studies provides an excellent background. In addition, since scholars and political leaders are paying increased attention to the Caribbean and Latin America as well as to blacks and other minorities in the United States, students of African American studies will enter a field that touches on issues of far-reaching national and international significance.

## Major in African American Studies

### Departmental courses

*Core courses (5):* 210-1 or -2; 212-1 or -2; 215; 236; 245

*Major courses (6):* In addition to the mandatory core sequence, 6 courses in the department are required, including at least 4 at the 300 level. Students should select courses in consultation with the director of undergraduate studies.

*Senior course (1):* The major also requires a senior-level course (390, 396, or 399).

**Related courses:** Subject to approval of the department adviser, majors must take 5 200- or 300-level courses outside the department, including at least 3 at the 300 level. Students are expected to choose related courses that develop methodological skills and substantive focus.

## Minor in African American Studies

The minor in African American studies provides thorough exposure to contemporary scholarship concerning the African American experience.

### Minor course requirements (8 units)

- 4 foundation courses chosen from 210-1,2; 212-1,2; 215; 236; 245
- 4 additional courses in the department or approved by the department, including 3 at the 300 level

## Honors in African American Studies

To qualify for honors, a student must demonstrate consistently high performance in the major and complete a major research project during the senior year. Specifically, a student must have a cumulative grade point average of at least 3.3 in African American studies courses, with no grade below a B in any single course. A senior who meets these criteria and is interested in pursuing departmental honors must notify the honors coordinator during the fall of the senior year. The student will select a thesis adviser in consultation with the honors coordinator, who also serves as director of undergraduate studies. The thesis adviser need not be a member of the department. Completion of the thesis ordinarily requires at least two quarters, during which the student and thesis adviser are expected to meet regularly. Merely completing a thesis does not guarantee honors; the thesis adviser and one other faculty member, selected by the honors coordinator, must recommend the project for honors to the Office of the Dean.

## Core Courses

### AF AM ST 210-1,2 Survey of African American Literature

Two-quarter sequence on the literature of blacks from slavery to freedom. Works of major writers and significant but unsung bards of the past.

### AF AM ST 212-1,2 Introduction to African American History

**1.** Key concepts in African American history from 1700 to 1861. Includes African origins, the Atlantic slave trade, origins of slaving and racism in the United States, life under slavery in the North and South, religion, family, culture, and resistance. **2.** Key concepts in African American history from emancipation to the beginnings of the civil rights era. Focus on constructions of class, gender, and community; the rise of Jim Crow; strategies of protest; and migration and urbanization.

### AF AM ST 215-0 Introduction to Black Social and Political Life

Analysis of class, gender, sexuality, immigrant status, and ethnic origin in black society and politics. Focus on demographic trends, lived experiences, and ideological debates.

### AF AM ST 236-0 Introduction to African American Studies

Key texts and concepts in African American studies from a range of disciplinary perspectives.

### AF AM ST 245-0 The Black Diaspora and Transnationality

Examination of events, movements, theories, and texts that have shaped development of the African diaspora. Topics include slavery, abolitionism, pan-Africanism, the culture-politics nexus, hip-hop, AIDS, and linkages among gender, sexuality, and diasporic sensibilities.

## Courses

### AF AM ST 214-0 Comparative Race Studies in the United States

Problems and experiences of racialized minorities: blacks, Native Americans, Asian Americans, and Hispanic Americans. Comparative exploration of their relationships to each other and to the majority society. May be repeated for credit with change of comparative racial groups or time period explored.

### AF AM ST 218-0 Cracking the Color Lines: Asian-Black

**Relations in the U.S.** Comparative historical analysis of Asian-black relations in the United States, including racialized and sexualized discourses structuring interracial relations and social, political, and economic location. Slavery, immigration, model minority myth, cross-racial politics.

### AF AM ST 220-0 Civil Rights and Black Liberation

The Northern and Southern civil rights movements and the rise of black nationalism and feminism, 1945–72.

### AF AM ST 225-0 African American Culture

Survey of African American culture from slavery to the present. Relation of African American culture to African and Euro-American cultures, the Black Atlantic as a unit of analysis, representations of blackness in the public imagination.

### AF AM ST 226-0 Introduction to Transnational Black

**Cultures** An interdisciplinary introduction to history, cultural production, or politics of societies whose



relationships to each other extend beyond national boundaries.

**AF AM ST 250-0 Race, Class, and Gender** Introduction to scholarship and key theories that treat race, class, and gender as intersecting social constructs. Race, class, and gender in work, family and reproduction, education, poverty, sexuality, and consumer culture. How race, class, and gender inform identity, ideology, and politics to incite social change.

**AF AM ST 259-0 Introduction to African American Drama** Thematic and historical survey of African American drama. Sociopolitical context, the aesthetic reflected in the work, impact on African American and general theater audiences.

**AF AM ST 310-0 Contemporary Asian-Black Relations: Conflict and Cross-Cultural Collaboration in Urban America** Divides between Asians and blacks; areas of positive cross-cultural collaboration. Historical analysis of reparations, the 1992 Los Angeles riots, and affirmative action. Cross-racial exchange in youth expressions, popular culture, hip-hop.

**AF AM ST 316-0 African American Folklore** African American folklore in a variety of genres and forms of presentation, from both rural and urban communities. Includes folk narratives, folksongs, the dozens, toasts, jokes and humor, folk beliefs, preachers, folk heroes, and the literary transformation of folk materials.

**AF AM ST 319-0 Race, Ethnicity, and the American Constitution** Investigation of how race and ethnicity have influenced the evolution of the U.S. Constitution and legal debate and practice. Topics include affirmative action, school integration, and the death penalty. Prerequisite: 220 or POLI SCI 220 or 230.

**AF AM ST 320-0 The Social Meaning of Race** Race as a social concept and recurrent cause of differentiation in multiracial societies. Impact of race on social, cultural, economic, and political institutions. Discussion of prejudice, racism, and discrimination.

**AF AM ST 321-0 Researching Black Communities** Introduction to the methodology and findings of qualitative research on black communities in the United States. Topics include black migration, urban geography, black culture, class and gender stratification, racial identity.

**AF AM ST 325-0 Race, Poverty, and Public Policy in America** Examination of the scope of poverty in America, competing theories about its causes, and how racial stratification creates and perpetuates economic marginalization. Public-policy responses to the plight of the poor; debates about the future of antipoverty policy, with emphasis on the relationship between racial and economic stratification. Prerequisite: 236-1 or SOCIOL 110.

**AF AM ST 327-0 Politics of African American Popular Culture** Examination of the debates within African American communities about the proper role and function of black art and artists in relation to black politics. Prerequisite: 236-1 or 236-2.

**AF AM ST 330-0 Black Women in 20th-Century United States** Experiences and leadership of African American women in major events in recent history, including anti-lynching, women's suffrage, civil rights movements, and World War II.

**AF AM ST 331-0 The African American Novel** Readings in classic black American fiction. The author as creator and participant. Works of Wright, Ellison, Baldwin, and others. Prerequisite: sophomore standing.

**AF AM ST 332-0 Black Feminist Theories** In-depth survey of major constituents of black feminist theory, utilizing interdisciplinary approach with readings from history, sociology, literature, popular culture, and religious studies.

**AF AM ST 334-0 Gender and Black Masculinity** Perceptions and constructions of black masculinity within African American and "American" cultures in the United States; readings in gender studies, feminist theory, African American studies, and cultural studies.

**AF AM ST 335-0 Race and Literature in 19th-Century America** Examination of the evolution and persistence of the notion of "race" in 19th-century America, with attention to the origins of the idea of race in the West. Focus on the multiracial character of 19th-century America.

**AF AM ST 340-0 Slavery and Abolitionist Discourse** Investigation of the rise of abolitionist discourse in the West, including the evolution of the debates over slavery from the latter part of the 18th century to the late 19th century.

**AF AM ST 342-0 Comparative Slavery** Traces slavery across historical epochs and geographic contexts, with an emphasis on Latin America, the Caribbean, and the United States.

**AF AM ST 345-0 Race in Latin America** Introduction to the history of race in Latin America and the Spanish-speaking Caribbean; exploration of histories and experiences of racialized groups through examining relationships between racial and social inequality, racial difference, and political development.

**AF AM ST 348-0 Afro-Latin America: Communities, Cultures, and Identities** Exploration of the history of African-descended people throughout Latin America, emphasizing slavery, freedom, and the emergence of Afro-Latin American communities, cultures, and identities. Topics include race, gender, Afro-Latin spiritual systems/religion, family, and resistance.

**AF AM ST 350-0 African American Literary Criticism and Theory** Advanced introduction to African American literary cultural criticism and theory. Topics include the "black aesthetic"; black writers as critics; black feminism, representation, and sexuality; critiques of the roles of black intellectuals; and the uses of and resistance to post-structuralist theory in African American criticism.

**AF AM ST 355-0 20th-Century Intellectual and Popular Culture** Examination of the rise and persistence of the notion of black cultural/racial authenticity in the 20th



century through the lens of various forms of intellectual and popular culture.

**AF AM ST 357-0 Performing Memory in the Black World**

Exploration of the ways in which peoples of the Black Atlantic remember slavery and fashion identities through novels, film, folktales, and drama.

**AF AM ST 360-0 Major Authors** In-depth examination of a selected author's body of work. Choice of author varies. May be repeated for credit with change of author.

**AF AM ST 363-0 Racism in Western Modernity** Impact of racism in the formation of Western modernity. Critical conceptual and historical analyses of the social formation of "race" and the historical implications of racism in the contemporary West.

**AF AM ST 365-0 Black Chicago** Surveys the social, cultural, and political history of African Americans in Chicago, including the Great Migration, the black political machine, black Chicago music, racial segregation, internal class stratification, and the role of black churches.

**AF AM ST 370-0 Black Activist Debates** Analysis of African American political thought and advocacy since Reconstruction. Major ideological and tactical debates among Ida B. Wells, W. E. B. Du Bois, Booker T. Washington, and Marcus Garvey; the shift from civil rights to Black Power in the black liberation movement; the rise of black feminism and the gay and lesbian rights movement; the rise of black conservatism and the contemporary struggle for reparations for slavery and segregation.

**AF AM ST 375-0 Globalization, Eurocentrism, Black Cosmopolitanism** Consequences of the omission of "coloniality" from questions asked of Western modernity. Examines "globalization," "Eurocentrism," and "black cosmopolitanism" as bases for understanding social theory's relation to coloniality.

**AF AM ST 378-0 The Harlem Renaissance** African American political and social movements and cultural production in theater, music, visual arts, and literature from 1915 to 1930. Prerequisites: consent of instructor and 210-1,2 or another African American literature course.

**AF AM ST 379-0 Black Women Writers** Intensive, multi-genre examination of the contribution of black women to African American, women's, and American literature, with consideration of the factors and figures that have influenced the reception of black women's writings across time.

**AF AM ST 380-0 Topics in African American Studies**

Advanced work on social, cultural, or historical topics. May be repeated for credit with different topic. Prerequisite: advanced student or senior.

**AF AM ST 381-0 Topics in Transnational Black Culture**

Examination of middle-passage texts such as novels, poetry, film, drama, slave narratives, and historical texts in order to compare how artists from across the African diaspora have approached this historically and emotionally loaded event. Prerequisite: advanced student or senior.

**AF AM ST 390-0 Research Seminar in African American**

**Studies** Methods of researching the African American experience. Identification of research problems; location, selection, and critique of relevant literature; data gathering and analysis; report writing. Topics vary. Prerequisite: advanced student or senior.

**AF AM ST 396-0 Internship in African American Studies**

Analysis of social and cultural institutions through field study and participant observation. Entails a research project sponsored by a Northwestern faculty member. Prerequisite: advanced student or senior.

**AF AM ST 399-0 Independent Study** Open to advanced students with consent of instructor. Prerequisite: advanced student or senior.

**Sample Related Courses in Other Departments**

- AF ST 390, 398
- ANTHRO 320, 332, 372 (if related to people of African descent)
- COMM ST 326 (see the School of Communication section of this catalog)
- ECON 321, 325, 326, 354
- ENGLISH 365 (if related to people of African descent), 366
- FRENCH 365, 366
- GEN MUS 330, 340-1,2,3 (see the Bienen School of Music section of this catalog)
- HISTORY 212-1,2, 306-1,2, 355, 356-1,2, 357, 358-1,2
- LATIN AM 391
- PERF ST 216, 309 (see the School of Communication section of this catalog)
- PHIL 368 (when appropriate)
- POLI SCI 327, 357 (if related to people of African descent), 359, 360
- SOCIOL 201, 207, 323, 325
- THEATRE 368 (see the School of Communication section of this catalog)

**AFRICAN AND ASIAN LANGUAGES**

The Program of African and Asian Languages (PAAL) offers opportunities to explore through language study some of the fascinating cultures that are vital for Americans to understand: those of Africa, China, India, Japan, Korea, and the Middle East. Students who combine study of one of PAAL's African or Asian languages with a major or background in such departments as history, economics, political science, or sociology will be well prepared for graduate study, professional programs, and careers in international business, journalism, trade, law, or diplomacy. Even the natural sciences have exchange programs in which knowledge of non-Western languages is useful.

PAAL offers courses in Arabic, Chinese, Hebrew, Hindi, Japanese, Korean, Persian, Swahili, and Turkish. Minors are available in Chinese and Japanese. Other African languages can be made available. Any PAAL

language may be taken to fulfill the Weinberg College requirement of two years of foreign language study. For programs of study that integrate PAAL's language offerings, see the Program of African Studies, Asian and Middle East Studies Program, International Studies Program, and Jewish Studies Program.

Advanced language study may be taken through registration in 399 Independent Study. Students are strongly encouraged to enrich their language learning by studying abroad. Interested students should consult an adviser in the Study Abroad Office early in their academic careers.

### Minor in Chinese or Japanese Language and Culture

These PAAL minors offer a concise and coherent set of courses designed to develop strong language skills in either Chinese or Japanese along with a sense of the cultural context of the language. The minors also offer the opportunity to incorporate study abroad experience for even more intensive encounters with the language and culture.

#### Minor course requirements (8 units)

##### Option A

- Language (5 units)
  - 3 quarter-courses of 200-level Chinese or Japanese
  - 2 quarter-courses of 300-level Chinese or Japanese
- Literature/culture (3 units)
  - 2 quarter-courses of Chinese or Japanese literature in translation (COMP LIT 271-1,2,3 or 274-1,2,3,4)
  - 1 quarter-course from an Asian studies discipline (e.g., ART HIST 240; HISTORY 281, 284, 381, or 384)

##### Option B: Semester or full-year study abroad

- Language (5 units)
  - 3 quarter-courses of 200-level Chinese or Japanese taken either partly or entirely in China or Japan (remainder taken upon return)
  - 2 quarter-courses of 300-level Chinese or Japanese taken upon return
- Literature/culture (3 units)
  - Any 3 disciplinary courses taken in China or Japan

### African Language Courses

**AAL 105-1,2,3 Elementary Arabic** Three-course introduction to modern standard Arabic. Speaking, reading, and listening comprehension skills developed.

**AAL 106-1,2,3 Intermediate Arabic** Grammar, reading of Arabic texts, oral communication in Arabic. Prerequisite: 105-3 or equivalent.

**AAL 121-1,2,3 Swahili I** Basic literacy skills and interactive proficiency; Swahili in cultural and historical context.

**AAL 122-1,2,3 Swahili II** Development of literacy and interactive proficiency skills; introduction to verbal arts. In Swahili. Prerequisite: 121-3 or equivalent.

**AAL 207-1,2,3 Arabic III** Reading and discussion of Arabic

writings relevant to students' interests and needs. Emphasis on writing skills. Prerequisite: 106-3 or equivalent.

**AAL 223-1,2,3 Introduction to Swahili Literature** Overview of Swahili oral verbal arts, classical literature, and modern writing. In Swahili. Need not be taken in sequence. Prerequisite: 122-3 or equivalent.

**AAL 308-1,2,3 Arabic IV** Continuation of instruction in Arabic, using textbooks and supplemental materials from literary sources (prose and poetry) and broadcast and print media. Prerequisite: 207-3 or equivalent.

**AAL 309-1 Arabic Literature in Arabic: Modern Prose** Samples of modern Arabic short stories and novels introduce students to modern Arabic literature while continuing to strengthen their language skills. Prerequisite: 308-3 or equivalent.

**AAL 309-2 Arabic Literature in Arabic: Classical Texts** Samples of *adab* and classical branches of learning introduce students to classical Arabic literature and continue to strengthen their skills. Prerequisite: 308-3 or equivalent.

**AAL 309-3 Arabic Literature in Arabic: Poetry** Introduces students to classical and modern Arabic poetry in both traditional meter and "free" verse, including poets from the Umayyad, Abbasid, and modern periods. Prerequisite: 308-3 or equivalent.

### Asian Language Courses

All Chinese language courses offer two tracks: regular courses of four levels for mainstream students and accelerated courses of four levels for students who come from Chinese-speaking homes. Mandarin-speaking students from mainland China, Taiwan, Singapore, or Hong Kong should join the accelerated courses.

For courses in Arabic, see African language courses.

**AAL 111-1,2,3 Elementary Chinese** Speaking, aural comprehension, reading, writing of basic vernacular Chinese. Both standard and simplified characters involving about 1,500 compounds. Accelerated section available for students with some oral proficiency but no literacy.

**AAL 112-1,2,3 Intermediate Chinese** Conversation, aural comprehension, writing based on reading Chinese stories, poems, stories of ballets, historical and cultural texts. Accelerated section available for students with some oral proficiency but no literacy. Prerequisite: 111-3 or equivalent.

**AAL 115-1,2,3 Japanese I** Conversation, grammar, reading, and writing for beginners. Issues of United States-Japan cross-cultural communication. Five class meetings a week plus language laboratory.

**AAL 116-1,2,3 Japanese II** A comprehensive approach to conversation, grammar, reading, and writing. Four class meetings a week. Prerequisite: 115-3 or equivalent.

**AAL 118-1,2,3 Turkish I** Sequential three-course introduction to basic literacy and oral proficiency. Offered every other academic year.

**AAL 119-1,2,3 Turkish II** Intermediate Turkish. Prerequisite: 118-3 or equivalent.

**AAL 125-1,2,3 Korean I** 3-course introduction to basic literacy and oral proficiency. Accelerated section available for students with some oral proficiency but no literacy.

**AAL 126-1,2,3 Korean II** Development of literacy and interactive proficiency skills. Prerequisite: 125-3 or equivalent. Accelerated section available for students with some oral proficiency but no literacy.

**AAL 127-1,2,3 Accelerated Korean** Years 1 and 2 combined.

**AAL 128-1,2,3 Hindi I** Three-course introduction to basic literacy and oral proficiency. Accelerated section available for students with some oral proficiency but no literacy.

**AAL 129-1,2,3 Hindi II** Three-course sequence developing literacy and interactive oral proficiency skills. Prerequisite: 128-3 or equivalent. Accelerated section available for students with some oral proficiency but no literacy.

**AAL 131-1,2,3 Persian I** Sequential three-course introduction to basic literacy and oral proficiency. Offered every other academic year.

**AAL 132-1,2,3 Persian II** Intermediate Persian. Prerequisite: 131-3 or equivalent.

**AAL 213-1,2,3 Advanced Chinese** Readings from the works of contemporary Chinese writers. Discussion and writing based on the reading materials. Prerequisite: 112-3 or equivalent.

**AAL 217-1,2,3 Japanese III** Advanced readings in modern colloquial Japanese; prose essay, literary, and newspaper styles. Prerequisite: 116-3 or equivalent.

**AAL 318-1,2,3,4 Japanese IV** A series of 4 quarterlong Japanese IV courses at the upper-intermediate level.

1. Contemporary Japanese literary works for reading and discussion. 2. Writing for various purposes. 3. Newspaper reading and news listening. 4. Reading Japanese literature in Japanese. To enroll in any 318, students must complete 217-3 or take a placement test.

**AAL 319-1,2,3 Chinese IV** Advanced reading and writing skills and Chinese literature in the language. Prerequisite: 213-3 or equivalent.

## Hebrew Courses

**AAL 101-1,2,3 Elementary Hebrew** Understanding, speaking, reading, and writing of mainly conversational Hebrew. Hebrew used as language of instruction. Drill in language laboratory.

**AAL 102-1,2,3 Intermediate Hebrew** From language to literature: review of grammar; reading and discussing Hebrew literary works (prose and poetry) and newspaper articles. Compositions and oral presentations. Prerequisite: 101-3 or equivalent.

**AAL 203-1,2,3 Advanced Hebrew** Reading Hebrew literature, some biblical but mostly modern prose. Compositions and oral presentations. Prerequisite: 102-3 or equivalent.

## All PAAL Languages

**AAL 399-0 Independent Study** For undergraduate students of any of the above languages who have advanced beyond the regular course offerings.

## AFRICAN STUDIES

In 1948 the distinguished scholar Melville J. Herskovits organized the Program of African Studies at Northwestern; more than a half-century later the program remains a model at the forefront of Africanist study and research. Through sponsorship of multidisciplinary courses with African content, language training, and promotion of Africa-based study, the program supports and enlivens the undergraduate study of Africa while serving as the University's "headquarters" for formal and informal interaction between interested students, faculty, and visitors. Every year the program brings undergraduates studying Africa together with faculty and other experts in many areas of inquiry — across disciplinary boundaries and regional specializations — for lectures, seminars, workshops, conferences, and research programs. Northwestern's Melville J. Herskovits Library of African Studies, an unparalleled resource for Africanist study, attracts students and scholars from all over the world. Over the years the program has remained in active contact with its counterparts in Africa and elsewhere, while expanding its role in the University and off-campus communities.

### Minor in African Studies

The minor in African studies approaches the study of African societies, cultures, histories, and arts across the disciplines — in the humanities, social sciences, and the professions. Students earning a bachelor's degree in Weinberg College or another undergraduate school may complete a minor in African studies by merging a core of courses with African content with their major program of study. Undergraduates in all disciplines are welcome to participate formally or informally in the program's activities, which advance the training of Africa specialists at Northwestern and promote awareness of Africa in a wider context.

### Minor course requirements (6 units)

- 6 courses with African content from at least two departments. At least 2 of the 6 courses must be from the HISTORY 255-1,2,3 sequence, and 1 must be ANTHRO 255. Students are encouraged to develop full-length research papers on African topics, supervised by faculty with African interests. They may write these papers as part of regularly offered classes, independent study courses, or senior honors programs.
- Minimum of an overall B average in these courses. Courses taken for P/N do not count toward the minor.
- Students are strongly encouraged to study a non-English language that is spoken in Africa or its diaspora, such as Swahili, Arabic, French, German, Italian, Portuguese, or Spanish. Competence in a foreign language can facilitate individual research projects, widen understanding of particular topics, and increase study abroad opportunities. Students applying for the minor in African studies, conferred at the end of each spring quarter, must

present records showing a minimum of 5 courses not double-counted in their major. Program staff encourage students to meet with them to initiate and monitor progress toward meeting the requirements.

### Courses

**AF ST 390-0 Topics in African Studies** A general examination of topics relevant to African studies. May be repeated for credit with change in topic.

**AF ST 392-1,2 Herskovits Undergraduate Research Award Courses** 2-course sequence required for recipients of the Herskovits Undergraduate Research Award.

**AF ST 398-0 Seminar in African Studies** Close study and discussion of an issue or question central to African studies. May be repeated for credit with change in topic.

**AF ST 399-0 Independent Study** May be repeated for credit with change in topic.

## AMERICAN STUDIES

The American Studies Program is an integrated interdisciplinary honors major involving faculty members of several departments. By drawing on a broad range of knowledge from the humanities and social sciences, the program examines the components of American culture and ways of integrating them. Students are allowed a wide-ranging yet disciplined exploration of problems that cross the boundaries of traditional academic fields. Freshmen and sophomores apply for admission to the major late in the winter or early in the spring quarter. Because this selective honors program has more applicants than available space, admission depends in part on academic distinction and on demonstrated interest in American cultural studies.

### Major in American Studies

*Program courses:* All sophomore and junior majors must complete 301-1,2,3. Seniors must complete 390-1,2,3.

*Related courses:* 10 quarters at the 200 or 300 level from the general curricula in American studies from throughout the University. These courses will be apportioned in a way that satisfies the interdisciplinary purpose of a major in American studies and expresses each student's explicit intellectual goals, but every major is required to take HISTORY 210-1,2 or an approved equivalent as early as possible in his or her academic career.

### Courses Primarily for Freshmen and Sophomores

**AMER ST 210-0 Topics in American Culture** Topics of interest to the American cultural analyst and historian — for example, early American symbols of heroism, the meaning of the frontier. Aimed at large general undergraduate enrollment. May be repeated for credit with consent of program director.

### Courses Primarily for Juniors and Seniors

**AMER ST 301-1,2,3 Seminar for Majors** Yearlong sequences sharing a broad theme, integrating methods and materials from different disciplines. Change of instructor each quarter; change of theme every year. Limited to 20 students (majors only).

**AMER ST 310-0 Studies in American Culture** Readings and discussions of topics in American cultural life — for example, law in 19th-century America or television news in contemporary U.S. culture. Limited enrollment with emphasis on student participation. Prerequisites vary (check with program director or in program office). May be repeated for credit with consent of program director.

**AMER ST 390-1,2,3 Senior Project** Thesis or field study. Required of majors.

**AMER ST 399-0 Independent Study** Readings and conferences on special subjects for students pursuing their area of interest within the major.

## ANIMATE ARTS

An adjunct major in animate arts is open to students in all undergraduate schools. Please see Animate Arts in the Cross-School Programs section of this catalog.

## ANTHROPOLOGY

Anthropology studies humankind from a broad comparative and historical perspective: the biological evolution of the human species and aspects of the biology of living human populations, the origins of languages and cultures, the long-term development of human cultures over many millennia, and the social life of humans in groups — families, communities, and nations. Anthropologists attempt to describe specific cultural traditions, forms of social structures, languages, and transitions in human evolution and cultural history. They compare cultures and societies to assess what cultures are similar or different, and why. Anthropology is at once a biological science, a social science, and one of the humanities.

Anthropology's breadth and its emphasis on biological and cultural change and cross-cultural comparison make it an ideal major for anyone seeking a solid liberal education as well as for those seeking careers in academic or applied anthropology or archaeology. It serves as an excellent background for students who plan to pursue specialized training in law, medicine, nursing, social work, education, conservation, international relations, or commerce. The world is an ever-smaller and more culturally mixed global community. Knowledge of the developmental processes that explain biological and cultural differences is relevant to a variety of careers. For example, prelaw students would profit from the cross-cultural study of conflict and conflict resolution; premedical students from courses in human evolution and population genetics as well as the cross-cultural study of health and disease.

The department has many strengths: the application of evolutionary and other biological perspectives to the development of humankind; North American, South American, and European prehistoric archaeology; the study of African societies; the anthropology of complex societies; political economy; and gender. The department is strong in basic theory and refinements of qualitative and quantitative analysis of anthropological data as well as ethnography.

Anthropology majors are encouraged to participate in a variety of field studies programs, including the department's archaeological field training in Belize, field training conducted with study abroad programs, and summer urban field studies in Chicago. The department is also formally affiliated with Northwestern's Chicago Field Studies Program, which offers a variety of academic internships throughout the year. Field studies that offer the opportunity to conduct original research are especially recommended as preparation for writing a senior thesis.

### Major in Anthropology

Students are expected to complete a 15-course program (11 courses in anthropology and 4 in related fields) for a major in anthropology. The department's 4 required 200-level courses provide background in the four major subfields of anthropology. 370 examines the philosophical and historical roots of the discipline. The 5 additional 300-level courses, including an examination of appropriate methods and research design issues, develop the student's intellectual maturity in the discipline. All seniors are required to take 398 and to prepare a senior thesis. This requirement provides students with an opportunity to conduct original research and, in the process, gain valuable analytical, critical thinking, and writing skills.

### Departmental courses

- 211, 213, 214, and 215. Students with previous background in anthropology may petition to substitute a 300-level course for a 200-level requirement.
- 370
- 5 additional 300-level courses selected in consultation with an adviser. Normally, these courses are chosen from one of the subfields listed below, but students may, with the consent of their advisers, develop a focus that bridges the subfields of anthropology (e.g., culture and technology, health and human development, the institutionalization of power).
  - *Archaeology*: 322 and 4 courses chosen from 301, 302, 303, 311, 321 (offered in summer), 325, 328, 339, 362, 381, 382, 383, 384, 390, 391, 396 (offered in summer)
  - *Biological anthropology*: 5 courses chosen from 306, 310, 312, 313, 314, 315, 317, 362, 383, 390
  - *Cultural/linguistic anthropology*: 389 and 4 courses chosen from 310, 311, 315, 320, 330, 332, 339, 341, 347, 350, 354, 355, 360, 361, 362, 363, 364, 368, 372,

373, 374, 376, 377, 383, 390, 395; CFS 393-1,2, 394-1,2, 395-1,2

- *Human biology*: See Concentration in Human Biology for requirements.

- 398 (senior year)

**Related courses:** Subject to the department adviser's approval, 4 courses from other departments and programs. One of these courses must be in formal or statistical methods, and at least 2 of these courses must be 300-level courses. All 4 courses should relate to the student's independent research work and strengthen the focus that guided the selection of 300-level courses in anthropology.

### *Concentration in Human Biology*

The human biology concentration is a good option for students interested in pursuing careers in the health sciences or graduate work in the biological sciences. The concentration combines a core foundation in basic science with an integrative perspective on the human organism, drawing on both the biological and social sciences. Course work emphasizes the study of human biology and health from a comparative and evolutionary perspective.

In their freshman and sophomore years students complete the introductory (200-level) anthropology requirements as well as foundational courses (which are also premedical school requirements). Junior- and senior-year course work includes 300-level courses in biological anthropology/human biology and related courses from other departments. Additionally, all seniors are required to take 398 and prepare a senior thesis.

### Departmental courses

- 211, 213, 214, 215
- 370, 386
- 4 courses chosen from 306, 310, 312, 313, 314, 315, 317, 362, 383, 390
- 398 (senior year)

### Related courses

*Foundational courses (also premedical school requirements)*

- BIOL SCI 110-1,2,3 or 210-1,2,3
- CHEM 101, 102, and 103; or 171 and 172
- CHEM 210-1,2 or 212-1,2
- MATH 220, 224, STAT 202, or equivalent
- PHYSICS 130-1,2,3 or 135-1,2,3

*Advanced courses:* Subject to the approval of the departmental adviser, 3 additional related courses at the 300 level from other departments. See the departmental adviser for a list of recommended courses.

### Minor in Anthropology

The minor in anthropology provides students in other fields with a framework to pursue a particular focus within the discipline. Such a focus might be within a subfield of anthropology (e.g., biological anthropology, archaeology,



cultural anthropology, linguistic anthropology), in area studies (e.g., Africa, the Middle East, the United States), or in a specific topic (e.g., ethnicity, gender, the origins of the state, urban studies). To fulfill this goal, the minor in anthropology combines 2 of the 4 200-level courses required of majors in anthropology, 1 in the area of ethnography (211 or 215) and 1 in the area of origins (213 or 214), with 5 300-level courses that constitute a coherent focus. The 200-level courses provide a foundation for pursuit of specialized topics.

Students pursuing the minor in anthropology must consult with the department's director of undergraduate studies to establish a program and be assigned a departmental adviser.

### Minor course requirements (7 units)

- 211 or 215
- 213 or 214
- a coherent combination of 5 300-level courses in anthropology with a specific focus

*Sample programs:* Students majoring in biological sciences but with an interest in ecology and behavior would build a coherent minor in biological anthropology by taking 211 or 215; 213; and a focused course selection such as 306, 310, 312, 313, and 383. Students majoring in history with an interest in pre- and early history would build a coherent minor in archaeology by taking 211 or 215; 214; and a focused course selection such as 301, 302, 303, 322, and 381. Students majoring in political science with an interest in noninstitutional or nongovernmental political processes would build a coherent minor in cultural anthropology by taking 211; 213 or 214; and a focused course selection such as 311, 320, 332, 341, and 347. Other programs for the minor in anthropology may be designed to meet a student's particular needs or interests.

### Honors in Anthropology

Students wishing to be considered for departmental honors should make inquiries no later than spring quarter of the junior year. In order to be eligible for honors, students must have a grade point average of 3.5 or above in anthropology courses. Enrollment is required in one quarter of 399 Independent Study or an appropriate graduate-level course in addition to 398 Senior Seminar (required for all majors). 399 should be taken before enrolling in 398. Students who meet these requirements and prepare an outstanding senior thesis will be nominated to the College Committee on Superior Students and Honors, which has final authority to grant the honors degree. For more information, consult the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

### Minor in the Study of Evolutionary Processes

The Department of Anthropology is a contributor to the interdisciplinary minor in the study of evolutionary

processes (MSEP). The minor combines essential components from anthropology, biological sciences, earth and planetary sciences, and physics and astronomy to develop graduates who understand the theoretical and practical aspects of evolution as they apply to modern society, medicine, and technology. More information about the minor can be found on page 67 and at [www.wcas.northwestern.edu/evolution](http://www.wcas.northwestern.edu/evolution).

### Courses

For 300-level courses in anthropology, the prerequisite is sophomore standing or 1 100- or 200-level course, unless a specific prerequisite is included in the description below. A student without the prerequisite occasionally may be admitted to a course with the consent of the instructor.

**ANTHRO 105-0 Fundamentals of Anthropology** Introduction to anthropology; the biological evolution of humankind; the evolution of culture; the comparative study of existing or historically recorded societies.

**ANTHRO 112-0 New Directions in Archaeology** New frontiers in archaeological perspectives of historical events, public policy, historic preservation, and prehistoric interpretation.

**ANTHRO 211-0 Culture and Society** Introduction to the comparative study of culture, exploring different types of social organization, their evolutionary significance, and their economic and political correlates.

**ANTHRO 212-0 Global Cultures, Global Inequalities** A cultural anthropological introduction to the contemporary world and the historical backdrop to contemporary globalization.

**ANTHRO 213-0 Human Origins** Emergence of human species through the process of organic evolution, emphasizing genetics, the fossil record, and comparison with our nearest living relatives.

**ANTHRO 214-0 Culture Origins** The evolution of culture from its earliest beginnings through the development of urbanism and the state. Principles of archaeological research.

**ANTHRO 215-0 The Study of Culture through Language** The scope of linguistic anthropology, from the study of language as an end in itself to the investigation of cultures through the medium of human languages.

**ANTHRO 220-0 Evolution of Moral Systems** Critical examination of evolutionary theories of the origin and development of the human propensity to make moral judgments. Prerequisite: 105.

**ANTHRO 225-0 Evolution of Human Society** Theories of the long-term evolution of human social organizations; comparative analysis of different scales of organization; population, environment, technology, subsistence, political economy, social stratification.

**ANTHRO 232-0 Myth and Symbolism** Introduction to different approaches to the interpretation of myth and symbolism, e.g., Freudian, functionalist, and structuralist.

**ANTHRO 235-0 Attending to Culture** Techniques of social



and cultural analysis for students planning to study or work abroad, with an emphasis on field-study exercises that treat culture as a lived experience, society as a participatory process, and social observation as systematic and abstract.

**ANTHRO 255-0 Contemporary African Worlds** Use of key anthropological insights about value judgments and cultural relativism to examine the survival strategies and turbulent histories of contemporary African societies.

**ANTHRO 301-0 Hunter-Gatherer Archaeology** Evolution and cultural history during the Pleistocene epoch. Inter-relationship of biology, environment, and culture from earliest hominids through appearance of *Homo sapiens*. Prerequisite: 214 or equivalent.

**ANTHRO 302-0 Agriculture: Its Origins, Environmental Impacts, and Social Transformations** Beginnings of agriculture, one of the great revolutions in human history. Domestication of plants and animals, dispersal of domesticates, long-term intensification of agriculture, environmental consequences of agriculture, and related social and cultural transformations. Archaeological evidence from Mesopotamia, Europe, Mesoamerica, and North America. Prerequisites: 214, 225, BIOL SCI 204, or ENVR SCI 235.

**ANTHRO 303-0 Origins of Civilization** Comparative survey of prehistoric civilizations and systematic examination of the formative factors in their evolution. Prerequisite: 214 or equivalent.

**ANTHRO 306-0 Evolution of Life Histories** Evolved strategies for allocating resources among growth, reproduction, and maintenance; emphasis on the biological processes underlying the human life cycle and its evolution.

**ANTHRO 310-0 Evolution and Culture** Introduction to the application of theory from evolutionary biology to cultural anthropology; principles of evolutionary biology; application of principles to human social behavior and culture. Prerequisite: 213 or equivalent.

**ANTHRO 311-0 The Indians of North America** Aboriginal cultures of northern Mexico, continental United States, Alaska, and Canada. Languages, art, and social, economic, and religious life.

**ANTHRO 312-0 Human Population Biology** Current theory and research in human biological diversity, focusing on the impact of ecological and social factors on human biology; how adaptation to environmental stressors promotes human biological variation. Prerequisite: 213.

**ANTHRO 313-0 Anthropological Population Genetics** Principles of population genetics applied to primates. Mathematical models, analyses of small populations, and interaction of social and genetic processes. Prerequisite: consent of instructor.

**ANTHRO 314-0 Human Growth and Development** Integrated biological and cultural perspective on human growth and development from infancy through adolescence; cross-cultural variation in developmental processes and outcomes. Prerequisite: 100- or 200-level anthropology, biology, or psychology course or consent of instructor.

**ANTHRO 315-0 Medical Anthropology** Theories of interactions between culture and biology that affect human health. Beliefs and practices for curing illness and maintaining well-being. Cross-cultural study of infectious and chronic diseases, mental illness, infant/maternal mortality, poverty, and gender. Prerequisite: 100- or 200-level anthropology or sociology course or consent of instructor.

**ANTHRO 317-0 Human Evolution** Fossil record and reconstruction of phylogeny; morphological and behavioral adaptation of early hominids and forebears.

**ANTHRO 320-0 Peoples of Africa** A survey of the cultures of Africa and the significant similarities and differences among the indigenous societies of the continent. Prerequisite: 211.

**ANTHRO 321-0 Archaeological Field Methods** Practical training in basic methods and techniques at an excavation site; given with summer Archaeology Field School.

**ANTHRO 322-0 Introduction to Archaeology Research Design and Methods** Regional and site-specific approaches to the description and analysis of patterns in archaeological data, including settlement survey, site characterization, vertical excavations, and horizontal household excavations.

**ANTHRO 325-0 Archaeological Methods Laboratory** Analysis of archaeological methods (faunal, botanical, artifact, or soil analysis) with various techniques. May be repeated for credit.

**ANTHRO 327-0 The Archaeology of Ethnicity in America** History of different ethnic groups in America as shown through living quarters, burials, food remains, tools, jewelry, etc. How groups have been portrayed in museums claiming to depict the American past. Focus on African Americans and Native Americans.

**ANTHRO 328-0 The Maya** The archaeology of the Maya in Latin America; life and society in pre-Columbian Maya civilization; history of Maya resistance to colonial and post-colonial domination (e.g., Zapatistas). Prerequisite: 100- or 200-level anthropology, history, or sociology course.

**ANTHRO 330-0 Peoples of the World** Comparative ethnography of a regionally or historically associated group of cultures or a type of community defined in ecological, ideological, or other terms. May be repeated for credit.

**ANTHRO 332-0 The Anthropology of Reproduction** Marriage and reproduction throughout the world, particularly the developing world and Africa. Conjugal strategies, fertility, contraception.

**ANTHRO 339-0 Material Culture** Relationship between material objects and social life; review of theoretical approaches to gifts and commodities; ethnographic collecting in colonial and postcolonial settings; relationship between culture and aesthetics. Prerequisite: 211 or consent of instructor.

**ANTHRO 340-0 Visual Anthropology of Africa** Anthropological analysis of techniques, visual rhetoric, and narrative strategies embedded in images of Africa and Africans in a variety of contemporary and digital media. Course

includes instruction in video production. Prerequisite: 200-level social science or African studies course or consent of instructor.

**ANTHRO 341-0 Economic Anthropology** Economic organization in small-scale nonindustrialized communities.

Traditional structures of primitive and peasant economies.

**ANTHRO 347-0 Political Anthropology** Cross-cultural study of political organization in stateless and state societies. The state, its origin, and changing role in developing countries.

**ANTHRO 350-0 Anthropology of Religion** The human relationship with the supernatural and action patterns accompanying beliefs. Comparison of nonliterate religions and historical religions.

**ANTHRO 354-0 Gender and Anthropology** Cross-cultural survey of women's roles from three perspectives: biosocial, sociocultural, politicoeconomic. Theory of gender inequality. Emphasis on the third world.

**ANTHRO 355-0 Sexualities** Cross-cultural survey of sexuality from an anthropological perspective. Focus on first half of the 20th century, the 1970s, 1980s, and the turn of the 21st century.

**ANTHRO 360-0 Language and Culture** Relationship between language and culture; language as the vehicle of culture and as the manifestation of thought.

**ANTHRO 361-0 Talk as Social Action** Analysis of talk in interaction based on examination of audio and video recorded data and associated transcripts. Conversation, action, turn, sequence, relevance, social structure, qualitative methodologies. Prerequisite: 215 or consent of instructor.

**ANTHRO 362-0 Advanced Methods in Quantitative Analysis** Advanced applications of univariate and multivariate statistics to anthropological research questions. Prerequisite: 200-level statistics course.

**ANTHRO 368-0 Latino Ethnography** Sociocultural analysis of U.S. Latino communities. Examines ethnographies by and about Latinos based in the United States. Draws on a broad disciplinary basis, including Latino studies and ethnic studies, to critique and elaborate on ethnographic methods and epistemologies. Prerequisite: 211, LATIN AM 251, or consent of instructor.

**ANTHRO 370-0 Anthropology in Historical Perspective** Major schools of thought in social, archaeological, and biological anthropology over the last century. Prerequisite: 200-level anthropology course or consent of instructor.

**ANTHRO 372-0 Third World Urbanization** Urbanization processes in the third world. Spatial development, wage labor, the informal sector, gender relations, rural-urban migration, and global and transnational interactions. Effects of these processes on sociocultural practices. Prerequisite: 100- or 200-level social science course or consent of instructor.

**ANTHRO 373-0 Power and Culture in American Cities** Overview of history and present realities of American urban life, with focus on ethnographic knowledge and stratifications by class, race, ethnicity, gender, nationality,

and sexuality. Reconstitution of social and cultural relations, politics, and labor markets by recurrent streams of migration. Prerequisite: 100- or 200-level cultural anthropology or sociology course or consent of instructor.

**ANTHRO 374-0 The Anthropology of Complex Organizations** Examination of recent research in organizational ethnography based on investigations in industrial ethnology, the anthropology of work, studies of public-sector bureaucracies, and research in multinational corporations. Prerequisite: 100- or 200-level anthropology or sociology course or consent of instructor.

**ANTHRO 376-0 Socialization** Cross-cultural study of the intergenerational transmission of culture; processes by which social groups pass on social tradition and behavior to succeeding generations. Prerequisite: 211, introductory psychology course, or consent of instructor.

**ANTHRO 377-0 Psychological Anthropology** Contemporary approaches to cross-cultural behavior: ecocultural aspects of behavior development through maturation and socialization in human and nonhuman primates. Prerequisite: introductory survey courses in psychology or anthropology or consent of instructor.

**ANTHRO 378-0 Law and Culture** Introduction to the anthropology of law; institutional knowledge as seen in material culture and legal documents; colonial and postcolonial settings; theoretical approaches to the relationships between law and culture, colonialism, evidence, and globalization. Prerequisite: 200-level anthropology course or consent of instructor.

**ANTHRO 381-0 North American Prehistory** Intensive study of cultural history of one or more areas of the continent from archaeological evidence.

**ANTHRO 382-0 Households and Everyday Life** The role of households and everyday life in past and present societies throughout the world. Focus on people, gender, social relations, and interpersonal relations. An archaeology course with heavy emphasis on theoretical perspectives from sociology and cultural anthropology. Prerequisite: 100- or 200-level anthropology, history, or sociology course.

**ANTHRO 383-0 Environmental Anthropology** How humans have changed and are changing the environment and what can be done to halt environmental deterioration. Topics include tribal lifestyles, population trends, food supplies, consumerism, environmental regulation, and ecological consciousness.

**ANTHRO 384-0 Introduction to Zooarchaeology** Introduction to the study of animal bones from archaeological sites. Identification, sampling, quantification, hunting economies, domestication, and herding systems in complex societies. Prerequisites: 214; 301 or 302; or consent of instructor.

**ANTHRO 386-0 Methods in Human Biology Research** Laboratory-based introduction to international research in human biology and health; methods for assessing nutritional status, physical activity, growth, cardiovascular health, endocrine and immune function. Prerequisite: 213 or consent of instructor.

**ANTHRO 389-0 Ethnographic Methods and Analysis**

Descriptive, naturalistic study of the culture of human social groups. Data gathering through observation and interview. Data analysis for ethnographic reporting. Prerequisites: 211 and 215.

**ANTHRO 390-0 Topics in Anthropology** Advanced work in areas of developing interest and special significance. May be repeated for credit with different topic.

**ANTHRO 391-0 Archaeology, Ethics, and Contemporary Society**

Why study of the past is relevant to the present; examination of ethical issues in archaeology as they arise during the field work experience. Prerequisite: 321.

**CFS 393-1,2, 394-1,2, 395-1,2 Chicago Field Studies** See Chicago Field Studies.

**ANTHRO 395-0 Field Study in Anthropology** Ethnographic field experience in the United States (e.g., the Southwest) or abroad. Offered in conjunction with summer field schools for exceptional students. Prerequisite: consent of instructor.

**ANTHRO 396-0 Advanced Archaeological Field Methods**

Complex excavation and survey procedures, topographic map making, excavation drawing, soil description; offered in conjunction with the summer Archaeology Field School.

**ANTHRO 396-7 Junior Tutorial** Intensive work on a topic not normally offered.

**ANTHRO 398-0 Senior Seminar** Supervised group discussion of research in preparation of senior thesis. Required of all majors. Prerequisite: 388.

**ANTHRO 399-0 Independent Study** Open with consent of department to juniors and seniors who have completed with distinction at least 2 quarter-courses or equivalent in anthropology. Under direction of individual members of department.

**Related Courses in the Bienen School of Music**

- MUSICOL 323, 326-1,2

**Summer Field Schools**

*Ethnographic Field School in Cultural and Linguistic*

*Anthropology*: 395

*Archaeology Field School*: Courses may include 321, 322, 325, and 396, some of which are also offered on the Evanston campus.

For additional information, contact the Department of Anthropology.

**ART HISTORY**

Art history explores the historical meaning of art, architecture, and visual culture in all parts of the world from antiquity to the present. It analyzes visual objects through their form, technique, design, historical context, and ideological function. It also studies individual artists or makers, cultural institutions, audiences, and intercultural exchanges. It is inherently interdisciplinary, often requiring theoretical engagement with fields such as anthropology, philosophy,

critical theory, political science, history, literature, film, performance, theater, and area studies.

The study of art history develops skills of informed and critical looking, reading, speaking, and writing. Thus, while it offers specialized knowledge of the visual world for those who want to pursue careers in the art world, academia, and the practice of art and design, the major is also excellent for any student seeking a solid foundation in the liberal arts. With its broad historical, cultural, geographic, and methodological spectrum, it offers an excellent background for students who want to specialize in areas such as law, medicine, business, international relations, politics, and education.

Careers in museums generally require at least a master's degree. Careers in college and university teaching and research require a PhD. For more information about careers in art history, contact the director of undergraduate studies.

The art history curriculum enables students to acquire a broad knowledge of world traditions of art and visual culture and gain expertise in particular areas, forms, and practices. It readily accommodates students who wish to study abroad. At the heart of the major curriculum is the Undergraduate Methods Seminar (391), which surveys different methodological approaches to art history and critical texts that have shaped the discipline. It prepares students for the independent research required in seminars and advanced lecture courses and ideally should be taken by the end of the junior year.

100-level freshman seminars treat a wide variety of art historical topics that vary from year to year and are intended to introduce students to the discipline of art history and help them develop or improve their basic writing and research skills. These courses are not required for art history majors.

200-level courses offer broad introductions to African, African diaspora, Asian, ancient, medieval, Islamic, American, Latin American, and European art and the history of architecture. They are taught in rotation, usually with three subject areas offered annually. The courses consist of two or three lectures and a single discussion class each week and provide students with the factual and methodological foundation for more advanced courses at the 300 level.

300-level courses provide detailed explorations of important fields and issues in art history and visual culture. Enrollments may be limited to facilitate discussion. In these classes students discover the field expertise of their professors and are introduced to advanced research in art history. 300-level classes often require prior course work at the 200 level, preferably in a related chronological and geographic area, and some may also require consent of the instructor.

Undergraduate seminars (390) are available to art history majors only, except with special consent of the faculty. Seminars meet once a week for instruction, discussion, and debate. In these classes majors hone their visual,

analytic, speaking, and writing skills and have the opportunity to work both cooperatively and individually. Seminar topics generally reflect the advanced research interests of the professor. Field trips to museums, private collections, and architectural monuments are often integrated into the class. The Museums Seminar (395) is often taught by a museum curator and may take place at the museum. Majors are required to take at least 1 seminar in addition to 391 prior to graduation and may take as many as 3.

Internships (396) at museums, galleries, or other suitable institutions often may be arranged for credit. Students wishing to take an internship are strongly encouraged to consult first with the director of undergraduate studies.

Independent study (399) outside the academic curriculum may be arranged in exceptional circumstances. In these cases students must get the consent of their academic adviser prior to the term in which they intend to pursue their independent research.

Scholarly resources at Northwestern include the University art collection, housed at the Mary and Leigh Block Museum of Art, the fine arts collection in Deering Library, the McCormick Library of Special Collections, and the Herskovits Library of African Studies, all on the Evanston campus. The Visual Media Collection, which is part of Northwestern Library's Digital Collections, is housed in the art history department and consists of a steadily growing collection of digital images chronicling the history of the art and architecture of Europe, the Americas, Asia, Africa, and the Middle East. The slide collection in the art history department includes approximately 275,000 slides.

Resources in the area include the Art Institute of Chicago, the Chicago History Museum; the Newberry Library; the Field Museum; the Museum of Contemporary Art; the Chicago Architectural Foundation; the Graham Foundation for Advanced Studies in the Fine Arts; the David and Alfred Smart Museum, the Renaissance Society, and the Oriental Institute at the University of Chicago; the Evanston Art Center; and other institutions. Research libraries that students may use with consent include the Ryerson Library at the Art Institute, the Newberry Library, and the Regenstein Library at the University of Chicago.

All majors are required to confer with the director of undergraduate studies at the start of the academic year about their course work and are encouraged to do so before each period of registration. The director is also responsible for approving study abroad, transfer credits, and the petition to graduate. He or she communicates regularly with majors by e-mail.

## Major in Art History

### Departmental courses

- 2 200-level courses
- 9 300-level courses, including Undergraduate Methods Seminar (391); at least 1 390 or 395 seminar; and at

least 1 course each in ancient-medieval, Renaissance-Baroque, modern, and non-Euro-American art history.

**Related courses:** At least 4 additional courses from one or more of the following departments or programs: African American studies, anthropology, art theory and practice, classics, comparative literary studies, English, French and Italian, gender studies, German, history, music history, performance studies, philosophy, radio/television/film, religion, Slavic languages and literatures, theater, and Spanish and Portuguese.

## Minor in Art History

### Minor course requirements (8 units)

- a maximum of 2 of the 8 required courses at the 200 level
- at least 1 of the remaining courses in a non-Euro-American area

## Honors in Art History

Students may be nominated for honors in art history only if they have successfully completed a senior thesis demonstrating substantial research and high quality. Students who wish to write a thesis must have a grade point average of 3.5 or better in departmental and related courses. The senior thesis requires

- successful completion of 2 independent study courses (399), 1 of which may count toward the major (taken in the fall and winter quarters of senior year)
- participation in the departmental senior thesis colloquium, in which students meet as a group with the director of undergraduate studies, twice in the fall and twice in the winter/spring, to share their work and their progress with their peers; the colloquium does not count toward course credit

Completed senior theses are submitted in April prior to graduation and evaluated by a departmental honors committee. For further information, please contact the undergraduate adviser. See also Honors and Prizes in the Undergraduate Education section of this catalog.

## Courses

**ART HIST 210-0 Introduction to Art History** Conceptual introduction to the problems and methods of art history. Team-taught by departmental faculty, it introduces professors and their areas of expertise as well as fundamental concepts, monuments, and objects in art history.

**ART HIST 220-0 Introduction to African Art** Thematic and historical survey of the major periods of art making in Africa; analysis of a few exemplary works.

**ART HIST 222-0 Art History and the African Diaspora** Introduction to the visual and performance art of the African diaspora, including the Caribbean, Brazil, and the United States.

**ART HIST 224-0 Introduction to Ancient Art** Introduction to the art and architecture of the ancient Near Eastern, Egyptian, Aegean, Greek, and Roman worlds.

**ART HIST 225-0 Introduction to Medieval Art** Introduction to the art and architecture of the medieval Mediterranean from the late Antique, Byzantine, and Islamic periods through the early medieval, Romanesque, and Gothic artistic traditions.

**ART HIST 228-0 Introduction to Pre-Columbian Art**

Introduction to pre-Columbian and Native American art and architecture, from tribal societies, such as the Iroquois, Mandan, and Kwakiutl, to complex states, such as the Aztec, Maya, and Inca.

**ART HIST 230-0 Introduction to American Art** Survey of art and architecture in cultural context, from the art of conquest to contemporary issues.

**ART HIST 232-0 Introduction to the History of Architecture and Design** The theory and history of architecture in relation to cities and landscape; the history of design, 1850–present.

**ART HIST 235-0 Introduction to Latin American Art** Survey of the work of artists and groups from throughout the various countries of Central and South America from colonial times to the present.

**ART HIST 240-0 Introduction to Asian Art** Introduction to the art and architecture of India, China, and Japan from ancient cultures to contemporary developments, including religious, court, and popular genres.

**ART HIST 250-0 Introduction to European Art** Leading centers and artists of Europe from the Middle Ages to the 20th century. Architecture, sculpture, painting, and graphic arts in relation to their social and cultural settings.

**ART HIST 255-0 Introduction to Modernism** Conceptual introduction to modernism, covering art and visual culture from the later 19th century to the later 20th century, with a focus on Europe and the United States.

**ART HIST 260-0 Introduction to Contemporary Art**

Conceptual and thematic introduction to art since the 1960s, with attention to the impact of new technologies, social and political change, globalization, and the ongoing transformation of artistic production and distribution.

**ART HIST 310-1,2 Ancient Art** Art and architecture of the Ancient Greco-Roman world. **1.** Art and architecture of Greece from the prehistoric Aegean to the Hellenistic periods. **2.** Art and architecture of the Roman world from Etruscan forerunners to the High Empire. Prerequisite: 1 200-level art history course.

**ART HIST 320-1,2,3 Medieval Art** Art and architecture of the Middle Ages. **1.** Byzantine. **2.** Early medieval. **3.** Late medieval. Prerequisite: 1 200-level art history course.

**ART HIST 330-1,2,3 Renaissance Art** Painting, sculpture, architecture, and the graphic arts in Europe from the late Middle Ages through the 16th century. **1.** Italian art from c. 1300 to the sack of Rome (1527). **2.** Italian art from Mannerism to the High Baroque in Rome. **3.** France, Germany, and/or the Netherlands from the 14th through the 16th centuries. Prerequisite: 1 200-level art history course.

**ART HIST 340-1,2 Baroque Art** Painting, sculpture, and the graphic arts in Europe from the late 16th through the 17th centuries. **1.** Art and visual culture of the Mediterranean regions (Italy, Spain, France). **2.** Northern Baroque art and visual culture. Prerequisite: 1 200-level art history course.

**ART HIST 350-1,2 19th-Century Art** Survey of European painting and sculpture. **1.** The late 18th century to 1848. **2.** 1848–1900. Prerequisite: 1 200-level art history course.

**ART HIST 360-1,2 20th-Century European Art** European painting, sculpture, architecture, design, and visual culture of the 20th century. **1.** Pre–World War II. **2.** Post–World War II. Prerequisite: 1 200-level art history course.

**ART HIST 365-1,2 American Art** Survey of the arts and visual culture in the United States, encompassing architecture, painting, sculpture, photography, prints, film, and popular culture. **1.** Colonial times to the Civil War. **2.** Post–Civil War. Prerequisite: 1 200-level art history course.

**ART HIST 366-0 Contemporary Art** In-depth study of art since 1960 as seen from a global perspective and with attention to concurrent developments in critical theory. Prerequisite: 1 200-level art history course.

**ART HIST 370-1,2 Modern Architecture and Design** **1.** The history and theory of architecture in relation to cities and landscape, 1800 to today. **2.** The history of design, 1850 to today. Prerequisite: 1 200-level art history course.

**ART HIST 372-1,2 Japanese Art** Survey of Japanese art. **1.** Arts of Japan pre-Meiji Restoration (1868), including painting, calligraphy, ceramics, architecture, sculpture, textiles, and gardens in religious and secular settings. **2.** Modern Japanese art and architecture, 1868–present. Prerequisite: 1 200-level art history course.

**ART HIST 378-0 Architecture and Urbanism of the World City in the 20th Century** Critical examination of the modern city as a socioeconomic system. Prerequisite: 1 200-level art history course.

**ART HIST 382-1,2 Chinese Painting** Survey of Chinese painting, 7th–17th centuries. **1.** Visual culture of the Tang and Song dynasties. **2.** Yuan and Ming dynasties. Prerequisite: 1 200-level art history course.

**ART HIST 384-0 African American Art** Art of the African-descended cultures of North and South America and the Caribbean. Prerequisite: 1 200-level art history course.

**ART HIST 385-0 Black Visual Culture: Race and Representation** Examination of how visual representations and technologies of vision have been used to create, transform, or destabilize the idea of race as it pertains to people in the African diaspora at specific historical moments. Prerequisite: 1 200-level art history course.

**ART HIST 386-0 Art of Africa** Thematic examination of art and art historiography of sub-Saharan Africa from the 15th century to the present. Prerequisite: 1 200-level art history course.



## Special Topics Courses

**ART HIST 319-0 Special Topics in Ancient Art** Content varies — for example, picturing the gods; monument and commemoration in antiquity; narrative in ancient art; and the Roman provinces. Prerequisite: 1 200-level art history course.

**ART HIST 329-0 Special Topics in Medieval Art** Content varies — for example, the early Christian church; history of illuminated manuscripts; pilgrimage and saints' cults; the cathedral; Spain; art and crusade. Prerequisite: 1 200-level art history course.

**ART HIST 339-0 Special Topics in Renaissance Art** Content varies — for example, the art of Bosch and Brueghel; the history of collecting; art at court; portraiture; gender and representation. Prerequisite: 1 200-level art history course.

**ART HIST 349-0 Special Topics in Baroque Art** Content varies — for example, French art of the 16th and 17th centuries; art and the New World; early modern prints and drawings; art and science. Prerequisite: 1 200-level art history course.

**ART HIST 359-0 Special Topics in 19th-Century Art** Content varies — for example, the art of Edouard Manet; orientalism; the spaces of 19th-century art; French painting in the south of France. Prerequisite: 1 200-level art history course.

**ART HIST 367-0 Special Topics in American Art** Content varies — for example, nationalism and internationalism in American art; the myth of America; the artist in American society; elite and popular visual traditions. Prerequisite: 1 200-level art history course.

**ART HIST 368-0 Special Topics in 20th-Century Art** Content varies — for example, art of the Russian Revolution; the avant-garde; totalitarian art; art during war; modernism and its discontents; art and decolonization; medium specificity. Prerequisite: 1 200-level art history course.

**ART HIST 369-0 Special Topics in Contemporary Art** Content varies and may coincide with local exhibitions — for example, art and activism, utopia and dystopia in recent practice; participatory art; the Sixties; video art; art criticism; globalization; visual cultural studies; photography in/as art; installation art; truth and fiction in recent practice. Prerequisite: 1 200-level art history course.

**ART HIST 379-0 Special Topics in Architecture** Content varies — for example, Chicago architecture, including the work of Sullivan and Wright; Beaux Arts architecture in Europe and America; modernism in architecture; American architecture from Thomas Jefferson to Frank Lloyd Wright. Prerequisite: 1 200-level art history course.

**ART HIST 389-0 Special Topics: Arts of Asia and the Middle East** Content varies — for example, aspects of painting in the Indian subcontinent: Mughal and Rajput; issues of gender and sexuality in Japan and China from the 18th through the 20th century; design and architecture in modern Japan; artistic interaction between Japan and the

United States; art in/about the Middle East. Prerequisite: 1 200-level art history course.

## Courses Primarily for Majors

**ART HIST 390-0 Undergraduate Seminar** Content varies — for example, video's first decade; readings in medieval art; Frank Lloyd Wright and Mies Van der Rohe, 1937–50; Bosch and Brueghel; Japanese prints; Jerusalem; the spaces of Chicago. Prerequisite: 1 300-level art history course.

**ART HIST 391-0 Undergraduate Methods Seminar** An introduction to the history of the discipline of art history and to the different methodological approaches to the study of art and visual culture. Prerequisite: 1 300-level art history course.

**ART HIST 395-0 Museums** Museum studies seminars. Content varies — for example, the history of museums, their ethical basis, community responsibilities, educational prerogatives, and future directions. Prerequisite: 1 300-level art history course.

**ART HIST 396-0 Internship in the Arts** Direct participation under the supervision of a faculty member in the regular activities of an established arts organization. By petition, on a limited basis; may be taken only once. Prerequisite: 1 300-level art history course.

**ART HIST 399-0 Independent Study** Special projects in art history involving reading and conferences with a supervising professor; 2 quarters required for students writing a senior thesis in art history. Prerequisite: 1 300-level art history course.

## ART THEORY AND PRACTICE

As its name suggests, the Department of Art Theory and Practice explores both the making of contemporary art and the ideas and theories that drive it. Faculty and students pursue the visual arts as a theoretical discipline that pushes the boundaries of aesthetic and cultural experience. The department offers a range of courses that apply traditional approaches, adopt newer media, or use alternative strategies. The study of art practice in traditional media, such as painting, drawing, sculpture, and photography, is the core of the undergraduate course structure, enabling students to develop a solid foundation in the field's traditions and established forms. Studio art classes address both technique and critical thinking about contemporary art; these are complemented by classes in contemporary art theory. Other courses expressly look forward, exposing students to experimental approaches and a foretaste of future developments in visual art making. This dynamic curriculum incorporates digital technology, video, and conceptual art practice, thus blending new trends with traditional practices.

## Major in Art Theory and Practice

Students majoring in art theory and practice plan a program of study in consultation with and subject to the



approval of a department adviser. The major comprises a total of 19 departmental and related courses.

### Departmental courses

*Introductory courses (3):* 3 courses chosen from 120, 125, 140, or 150

*Intermediate and advanced courses (8):* 4 300-level courses including 380 (399 may be used only once to fulfill major requirements); 4 other studio courses at any level

*Art history and criticism courses (3):* 270, 272, and any art history department course other than freshman seminars

*Related courses (5):* 5 courses chosen from 200- and 300-level courses in one or more of the following departments with the approval of the adviser: African American studies, anthropology, art history, classics, comparative literary studies, English, French and Italian, gender studies, German, history, music, philosophy, Slavic languages and literatures, and Spanish and Portuguese

### Honors in Art Theory and Practice

Outstanding students may qualify for departmental honors in their senior year by taking 2 courses — 399 in the winter quarter and 380 in the spring quarter — in which they complete an approved studio project and related essay under department faculty supervision. See Honors under Academic Policies earlier in this section of the catalog.

### The Teaching of Art

Weinberg College students pursuing a major in art who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

### Courses

**ART 120-0 Basic Painting** Introduction to problems in oil painting and visual thinking. Includes surface preparation, color mixing, and composition. No previous experience necessary.

**ART 125-0 Basic Drawing** Introduction to basic drawing techniques and problems in line, space, perception, and the expressive use of various graphic media. No previous experience necessary.

**ART 135-0 Basic Calligraphy** Chinese and Japanese calligraphy from ancient pictographs to modern-day Chinese Kanji, using a calligraphy brush with sumi ink. No previous experience necessary.

**ART 140-0 Basic Sculpture** Introduction to basic sculptural materials and techniques and issues of three-dimensional form. No previous experience necessary.

**ART 150-0 Basic Photography** Extensive darkroom instruction focusing on aesthetic problems and the production of

high-quality black-and-white prints. No previous experience necessary.

**ART 210-0 Digital Tools for Artists** Introduction to basic digital tools including Adobe Photoshop and Illustrator and their use in the production of both traditional media and digital works. Prerequisite: 1 100-level course in the department.

**ART 222-0 Intermediate Painting** Development of visual language and technical skills in oil painting. Prerequisite: 120.

**ART 224-0 Color Theory** Introduction to color theory with emphasis on its application to the visual arts. Key terms, the basics of color physics, the physiology of visual perception, and theories of color relationships. Prerequisite: 1 100-level course in the department.

**ART 225-0 Intermediate Drawing** Continued development of drawing skills, perceptual abilities, content, and creative thought. Prerequisite: 120 or 125.

**ART 230-0 Alternatives to the Object** Alternative approaches to making and understanding visual art. Rather than approaching the work of art as an object, students explore it as gesture, idea, or experience. Prerequisite: 1 100-level course in the department.

**ART 231-0 Relief Printmaking** The design and production of prints from wood, linoleum, and plastic surfaces; also collograph and monoprint techniques. Prerequisite: 120 or 125.

**ART 232-0 Intaglio Printmaking** Etching, engraving, aquatint, mezzotint, and drypoint. Prerequisite: 120 or 125.

**ART 240-0 Intermediate Sculpture** Concepts, forms, and processes in sculpture, with an emphasis on developing a personal artistic direction. Prerequisite: 140 or consent of instructor.

**ART 250-0 Intermediate Photography** Large-format, studio lighting techniques, conceptual approaches, introduction to digital photography. Prerequisite: 150.

**ART 252-0 Color Photography** Techniques and issues of contemporary color photographic process; digital printing. Prerequisite: 150.

**ART 260-0 Video Art** Methods of the studio-based production of video art, including shooting, editing, and presentation. Prerequisite: 1 100-level course in the department.

**ART 270-0 Contemporary Art Survey** Forms and concerns of art from the 1960s to the present, introduced in slide-lecture format.

**ART 272-0 Critical Methods for Contemporary Art** Introduction to basic key terms, concepts, and analytical categories of theoretical discourses relevant to an informed and critical engagement with contemporary art.

**ART 290-0 Intermediate Special Topics in Art** Studio course focusing on a topic or theme of special interest in contemporary art. Content varies. Prerequisites vary with topic.

**ART 310-0 Digital Art** Exploration and production of digital art including web-based works and/or computer-based interactive works. Prerequisite: 210 or consent of instructor.

**ART 322-1,2 Advanced Painting** Development of painting skills and personal artistic vision. Prerequisite: 222.

**ART 325-0 Advanced Drawing** Problems in form, technique, and content in drawing for the advanced student. Prerequisite: 225.

**ART 340-0 Installation Art** Exploration of installation art in any media, including video, photography, painting, light, sound, and sculptural materials, in works that expand the physical boundaries of art beyond the discrete object. Prerequisite: 140 or consent of instructor.

**ART 372-0 Art Theory and Practice Seminar** Variable topics addressed in a seminar format. Prerequisites: vary with topic.

**ART 380-0 Studio Critique** Development of a self-motivated individual studio practice, a strong portfolio, and critical skills. Students learn to give articulate verbal and written expression to the concerns their art explores. Prerequisite: junior or senior status in the major or consent of instructor.

**ART 390-0 Special Topics in Art** Studio course focusing on a topic or theme of special interest in contemporary art. Content varies. Prerequisites: vary with topic.

**ART 399-0 Independent Study** For advanced majors pursuing projects outside the context of regularly offered courses. Prerequisite: consent of department chair.

## ASIAN AMERICAN STUDIES

Asian American studies is a vital component of a liberal arts education that seeks to broaden awareness and appreciation of the world. Asian American studies deepens understanding of the multiracial history and character of the United States and also provides an opportunity to place the American experience within a larger global context.

Northwestern's Asian American Studies Program aims to provide students with an understanding of Asian American experience as fundamental to the ongoing development of American society and linked to the experiences of other racial minorities in the United States and of Asian migrants across the world. The program thus encourages students to develop informed, far-reaching perspectives that facilitate responsible participation in a rapidly changing world. As an interdisciplinary program, Asian American studies develops traditional investigative, analytic, and critical skills while also promoting the intellectual and creative powers students need to meet the challenges of the 21st century.

### Minor in Asian American Studies

The minor in Asian American studies offers an opportunity to pursue a coherent study of Asian American communities and the experiences of Asian Americans in the United States. It also provides a foundation for the interdisciplinary study of race, ethnicity, and migration within the modern global historical development of nationalism, imperialism, and colonialism.

### Minor course requirements (7 units)

- 6 courses in Asian American studies, including introductory survey (210), history survey (214), or literature survey (275). At most 2 courses from other programs and departments with significant coverage of Asian American issues may be counted toward the 6 courses with permission of the program director.
- 1 course in a discipline other than Asian American studies that focuses on race and ethnicity. The course should provide conceptual and comparative breadth concerning a topic related to Asian American studies.
- at least 3 of the required 7 courses must be at the 300 level

### Courses

**ASIAN AM 201-0 Topics in Asian American Studies** Varying topics in Asian American religion, literature, politics, and culture. May be repeated for credit with different topic.

**ASIAN AM 210-0 Introduction to Asian American Studies** Origins of the field, emerging trajectories, core concepts, theories and methodologies. Analyzes race, gender, immigration, diaspora, class, labor, and sexuality as primary subjects of the field.

**ASIAN AM 214-0 Introduction to Asian American History** Introduction to the history of Asians in the United States, with a focus on their impact on American society as well as their experiences within the United States.

**ASIAN AM 218-0 Cracking the Color Lines: Asian-Black Relations in the U.S.** Comparative historical analysis of Asian-black relations in the United States, including racialized and sexualized discourses structuring interracial relations and social, political, and economic location. Slavery, immigration, model minority myth, cross-racial politics.

**ASIAN AM 225-0 Contemporary Issues in Asian American Communities** Critical examination of post-1965 Asian American communities in light of demographic, social, racial, and economic trends in the United States and Asia.

**ASIAN AM 236-0 Introduction to Asian American Politics** Examination of how increased Asian American political participation and presence have changed racial politics in the United States.

**ASIAN AM 247-0 Asian Americans and Popular Culture** Examination of the place of Asian Americans within American popular culture, historically and today.

**ASIAN AM 250-0 Multiracial Asian Americans** Causes and consequences of increase in multiracial Asian Americans and impacts on notions of "race." Racialization and sexualization of Asian immigrants, post-1960s boom in interracial marriage, and identity formation of Asian biracials.

**ASIAN AM 275-0 Introduction to Asian American Literature** Introduction to Asian American literature from the early 20th century to the present, covering a range of genres and ethnicities.

**ASIAN AM 304-0 Asian American Women's History**

Exploration of race, gender, and the contours of U.S. history from the perspective of Asian American women's experiences. Considers migration, exclusion, labor, marriage, family, sexuality, and cross-racial alliance.

**ASIAN AM 310-0 Contemporary Asian-Black Relations:****Conflict and Cross-Cultural Collaboration in Urban America**

Divides between Asians and blacks; areas of positive cross-cultural collaboration. Historical analysis of reparations, the 1992 Los Angeles riots, and affirmative action. Cross-racial exchange in youth expressions, popular culture, hip-hop.

**ASIAN AM 350-0 Asian American Religions**

Analysis of the role of religion in Asian American communities; how experiences as immigrants and as racial and ethnic minorities shape religious practices, communities, theologies, and identities.

**ASIAN AM 360-0 Asian American Women and Gender**

Exploration of the intersections of gender, race, and ethnicity, the construction of masculinity and femininity, and the relationship with feminism in the life experiences of Asian American women.

**ASIAN AM 370-0 Diaspora in Asian American Studies**

Exploration of the ideas of diaspora and homeland and their implications for rethinking immigration and migration as they relate to the experiences of Asian Americans.

**ASIAN AM 380-0 Topics in Asian American Arts and**

**Performance** Analysis of Asian American contributions to the art and culture of the United States. Exploration of the dynamics of race, gender, and class in Asian American dance, theater, and film. May be repeated for credit with different topic.

**ASIAN AM 392-0 Seminar in Asian American Studies** Seminar on a topic in areas related to Asian American social structure and culture. May be repeated for credit with different topic.

**ASIAN AM 399-0 Independent Study in Asian American**

**Studies** Readings and conferences on special subjects for students pursuing areas of interest in Asian American studies.

**ASIAN AND MIDDLE EAST STUDIES**

The Asian and Middle East Studies Program accommodates the diverse levels of preparation and interests of students attracted to the study of Asia and the Middle East. Most 100- and 200-level courses as well as many 300-level courses are designed for students with no background in Asian and Middle East studies. Students may take such courses for elective credit or to meet specific requirements of their programs of study.

There are two Asian and Middle East studies majors. Students doing either major or the minor are encouraged to complete at least 1 quarter of research in their area of interest. Courses taken while enrolled in study abroad in Asia or the Middle East generally count toward the major or minor.

**Major in Asian and Middle East Languages and Civilizations**

The major consists of 17 quarter-courses chosen in consultation with the program director from the list of approved courses. The 17 quarter-courses must include 6 quarter-courses of language study beyond the first year in Arabic, Chinese, Hebrew, Hindi, Japanese, Korean, Persian, or Turkish. (Native-speaker proficiency does not count for course credit.) The student and adviser will identify an appropriate geographic or other focus and typically select at least 3 courses in each of three disciplinary categories: social sciences, history, and humanities. In most cases the focus will be on one of the four culturally differentiated areas into which Asia and the Middle East are conventionally divided: East Asia, Southeast Asia, South Asia, and West Asia/Middle East. Two units of the major must involve related research. These could be seminars, independent study, or a senior thesis.

A list of approved courses for the major is available on the Asian and Middle East studies web site at [www.asianandmiddleeast.northwestern.edu](http://www.asianandmiddleeast.northwestern.edu). The major also requires a study abroad experience in Asia or the Middle East, although students may petition for a waiver of this requirement. Students should see the program director for further information about major requirements. Up to 2 courses may double-count toward a second major.

**Adjunct Major in Asian and Middle East Studies**

The adjunct major in Asian and Middle East studies must be done in conjunction with another major. It requires completion of 11 quarter-courses but does not require an Asian or Middle Eastern language. A minimum of 5 of the 11 courses must be taken in a chosen concentration. In most cases the concentration will focus on one of the four culturally differentiated areas into which Asia and the Middle East are conventionally divided (see above). The approved courses for the adjunct major are the same as for the major.

**Minor in Asian and Middle East Studies**

Students qualify for a minor in Asian and Middle East studies by satisfactorily completing 8 quarter-courses chosen in consultation with the program director from the approved list of Asian and Middle East courses. The student and adviser will identify an appropriate geographic or other focus. Typically at least 2 courses are selected in each of three disciplinary categories: social sciences, history, and humanities. In most cases the focus will be on one of the four culturally differentiated areas into which Asia and the Middle East are conventionally divided (see above under the major). If the student satisfactorily completes two years of language study in Arabic, Chinese, Hebrew, Hindi, Japanese, Korean, Persian, or Turkish, then 6 disciplinary courses will suffice to qualify for the minor. (Native-speaker proficiency does not count

for course credit.) All students applying for minors in Weinberg College must present records that show a minimum of 5 courses not double-counted in their majors. Graduating seniors who have completed the requirements for a minor should request the application form from the program director.

## ASTRONOMY

See Physics and Astronomy.

## BIOCHEMISTRY, MOLECULAR BIOLOGY, AND CELL BIOLOGY

The Department of Biochemistry, Molecular Biology, and Cell Biology does not offer an undergraduate degree. See the following section for a description of the major in biological sciences.

## BIOLOGICAL SCIENCES

The science of biology is the study of living organisms at all levels of complexity and in all their diversity. The Program in Biological Sciences draws particularly on two departments: biochemistry, molecular biology, and cell biology, and neurobiology and physiology. Additional opportunities in life sciences are available for students in other departments: anthropology, biomedical engineering, chemistry, earth and planetary sciences, philosophy, psychology, and communication sciences and disorders. The curriculum is intended to maximize students' access to offerings from these departments. The baccalaureate degree offered by Weinberg College through the Program in Biological Sciences is the bachelor of arts with a major in biological sciences.

### Major in Biological Sciences

The goal of a baccalaureate degree program in biological sciences at a research university is to develop and enhance the intellectual and creative potential of life sciences students. To this end, the program includes the following:

- a foundation in mathematics, chemistry, and physics
- a core curriculum introducing fundamental areas of biological science
- concentrations that subsequently focus students' interests
- opportunities to participate in research

Because biology is grounded in the principles of chemistry, mathematics, and physics, all majors must complete the courses listed under related courses below. During the freshman year students usually complete 100-level chemistry and most or all of the mathematics requirements. In the fall quarter of sophomore year students start 210-1 concurrently with CHEM 210-1. Physics courses should be completed by the end of the junior year.

*Core curriculum:* To set the stage for study in biological sciences at the advanced level, each major must complete

210-1,2,3. These 3 courses taken in sequence address the central topics in contemporary biology with the goal of preparing students for further study in either the biological sciences or professional school. This core sequence includes laboratories that provide students with an appreciation of the discipline as an experimental science.

*Advanced courses:* The continuing expansion of knowledge in biology makes it difficult to master all areas in a four-year curriculum. Thus, the junior and senior years are designed to permit students to explore a focused area in the biological sciences that builds on the principles of the 200-level core. To provide a variety of coherent pathways, six areas of concentration have been designed. In addition to the 3 courses specifically required for each concentration, each student is required to take 309 (or 301) and 315, plus 3 300-level life science elective courses.

The concentration will be noted on the transcript; only one concentration can be noted. Following are the six concentrations and their respective requirements.

- Biochemistry: 321, 361, CHEM 210-3
- Evolutionary and developmental biology: 342, 344, 391
- Genetics and molecular biology: 353, 390, 395
- Neurobiology: 302, 305, 306
- Physiology: 325, 356, 358
- Plant biology: 330, 349, 350

*Related courses (required for all concentrations)*

- CHEM 101, 102, and 103 (or 171 and 172)
- CHEM 210-1,2 (or 212-1,2)
- MATH 220 and 224 or 212, 213, and 214
- 1 statistics course
- PHYSICS 130-1,2,3 (or 135-1,2,3)

### Advising

Sophomores with declared biological sciences majors are assigned specific faculty advisers. Juniors and seniors pursuing independent research also have research supervisors.

### Independent Research: Honors Program

The Program in Biological Sciences offers students the opportunity to work on a research project in a faculty sponsor's laboratory. Lists of participating faculty are available at [www.biosci.northwestern.edu](http://www.biosci.northwestern.edu). Students meet with faculty members whose research interests align with their own to explore research possibilities. Together they design a plan of study to be undertaken in a particular laboratory for at least nine months. Students should register for 399 while conducting the research.

Students engaged in independent research are encouraged to also write an honors thesis in their senior year. Students complete laboratory work, data analysis, and writing of the thesis according to an established timetable. Upon satisfactory completion of the thesis, a student may receive program honors on the recommendation of a faculty committee and become eligible to compete

for one of four awards given yearly for superior research. Completion of the thesis during the spring quarter enables students to treat a year of 399 as a 300-level elective to be counted toward the major. In general, a research project leading to honors may not be pursued outside the 399 framework. For additional information, see Honors under Academic Policies earlier in the catalog.

### Biological Sciences Second Major for ISP Students

The Integrated Science Program (ISP) is a highly selective BA program in Weinberg College (see Integrated Science Program). Students majoring in ISP who wish to complete a second major in biological sciences should fulfill the following requirements instead of those listed above. They may not substitute ISP 398 for any biological sciences or chemistry course in the ISP curriculum and must take the following courses:

- CHEM 212-2
- the 3 core courses for the relevant concentration in biological sciences

### Honors Program in Medical Education

The 300-level biological sciences course requirements for students also in the HPME program consist of 301, 315, the 2 nonlaboratory core courses appropriate for the chosen concentration (the lab course constitutes an HPME waiver), and 3 300-level electives. If a second HPME waiver is applied to this major, it must be applied to a 300-level elective.

### Premedical, Predental, and Preveterinary Students Majoring in Other Departments

Biological sciences requirements for most U.S. schools offering degrees in medicine, dentistry, and veterinary medicine are satisfied by either 110-1,2,3 or 210-1,2,3.

### The Teaching of Biological Sciences

Weinberg College students pursuing a major in biological sciences who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

### Minor in the Study of Evolutionary Processes

The interdisciplinary minor in the study of evolutionary processes (MSEP) can be tailored to meet the needs of both natural science majors and students majoring in other areas such as humanities, education, and social science. It combines essential components from anthropology, biological sciences, earth and planetary sciences, and physics and astronomy to develop graduates who understand the

theoretical and practical aspects of evolution as they apply to modern society, medicine, and technology.

### Minor course requirements (8 units)

#### Core courses (4 units)

- 1 introductory course in genetics and evolution (110-1, 210-1, or ANTHRO 213)
- introduction to earth systems and history (EARTH 203)
- upper-level course on evolution (342)
- capstone seminar (397)

#### Elective courses (4 units)

At least 1 must be an approved collection, field, or laboratory course. See [www.wcas.northwestern.edu/evolution/minor/courses.htm](http://www.wcas.northwestern.edu/evolution/minor/courses.htm) for a list of approved elective courses.

### Courses

**BIOL SCI 101-0 Biology in the Information Age** Fundamentals of the scientific process, using current events as illustrations. Choice of term project or tutorial. May not be taken for credit while or after taking any part of 110-1,2,3 or 210-1,2,3.

**BIOL SCI 102-0 Human Abilities** How technology, biology, and psychology interface to determine neuropsychological performance.

**BIOL SCI 103-0 Diversity of Life** Comparative survey of organisms, emphasizing adaptation and phylogenetic relationships.

**BIOL SCI 104-0 Plant-People Interactions** Biology and history of the interaction of humans and flowering plants.

**BIOL SCI 109-0 The Nature of Plants** Plant adaptations for growth, survival, and reproduction. Plant defense against herbivory, pollination, and seed dispersal.

**BIOL SCI 110-1 Biology: Genetics and Evolution** Principles of genetics and evolution and their application. With laboratory. May not be taken for credit while or after taking 210-1. Prerequisite: CHEM 101 recommended.

**BIOL SCI 110-2 Biology: Molecular and Biochemical**

**Biology** How genes direct synthesis of proteins; biochemistry. With laboratory. Prerequisite: 110-1. No credit while or after taking 210-2 or 210-3.

**BIOL SCI 110-3 Biology: Physiology and Cell Biology** How cells, tissues, and organ systems function. With laboratory. Prerequisite: 110-2. No credit while or after taking 210-2 or -3.

**BIOL SCI 112-0 Biotechnology and Society** Examination of modern biotechnology and its interaction with human society. May not be taken for credit while or after taking any part of 110-1,2,3 or 210-1,2,3.

**BIOL SCI 124-0 Biological Clocks** Daily and annual biological rhythms, their mechanisms, and their effects on health, performance, and society. May not be taken for credit while or after taking any part of 110-1,2,3 or 210-1,2,3.

**BIOL SCI 160-0 Human Reproduction** Basic biology of reproduction; relation between hormones, emotions, intelligence, and behavior; related policy issues. May not



be taken for credit while or after taking any part of 110-1,2,3 or 210-1,2,3.

**BIOL SCI 164-0 Genetics and Evolution** Principles of inheritance as they apply to evolution. May not be taken for credit while or after taking any part of 110-1,2,3 or 210-1,2,3.

**BIOL SCI 210-1 Genetics and Evolutionary Biology** Transmission and demic genetics; evolutionary biology. With laboratory. Prerequisites: MATH 220, 224; CHEM 103 or 172.

**BIOL SCI 210-2 Biochemistry and Molecular Biology** Lectures and laboratories in molecular and biochemical biology. Prerequisite: CHEM 210-1.

**BIOL SCI 210-3 Physiology and Cell Biology** Lectures and laboratories in how cells, tissues, and organ systems function. Prerequisites: 210-2 and CHEM 210-2.

**BIOL SCI 212-1 ISP Biochemistry** Synthesis and metabolism of organic molecules; structure and function of proteins. With laboratory. Prerequisite: CHEM 212-1.

**BIOL SCI 212-2 ISP Molecular and Cell Biology** Cell biology, transcription, translation, regulation of gene expression. With laboratory. Prerequisite: 212-1.

**BIOL SCI 301-0 Biochemistry** Biochemistry with focus on metabolism, energetics, and control mechanisms. Prerequisites: 110-1,2,3 or 210-1,2,3; CHEM 210-2. Credit not allowed for both 301 and 309.

**BIOL SCI 302-0 Fundamentals of Neurobiology I** Cellular and biochemical approaches to the nervous system, focusing on neuron structure and function. Prerequisites: 210-1,2,3; PHYSICS 130-2 or 135-2.

**BIOL SCI 303-0 Molecular Neurobiology** Mechanisms of signal transduction and synaptic plasticity; basic neurochemistry. Prerequisite: 302.

**BIOL SCI 304-0 Developmental Neurobiology** Cellular aspects of nervous system development; relationship between structure and function. Prerequisite: 302.

**BIOL SCI 305-0 Neurobiology Laboratory** Hands-on experience in the performance of classical experiments in cellular neurophysiology. Prerequisite: 302.

**BIOL SCI 306-0 Fundamentals of Neurobiology II** Integrative approach toward understanding functioning of mammalian central nervous system. Prerequisite: 302.

**BIOL SCI 307-0 Learning and Teaching Human Biology** The pedagogy of biological science. Prerequisite: some experience with computer technology.

**BIOL SCI 309-0 Principles of Biochemistry** Biochemistry with focus on macromolecular structure and function, relevant gene expression, and photosynthesis. Use of current literature. Prerequisites: 210-1,2,3, CHEM 210-1,2. Credit not allowed for both 301 and 309.

**BIOL SCI 310-0 ISP Quantitative Biochemistry and Molecular Biology** Protein interaction with small molecules; protein tertiary structure determination. Prerequisite: 212-1.

**BIOL SCI 311-0 ISP Neurobiology** Detailed look at

membrane properties of single neurons and synaptic transmission. Prerequisites: 212-1,2.

**BIOL SCI 312-0 Ecosystem Ecology** Fundamental processes of ecosystem ecology, with an emphasis on terrestrial ecosystems in the context of global change. Prerequisites: 210-1,2,3.

**BIOL SCI 313-0 Quantitative Methods for Ecology and Conservation** Approaches, methods, and techniques for analyzing datasets in ecology and conservation biology. Prerequisites: 210-1,2,3, STAT 202.

**BIOL SCI 314-0 Mind and Brain** Neural transmission; how neural dysfunction can translate into cognitive abnormality. Prerequisites: 110-1,2,3 or 210-1,2,3.

**BIOL SCI 315-0 Cell Biology** Relationship of shape, structural dynamics, and function with the cellular state and gene expression; cell-to-cell communication. Prerequisites: 110-1,2,3 or 210-1,2,3.

**BIOL SCI 316-0 Spring Flora** Life cycles, vegetative and reproductive structures, and adaptations for pollination and fruit/seed dispersal of the wildflowers, trees, and shrubs of oak woodland. Prerequisite: 110-1 or 210-1.

**BIOL SCI 317-0 Molecular Ecology** Ecological processes and concepts in the context of evolutionary theory, population genetics, and molecular biology. Prerequisites: 210-1,2,3.

**BIOL SCI 318-0 Assembly of Neural Circuits** Cellular and molecular processes in the generation of selective connections in the developing brain, including the role of activity-dependent plasticity. Prerequisite: 302.

**BIOL SCI 319-0 Biology of Animal Viruses** Virus structure, synthesis of viral nucleic acids and proteins, the interaction of the viral and cellular genomes. Prerequisites: 210-1,2,3.

**BIOL SCI 320-0 Animal Behavior** Evolutionary study of animal behavior, emphasizing theory but using field data to test or illustrate aspects of theory. Prerequisites: 110-1,2,3 or 210-1,2,3; 1 course in statistics.

**BIOL SCI 321-0 Physical Biochemistry** Thermodynamic laws, diffusion, chemical equilibria, kinetics, and statistical thermodynamics. Prerequisites: 210-1,2,3; CHEM 103 or 172; MATH 224; PHYSICS 130-1 or 135-1.

**BIOL SCI 323-0 Bioinformatics: Sequence and Structure Analysis** Utilization of informational and modeling techniques to explore evolutionary and other problems related to the genome. Prerequisites: 210-1,2,3; 1 course in statistics.

**BIOL SCI 324-0 Neurobiology of Biological Clocks** Daily and circadian biological clocks: research regarding their causation and adaptive significance. Prerequisites: 110-1,2,3 or 210-1,2,3.

**BIOL SCI 325-0 Animal Physiology** Physiological principles and mechanisms responsible for the ability of animals to regulate variables in the steady state. Prerequisites: 110-1,2,3 or 210-1,2,3.

**BIOL SCI 326-0 Neurobiology of Learning and Memory** Molecular and neural bases of memory. Prerequisite: 302.

**BIOL SCI 327-0 Biology of Aging** Biological aspects of aging, from molecular to evolutionary. Prerequisites: 110-1,2,3 or 210-1,2,3.



**BIOL SCI 330-0 Plant Biology** Plant structure, physiology, photosynthesis, evolutionary diversity, and ecology.

Prerequisites: 110-1,2,3 or 210-1,2,3.

**BIOL SCI 331-0 Soil Ecology** Laboratory and field methods of soil analysis to understand terrestrial ecosystem functions and processes. Prerequisites: 210-1,2,3; 330.

**BIOL SCI 332-0 Plant Conservation Genetics** Critical issues in the management and understanding of endangered plant populations. Prerequisites: 210-1,2,3; 330.

**BIOL SCI 333-0 Plant-Animal Interactions** An exploration of the complex mutualisms (e.g., pollination, seed dispersal) and antagonisms (e.g., herbivory, parasitism) among members of these two kingdoms. Prerequisite: 110-1 or 210-1.

**BIOL SCI 334-0 Soils and the Environment** Soil development and morphology; physical, chemical, hydrologic, and biological properties of soils. Prerequisites: 210-1,2,3; CHEM 103 or 172.

**BIOL SCI 338-0 Field Methods in Plant Conservation**

Hands-on experience in plant conservation practices with professionals in the Chicago area. Exposure to many conservation issues and field techniques. Prerequisite: 210-1.

**BIOL SCI 341-0 Population Genetics** Processes that affect allele frequency change and thus cause evolution. Prerequisites: 210-1,2,3; 1 course in statistics.

**BIOL SCI 342-0 Evolutionary Processes** Natural selection, patterns of descent, methods of classification, origin of species and higher taxonomic categories, and evolutionary developmental biology. Prerequisites: 110-1, 164, or 210-1; 1 course in statistics.

**BIOL SCI 344-0 Vertebrate Morphology and Ontogeny Laboratory** Vertebrate phylogeny illustrated via comparative morphology; anatomical/functional and ontogenetic considerations; dissections. Prerequisites: 110-1,2 or 210-1,2.

**BIOL SCI 345-0 Topics in Evolutionary Biology** Topics vary but always deal with the biology of a major group of organisms. With laboratory. May be repeated for credit with different topic. Prerequisites: 110-1,2 or 210-1,2.

**BIOL SCI 346-0 Field Ecology** An intensive experience in field ecological research. Prerequisites: 110-1, 164, or 210-1; 1 course in statistics.

**BIOL SCI 347-0 Conservation Biology** Evolution, ecology, and conservation of patterns of biological diversity. Prerequisites: 110-1, 164, or 210-1; 1 course in statistics.

**BIOL SCI 348-0 Plant Population Genetics** Evolutionary processes at the plant population level. Prerequisites: 210-1,2,3 and 330.

**BIOL SCI 349-0 Plant Community Ecology** Abundance, distribution, diversity, and scaling in plant communities in space-time. Prerequisites: 210-1,2,3 and 330.

**BIOL SCI 350-0 Plant Evolution and Diversity Laboratory** Determination of plant phylogenetic relationships. Prerequisites: 210-1,2,3 and 330.

**BIOL SCI 353-0 Molecular Biology Laboratory** Project-based approach to learning lab skills in eukaryotic molecular biology. Prerequisites: 210-1,2,3.

**BIOL SCI 355-0 Immunobiology** Nature of host resistance; characteristics of antigens, antibodies; basis of immune response; hypersensitivity. Prerequisites: 210-1,2,3.

**BIOL SCI 356-0 Endocrinology** Physiology and biochemistry of hormones and glands of internal secretion in vertebrates; endocrine glands. Prerequisites: 210-1,2,3.

**BIOL SCI 358-0 Physiology Laboratory** Experiments in several physiological systems. Design, techniques, data analysis, and report writing emphasized. Prerequisite: 325.

**BIOL SCI 359-0 Environmental Physiology Laboratory** Experiments investigating how physiological systems of humans and other organisms respond to environmental variables. Data analysis and report writing emphasized. Prerequisites: 210-1,2,3.

**BIOL SCI 361-0 Protein Structure and Function** Structure and function of proteins; X-ray crystallography and NMR. Prerequisites: 301 or 309; PHYSICS 130-1,2,3 or 135-1,2,3.

**BIOL SCI 377-0 Sensory Neurobiology** Physiological processes in sensory receptor cells; chemical senses, vision, hearing, and lateral line organs. Prerequisites: 210-1,2,3.

**BIOL SCI 378-0 Functional Genomics** Patterns of gene expression and their causes. Prerequisites: 210-1,2,3.

**BIOL SCI 389-0 Biology of Reproduction** Molecular aspects of gametogenesis and fertilization; signal transduction/receptors involved in fertilization. Prerequisites: 210-1,2,3.

**BIOL SCI 390-0 Molecular Biology** Nucleic acid structure; DNA mutation, repair, recombination, replication, restriction, and modification; translation. Prerequisites: 210-1,2,3.

**BIOL SCI 391-0 Developmental Biology** Molecular mechanisms underlying early embryonic development, including establishment of the body and organogenesis. Discussion of original literature. Prerequisites: 210-1,2,3.

**BIOL SCI 395-0 Molecular Genetics** Exploration of recent advances that have revolutionized the fields of gene expression and cell regulation. Discussion of articles and primary research papers. Prerequisite: 390.

**BIOL SCI 397-0 Capstone Seminar in Evolutionary Processes** A highly interactive, upper-level seminar for all seniors in the evolutionary processes minor and for biological sciences seniors intensely interested in evolutionary processes.

**BIOL SCI 399-0 Independent Research** Supervised individual research open only to students meeting specified requirements.

## BUSINESS INSTITUTIONS

The Business Institutions Program approaches the study of business through a thoughtful investigation of the cultural, political, philosophical, literary, and social consequences of business institutions. Therefore, the program is not meant to serve as narrowly conceived preprofessional training or to function as a business concentration within

any single departmental major. Instead the program is conceived as a means to a broad multidisciplinary perspective on a significant area of inquiry in 21st-century society. Students who wish to pursue the minor in business institutions should be open to inquiries grounded in the intellectual approaches of many disciplines.

### Minor in Business Institutions

The minor in business institutions requires the successful completion with a grade of C– or above of 8 courses: 3 required core courses and 5 electives. The program director may approve a course offered in a particular year as a substitution for an elective course when the syllabus demonstrates a business institutions emphasis.

Students interested in the minor in business institutions should consult with a program adviser. Information is available in the Weinberg College Office of Studies and the program office, University Hall, room 001. Students applying for the minor in business institutions must present records showing that a minimum of 5 out of the 8 courses required for the minor are not double-counted in their major. Additionally, no more than 5 of the 8 courses may be taken in the same department. Credits for the minor may include 1 internship-related credit and up to 2 professional linkage seminar credits. Grades of P/N are not accepted.

### Minor course requirements (8 units)

#### Core courses

- ECON 201 and 202 (which together count as 1 business institutions core requirement) or ECON 310-1
- ECON 250 or 350 or POLI SCI 341, 348, or 375
- SOCIOL 302

#### Electives: 5 courses chosen from

- 239, 260, 390, 392, 394
- ANTHRO 341
- CFS (Chicago Field Studies) or other internship-related course (at most 1 credit may be counted)
- ECON 260, 307, 308, 309, 315, 322, 323-1,2, 324, 325, 326, 330, 331, 337, 339, 341, 349, 350, 351, 354, 355, 359, 360, 361, 362, 370
- HISTORY 322-1,2, 367
- IMC 300, 301 (Integrated Marketing Communications; see the Medill School of Journalism)
- PHIL 260, 261, 262, 263, 268, 269
- POLI SCI 329, 348, 349, 352, 353, 354, 361, 371, 372, 374
- SOCIOL 215, 312, 315, 321, 331, 332, 335, 355

### Courses

**BUS INST 239-0 Marketing Management** Basic principles and applications of marketing management; market segmentation, target marketing, brand positioning; survey of market research and consumer behavior; marketing of services, nonprofits, the arts.

**BUS INST 260-0 Accounting and Business Finance** Accounting and managerial finance, including the principles of accounting, the elementary concepts of the theory of capital and its relationship to the objectives and problems of managing the firm. Prerequisites: ECON 201, 202, or consent of instructor. (Note: This course changes from ECON 260 to BUS INST 260 effective winter quarter 2009.)

### BUS INST 390-0 Special Topics in Business Institutions

Investigation of topics of current interest to faculty and students — for instance, arts management.

### BUS INST 392-0 Business Institutions Program Internship

**Seminar** Allows students to relate scholarship concerning an aspect of corporate culture to experience gained from an internship. Prerequisite: consent of department.

**BUS INST 394-0 Professional Linkage Seminar** Content varies. Possible topics include sports marketing and entrepreneurship. Up to 2 professional linkage seminars on different topics may be counted toward the minor.

## CHEMISTRY

Chemistry is the study of molecular structure, chemical reactions, and the molecular basis of solids, liquids, and gases. Training in chemistry blends descriptive, conceptual, and mathematical elements in both lectures and laboratory work. While developing chemical knowledge is essential, the progressive honing of analytical abilities and application of this knowledge to research are just as important. Courses are carefully designed to give a rigorous introduction to chemistry for both science and nonscience students.

The broad applicability of phenomena and rigorous methodology of chemistry provide a wide range of career options for majors. By offering a foundation in mathematics, physics, and related sciences; a core curriculum introducing the fundamental areas of organic, inorganic, physical, and analytical chemistry; concentrations in six different areas of chemistry; and opportunities to participate in research, the department meets the needs of students with diverse career objectives, including professional chemistry, graduate training, medicine, and teaching. Options are also provided for Northwestern's engineering, biological sciences, and prehealth professional programs.

The chemistry faculty is actively engaged in a wide spectrum of original research in which undergraduates participate along with graduate students and visiting scholars from around the world. Undergraduates have opportunities to use modern instrumentation and to participate in seminars, colloquia, and informal contacts with scholars.

### Major in Chemistry

The major is recommended for students planning careers in chemistry. It is suitable preparation for graduate study in chemistry or medical school and for work as a professional chemist. The curriculum includes related courses in mathematics and physics as well as core courses and a concentration in chemistry.

*Core curriculum:* All majors are expected to complete the following courses in order to gain a solid basis in chemistry:

- 101, 102, 103 or 171, 172
- 220
- 212-1,2,3 or 210-1,2,3
- 333
- 342-1,2,3
- 350-1,2,3

*Related courses:* Since mathematics and physics are essential tools in chemistry, majors are required to take

- MATH 220 and 224 or 212, 213, and 214; 230 and 234 or 281-1,2 or 285-2,3 or 290-2,3 or 291-2,3
- PHYSICS 125-1,2,3 or 135-1,2,3

*Areas of concentration:* Areas of concentration draw upon courses within the department as well as in other departments. A chemistry major completes 3 courses in the selected concentration, typically during the final year of undergraduate study. The concentration areas, along with eligible courses, are

- Biochemistry: 304, 314, 316, 329, 435; BIOL SCI 301, 309, 321
- Environmental chemistry: 306, 329, 393; CIV ENG 267, 360, 365, 367
- Inorganic chemistry: 302, 329, 418, 433, 434, 435
- Organic chemistry: 301, 314, 316, 329, 410, 411, 412, 413-1,2, 418
- Physical chemistry: 303, 329, 442-1,2, 443, 444, 445, 448
- Materials/nanotechnology: 250, 307, 329; MAT SCI 201, 331, 333, 335, 370
- Self-designed concentration: If the concentrations above do not meet their interests, students may design a concentration with approval of the director of undergraduate studies in chemistry. A concentration may consist of 3 courses from the areas above or with a common theme.

### Minor in Chemistry

The minor in chemistry allows majors in other fields to complete a significant portion of the course work required for the chemistry major. It allows the flexible selection of course work from the traditional subdisciplines of organic, inorganic, physical, and analytical chemistry.

*Basic course:* 103 or 172 or equivalent

*Minor course requirements (6 units):* 6 200- or 300-level courses exclusive of 201 or 399. Chemistry courses at the 300 level may have additional chemistry, physics, and/or mathematics prerequisites.

*Sample programs:* Life science majors and premedical students are advised to take 210-1,2,3 or 212-1,2,3 and 3 additional courses. Physical science majors could take 342-1,2,3 and 3 additional courses. Students with interests in materials science, earth and planetary science, or environmental science should take 210-1,2 and 333 and 3 additional courses. Other programs for the minor may

be designed with departmental approval to suit individual needs; interested students should contact the director of undergraduate studies in chemistry.

### Four Year BA/MS

Students who have done outstanding work during their first three years and who have a professional interest in chemistry are eligible to apply for the four-year BA/MS program. Applications should be made during spring quarter of junior year. By the end of the third year the applicant should have completed nearly all of the 300-level course requirements, all or nearly all of the Weinberg College requirements, and at least 1 term of independent study. To fulfill the MS requirements, students must take 9 graduate courses. Applicants should submit to the director of undergraduate studies in chemistry a course plan for the fourth year, a brief description of proposed research, an unofficial transcript, and a letter of support from the research adviser. For more information, see Four-Year Master's Programs in the Undergraduate Education section of this catalog.

### Chemistry Second Major for ISP Students

The Integrated Science Program (ISP) is a highly selective BA program in Weinberg College (see Integrated Science Program). Students majoring in ISP who wish to complete a second major in chemistry must take these courses:

*Core program:* 212-1,2,3, 220, 333, 348, 350-1,2,3

*Concentration:* 2 courses from a selected area

### Honors Program in Medical Education

Chemistry majors who are also participating in the HPME program are permitted two waivers in their major. Only one of these waivers may be used for a core program course; the second waiver may be used for a concentration course.

### Honors in Chemistry

Seniors who have done outstanding work in the classroom and research laboratory are eligible for graduation with honors in chemistry. To be recommended by the department for honors, a student must have completed the courses required for a chemistry major, have a grade point average of 3.3 or above in chemistry, and have engaged in original research during at least 2 quarters of 399. A senior thesis written about the research activities and a strong recommendation from the research adviser are also necessary. For more information, consult the director of undergraduate studies in chemistry. See also Honors under Academic Policies earlier in this section of the catalog.

### The Teaching of Chemistry

Weinberg College students pursuing a major in chemistry who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the

School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

### Advanced Placement

Entering students may receive advanced placement in chemistry by means of the College Board's AP Chemistry examination or the department's placement examination taken on entry to Northwestern. Depending on their scores, they will be advised to register in 101; 171 (with credit for 101); or 210 or 212 (with credit for 101, 102, and 103). Students may not start any general chemistry sequence with 102 or 172. Questions should be directed to the director of undergraduate studies in chemistry.

### Courses Primarily for Freshmen and Sophomores

**CHEM 101-0 General Chemistry** Descriptive chemistry, elements and compounds; basic chemical calculations, mole problems, stoichiometry, and solution concentrations; gas laws; thermochemistry; quantum theory and electronic structure of atoms; periodic properties of the elements; nuclear chemistry; chemical bonding. With laboratory.

**CHEM 102-0 General Inorganic Chemistry** Descriptive chemistry, inorganic reactions; chemical bonding; condensed phases; introduction to chemical equilibria; phase equilibria; solutions and colligative properties; metal complexes. With laboratory. Prerequisite: 101 (C– or better) or consent of department.

**CHEM 103-0 General Physical Chemistry** Chemical equilibrium; equilibria in aqueous solution; thermodynamics; chemical kinetics; electrochemistry and oxidation-reduction reactions; solid-state chemistry; industrial chemical processes. With laboratory. A grade of C– or better in 103 required to enroll for any higher-level chemistry course. Prerequisites: 102 (C– or better) or consent of department; MATH 220.

**CHEM 171-0 Accelerated General Inorganic Chemistry** Review of mole problems and stoichiometry; descriptive chemistry, elements, compounds, and inorganic reactions; gas laws; phase equilibria and colligative properties; chemical equilibrium; aqueous equilibria; topics in chemical bonding and molecular structure. With laboratory. Prerequisite: department placement exam.

**CHEM 172-0 Accelerated General Physical Chemistry** Thermodynamics and equilibrium; chemical kinetics and mechanism; electrochemistry; electronic structure of the atom and quantum theory; advanced topics in chemical bonding; coordination compounds; solid-state chemistry; nuclear chemistry. With laboratory. Prerequisites: 171 (C– or better); MATH 220.

**CHEM 201-0 Chemistry of Nature and Culture** Chemistry for the nonscientist. Chemicals commonly encountered in everyday life. With laboratory.

**CHEM 210-1,2,3 Organic Chemistry 1.** Basic concepts of

structure, stereochemistry, and reactivity of organic compounds. The chemistry of hydrocarbons and alcohols.

With laboratory. No P/N registration. Prerequisite: 103 or 172 (C– or better). **2.** The chemistry of aromatic, carbonyl, and nitrogen compounds; characterization of organic substances by chemical and spectral methods; reaction mechanisms. With laboratory. No P/N registration. Prerequisite: 210-1 (C– or better). **3.** The chemistry of polyfunctional compounds of biological and medicinal interest. Modern organic synthesis, bioorganic chemistry, and recent developments in organic chemistry. With laboratory. No P/N registration. Prerequisite: 210-2 (C– or better).

**CHEM 212-1,2,3 Organic Chemistry** Primarily for chemistry majors and students in ISP. Similar to 210-1,2,3 except with laboratory in the first and second quarters. No P/N registration. Prerequisites: 103 or 172 (C– or better) and consent of department, enrollment in ISP, or department placement.

**CHEM 220-0 Introductory Instrumental Analysis** An introduction to basic laboratory techniques in analytical chemistry and spectroscopy. Topics include infrared and UV-visible spectroscopy, gas and liquid chromatography, elemental and thermal analysis, simple X-ray diffraction, error analysis, and literature-searching techniques. Prerequisite: 103 or 172 or equivalent.

### Courses Primarily for Juniors and Seniors

**CHEM 314-0 Bioorganic Chemistry** Biosynthetic chemistry as basis for survey of major classes of biomolecules, carbohydrates, amino acids, lipids, nucleotides, nucleic acids, and proteins. Current topics in bioorganic chemistry.

**CHEM 316-0 Medicinal Chemistry: The Organic Chemistry of Drug Design and Action** Introduction to principles of drug design and mechanisms of drug action from a chemical viewpoint. Historical introduction, drug design and development, receptors, enzymes and enzyme inhibitors, DNA, drug metabolism, and prodrugs. Prerequisite: 210-3, 212-3, or consent of instructor.

**CHEM 329-0 Analytical Chemistry** Principles and applications of analytical methods, with emphasis on advanced separation science, dynamic electrochemistry, and advanced mass spectrometry. No P/N registration. Prerequisites: 342-1 or -2.

**CHEM 333-0 Inorganic Chemistry** Descriptive chemistry of some important elements. Current concepts and models of chemical bonding. Prerequisites: 2 units of 200- or 300-level chemistry.

**CHEM 342-1 Thermodynamics** Laws of applications of thermodynamics. Thermochemistry, chemical potentials, solution thermodynamics, nonideal gases. Prerequisites: 103 or 172 (C or better); MATH 230; PHYSICS 135-1,2 (students may take PHYSICS 135-2 concurrently).

**CHEM 342-2 Quantum Mechanics and Spectroscopy** Quantum mechanics with emphasis on atomic and molecular electronic structure. Electronic, vibrational, rotational, and

magnetic resonance spectroscopy. Prerequisites: MATH 230 (234 recommended also); PHYSICS 135-1,2.

**CHEM 342-3 Kinetics and Statistical Thermodynamics**

Chemical kinetics, including experimental techniques and theories of rate processes. Statistical mechanics, including Boltzmann distribution, partition functions, and applications to thermodynamics. Prerequisites: 342-1,2.

**CHEM 348-0 Physical Chemistry for ISP** Gas laws and properties; kinetic theory; first, second, and third laws; phase equilibria; mixtures, phase diagrams, statistical thermodynamics, kinetics. Prerequisites: ISP enrollment; 172; MATH 281-1,2,3; or consent of department.

**CHEM 350-1 Advanced Laboratory 1** Advanced laboratory techniques in synthetic and analytical chemistry and spectroscopy. Advanced instrumental analysis: mass spectrometry, chromatography, NMR spectroscopy, X-ray crystallography. Inorganic and organic synthesis techniques. Prerequisites: 220 or 329 and 212-1,2,3 or equivalent; 333 corequisite.

**CHEM 350-2 Advanced Laboratory 2** Advanced laboratory techniques in synthetic and analytical chemistry and spectroscopy. Advanced analytical techniques: gel permeation chromatography and other polymer characterization methods. Advanced spectroscopy: atomic spectroscopy. Advanced organic and inorganic synthesis techniques. Prerequisites: 220 or 329 and 350-1; 342-2 corequisite.

**CHEM 350-3 Advanced Laboratory 3** Advanced laboratory techniques in synthetic and analytical chemistry and spectroscopy. Advanced spectroscopy: infrared and Raman vibrational and rotational spectroscopy, electronic spectroscopy, kinetics of fast reactions using spectroscopic techniques. Organic and inorganic synthesis techniques in a self-guided project. Prerequisites: 342-2 or equivalent and 350-2; 342-3 or 348 corequisite.

**CHEM 380-0 Cooperative Chemistry Education** Participation in approved industrial work experience away from the campus. No credit; no tuition. Prerequisite: consent of department.

**CHEM 393-0 Green Chemistry** Practices of environmentally benign chemistry as applied to the chemical industry. Introduction to the concept and discipline of green chemistry; growth and expansion of the discipline in historical context from its origins in the early 1990s to the present.

**CHEM 398-0 Undergraduate Seminar** Advanced work for superior students through supervised reading, research, and discussion. Prerequisite: consent of department.

**CHEM 399-0 Independent Study** Faculty-directed research. Prerequisite: consent of department.

## CHICAGO FIELD STUDIES

Affiliated with the Departments of Anthropology, Political Science, and Sociology, Chicago Field Studies (CFS) offers programs that combine Northwestern seminars with internships at Chicago area organizations. For 40 years CFS has helped students secure internships at more

than 350 organizations. It offers programs every quarter on a variety of subjects, such as social justice, law, business, and organizational behavior. Depending on the program, students intern up to 32 hours per week and earn 1 to 4 credits. Internship organizations are treated as sites for original research on which seminar discussions and assignments are based.

CFS programs are open to students in any school and major. Admission is by application only, and students must attend an information session before applying. More information can be found on the Chicago Field Studies web site at [www.wcas.northwestern.edu/cfs](http://www.wcas.northwestern.edu/cfs).

### Major/Minor Credit

A number of departments and programs — including anthropology, sociology, and business institutions — allow students to use CFS courses to fulfill major or minor requirements. The type and number of credits applicable, if any, are determined by the student's department.

### Programs

#### *Field Studies in the Modern Workplace*

This full-time program focuses on organizational behavior (workplace culture). Students intern 24 to 32 hours a week in a variety of professional fields (including law and business, although CFS also offers specific legal and business field studies programs). It is offered every quarter, including summer. The program has 2 required courses worth 2 units of credit each: 393-1,2.

#### *Legal Field Studies*

This full-time program focuses on contemporary issues and workplace culture in the legal field. Students intern 24 to 32 hours a week in legal organizations. It is offered 1 or 2 quarters a year. The program has 2 required courses worth 2 units of credit each: 394-1,2.

#### *Business Field Studies*

This full-time program focuses on contemporary issues and workplace culture in business. Students intern 24 to 32 hours a week in business organizations (primarily finance and marketing). It is offered 1 or 2 quarters a year. The program has 2 required courses worth 2 units of credit each: 395-1,2.

#### *Field Studies in Community Research*

This full-time program focuses on the field of community research. Students intern 15 to 30 hours per week in a community-based organization. It is offered 1 or 2 quarters per year. The program has 1 required course, 396, for which credit is variable.

#### *Field Studies in Social Justice*

This part-time program focuses on the social justice field. Topics vary by quarter (e.g., immigration, affordable



housing, homelessness, poverty, etc.). Students intern 10 to 15 hours per week in social justice organizations. It is offered 1 or 2 quarters per year. The program has 1 required course, 293, worth 2 units of credit.

### *Other Programs*

CFS periodically develops new programs focusing on different fields and topics, some of which are part-time and carry 1 to 2 units of credit. These programs are described on the CFS web site.

## **Courses**

**CFS 293-0 Field Studies in Social Justice** (2 units)

**CFS 393-1 Organizational Behavior: Modern Workplace** (2 units)

**CFS 393-2 Qualitative Research Methods** (2 units)

**CFS 394-1 Organizational Behavior: Law** (2 units)

**CFS 394-2 Contemporary Issues in Law** (2 units)

**CFS 395-1 Organizational Behavior: Business** (2 units)

**CFS 395-2 Contemporary Issues in Business** (2 units)

**CFS 396-0 Field Studies in Community Research** (variable credit)

## **CLASSICS**

Classics majors and minors study the language, literature, history, and culture of Greek and Roman antiquity. The department offers a wide range of topics and has strengths in literature, theater, mythology, Greek history, and the history of medicine. Students may also study the reception of classical antiquity in medieval through contemporary Western cultures by taking classical traditions courses offered by other departments. The wide range of choices includes philosophy, religion, political theory, art history, film studies, English, and comparative literature.

Classics majors may pursue a concentration in Latin, Greek, or both. For a classics minor, students may choose from a concentration with readings in Latin or Greek or classical studies with sources in English translation only. Additional information about classics programs and courses is available on the department's web site at [www.wcas.northwestern.edu/classics](http://www.wcas.northwestern.edu/classics) or in the department office.

### **Major in Classics**

The major in classics offers students three different paths of study. Although no previous knowledge of Latin or Greek is required, all students generally are required to achieve competence in one of these ancient languages in order to work with primary sources in the original. Some may choose to complete advanced work in both languages.

With concentrations in Latin, Greek, or both, the major requirements allow some flexibility. Classics majors develop familiarity with the broad sweep of ancient history and literature and key analytical skills necessary to examine

the record of Greek and Roman culture. They complete a demanding and distinctive course of study that stresses the development of important intellectual sensibilities — close reading, analytical clarity, thorough research, evaluation of evidence, logical analysis, effective writing, appreciation of nuance and subtleties, historical variability, and cultural differences. All majors complete a research project under the direction of a faculty member in a small 1-quarter seminar. Seniors pursuing honors will undertake an additional 2 quarters of research.

Each of the three tracks — Greek and Latin, Latin, or Greek — requires a minimum of 12 courses beyond the language prerequisites.

### *Major Concentration in Greek and Latin*

**Prerequisites:** Either GREEK 201-2 and LATIN 101-3 or LATIN 201-2 and GREEK 101-3 (or equivalent placements — see next page)

### **Major course requirements (12 units)**

- First language foundation (3): 3 courses in Greek or Latin at the 201-3 level or above
- Second language foundation (3): 3 courses in the second language, at the 200 or 300 level
- Additional courses (6):
  - CLASSICS 211, 212, 395
  - 3 additional Greek, Latin, or classics courses, at least 2 of which must be at the 300 level (may include 1 classical traditions course with consent of the director of undergraduate studies)

### *Major Concentration in Latin*

**Prerequisite:** LATIN 201-2 or equivalent placement (see next page)

### **Major course requirements (12 units)**

- Latin foundation: 3 courses in Latin at the 201-3 level or above
- Additional courses (9):
  - CLASSICS 211, 212, 395
  - 6 additional Latin, Greek, or classics courses, at least 3 of which must be at the 300 level (may include Greek language courses at any level and up to 2 classical traditions courses with consent of the director of undergraduate studies)

### *Major Concentration in Greek*

**Prerequisite:** GREEK 201-2 or equivalent placement (see next page)

### **Major course requirements (12 units)**

- Greek foundation: 3 courses in Greek at the 201-3 level or above
- Additional courses (9):
  - CLASSICS 211, 212, 395



- o 6 additional courses, at least 3 of which must be at the 300 level (may include Latin language courses at any level and up to 2 classical traditions courses with consent of the director of undergraduate studies)

### *Minor Concentrations in Classics*

Students may earn a minor in Latin, Greek, or classical studies. Each option allows students either to survey aspects of classical culture and traditions or to take a more focused cluster of courses. Unlike the Greek and Latin minors, the classical studies minor does not require study of an ancient language. Instead, it provides a framework for examining any aspect of Greek and Roman antiquity or its traditions and reception in medieval through contemporary Western culture.

Students majoring in classics may also earn a minor in classical studies, provided they do not double-count courses toward both the major and the minor.

### *Minor in Latin*

**Prerequisite:** LATIN 101-3 or equivalent placement (see below)

#### **Minor course requirements (6 units)**

- 3 Latin courses at the 200 and 300 level
- 3 additional Latin and/or classics courses, 1 of which must be at the 300 level (may include 1 classical traditions course with consent of the director of undergraduate studies)

### *Minor in Greek*

**Prerequisite:** GREEK 101-3 or equivalent placement (see below)

#### **Minor course requirements (6 units)**

- 3 Greek courses at the 200 and 300 level
- 3 additional Greek and/or classics courses, 1 of which must be at the 300 level (may include 1 classical traditions course with consent of the director of undergraduate studies)

### *Minor in Classical Studies*

- 2 courses from the following: CLASSICS 210, 211, 212, 260 (classics majors may substitute additional 200- or 300-level courses in classics, classical traditions, Greek, or Latin)
- 4 additional classics, classical traditions, Greek, or Latin courses, at least 2 of which must be at the 300 level (and none at the 100 level)

### **Language Placement**

Students either must complete the 100-level language sequence before enrolling in GREEK 201 or LATIN 201 or test into the 200-level courses. Completion of 201-3 or permission of the instructor is a prerequisite for

enrollment in 300-level language courses. Placement results may not be counted for credit toward the total number of courses required, e.g., the 6 additional courses for the major. More advanced course work must be completed instead.

### **Research Requirement**

The department requires all majors to undertake a research project in connection with 395 Research Seminar. Topics vary from year to year. Instruction in the use of traditional as well as digital research tools will be included. Students may petition the director of undergraduate studies to substitute research conducted for a study abroad program.

### **Study Abroad**

The department strongly encourages students to undertake study abroad for a summer, a term, or the academic year at, for example, the Intercollegiate Center for Classical Studies in Rome, Arcadia University in Athens, or the summer program at the American School of Classical Studies in Athens. Interested students should consult with the director of undergraduate studies in the fall of the previous year to ensure sufficient time to prepare applications and plan for appropriate credit toward the major.

### **Senior Thesis and Honors**

Students who have a grade point average of 3.3 in the major at the end of the winter quarter of their junior year are encouraged to write a senior honors thesis under the direction of a faculty member. Interested students should discuss their plans with a member of the faculty and the director of undergraduate studies during the spring quarter of their junior year. During their senior year they should enroll in 2 quarters of CLASSICS 399, which may count toward the major. Both the department and Weinberg College have research funds available to facilitate independent student research during the summer between the junior and senior years. Students completing a junior year abroad are eligible and should remain in contact with their intended faculty advisers during the spring quarter of the junior year.

### **The Teaching of Latin**

Weinberg College students pursuing a major in classics who also wish to be certified for secondary teaching of Latin are urged to contact the Office of Student Affairs in the School of Education and Social Policy as early as possible in their academic careers. For information about teaching careers in Latin and opportunities for mentoring and classroom observation, see the director of undergraduate studies in the Department of Classics.

### **Departmental Courses**

#### *Courses in Latin*

**LATIN 101-1,2,3 Elementary Latin** Classical Latin vocabulary, grammar, and syntax with graded readings for translation.

**LATIN 201-1,2,3 Introduction to Latin Literature** Grammar and vocabulary review. Readings in Cicero, Virgil, and Catullus; emphasis on literary analysis. Prerequisites: 101-1,2,3 or department placement.

**LATIN 310-0 Readings in Latin Literature** Selected topics and authors including Plautus, Cicero, Horace, Ovid, Tacitus, and Apuleius. Prerequisites: 201-1,2,3 or permission of instructor. May be repeated for credit with different topics.

**LATIN 399-0 Independent Study** Individual program of study under the direction of a faculty member. For advanced students only. Permission of department required.

#### *Courses in Greek*

**GREEK 101-1,2,3 Elementary Greek** Vocabulary, forms, and syntax of Attic Greek.

**GREEK 201-1,2,3 Introduction to Greek Literature** Review of basic grammar and vocabulary. Representative selections from Greek authors in their historical and cultural contexts.

**GREEK 301-0 Readings in Greek Literature** Selected authors and topics. Topics recently offered include Aeschylus's *Oresteia*, the Greek novel, Hellenistic epigrams, Herodotus, Thucydides, and Aristophanes. Prerequisites: 201-1,2,3. May be repeated for credit with different topics.

**GREEK 399-0 Independent Study** Individual program of study under the direction of a faculty member. For advanced students only. Permission of department required.

#### *Courses with Readings in English*

These courses offer an understanding of classical culture and its influence in history, literature, and art. There are no prerequisites in Greek or Latin.

**CLASSICS 110-0 Scientific Vocabulary through Classical Roots** Greek and Latin etymology in the vocabulary of the sciences. Designed primarily for science or medical students. Self-paced independent study.

**CLASSICS 210-0 Early Western Civilization** Comparative study of early Greek and Hebrew cultures against the background of other civilizations of the ancient Near East.

**CLASSICS 211-0 Classical Greece** History, literature, philosophy, and art in ancient Athens.

**CLASSICS 212-0 Roman Civilization** Development and character of the Roman Republic and Empire, emphasizing political and social institutions. Roman origins of Europe's politics, religion, literature, and ideas.

**CLASSICS 245-0 Classics and the Cinema** Analysis of how literary and social/political assumptions intersect in the reception of two related dramatic forms, one originating in 5th-century Greece, the other in the 20th-century U.S.

**CLASSICS 260-0 Classical Mythology** An introduction to Greek and Roman traditional narratives. Emphasis on the social, political, and religious values that they engage.

**CLASSICS 321-0 Roman History** Selected topics in Republican or Imperial history.

**CLASSICS 330-0 Ancient Economy** Preindustrial Mediterranean economies of ancient Greece and Rome. Farming, transportation, settlement patterns, capitalism and trade, slavery; ends with a rustic Roman banquet.

**CLASSICS 342-0 Early European Medicine** Greco-Roman origins of European medical thought from the cult of Asclepius through the Renaissance to Harvey; emphasis on ethical ideas, strengths, and weaknesses of Greek science.

**CLASSICS 345-0 Greek Tragedy** Readings in the plays of Aeschylus, Sophocles, and Euripides. Emphasis on Greek drama's social and political context and treatment of mythical material.

**CLASSICS 360-0 The Origins of Greek Democracy** Emergence of the world's first democracies in archaic Greece, 750–460 B.C.E. Topics include the rise of the city-state, tyranny, Sparta, the effects of military reform, the invention of written law, and the development and consequences of democratic ideology.

**CLASSICS 390-0 Topics in Greco-Roman Civilization**

Content varies; may be repeated for credit with different topic. Recent topics include Greek music and the city, Aristotle and democracy, and ancient Greek law.

**CLASSICS 392-0 Topics in Ancient History** Content

varies; may be repeated for credit with different topic. Recent topics include staging Greek drama, ancient Greek sanctuaries, and law and rhetoric in ancient Rome.

**CLASSICS 394-0 Topics in Greek and Latin Literature**

Content varies; may be repeated for credit with different topic. Recent topics include metamorphosis from Homer to Kafka, Roman comedy, and Roman literature and imperialism.

**CLASSICS 395-0 Research Seminar** Development of critical reading and writing skills and acquisition of information literacy as applied to resources in classics. Topics vary and typically include both a Greek and a Roman focus. Required for the major. Prerequisite: junior or senior standing.

**CLASSICS 399-0 Independent Study** Individual program of study under the direction of a faculty member. For advanced students only. Permission of department required.

#### **Classical Traditions Courses**

Offered in departments other than classics, classical traditions courses give significant attention to Greek and/or Roman antiquity (history or literature) in translation. They may be used to satisfy certain major and minor course requirements. Recently offered courses include

- ART HIST 224 Introduction to Ancient Art
- ART HIST 310-1 Ancient Art: Greek Art and Archaeology
- COMP LIT 211 Topics in Genre
- COMP LIT 390 Topics in Comparative Literature
- ENGLISH 312 Studies in Drama: Ancient Greek Theater and the Modern Stage
- ENGLISH 383 Literary Theory from Plato to Sidney
- GERMAN 325 The Greeks in German Culture

- HISTORY 333 The Age of the Renaissance
- HUMANITIES 201 Thinking through and across Traditions: Epic Literature and Orature
- ITALIAN 265 Body and Soul from Rome to the Renaissance
- PHIL 310 Studies in Ancient Philosophy
- POLI SCI 301 Ancient Political Thought

## COGNITIVE SCIENCE

Cognitive science is the scientific study of the mind with the goal of understanding the nature of thought. Students learn the ways in which converging sources of evidence may be integrated to discover the mechanisms underlying the complex adaptive properties of human cognition. The major in cognitive science gives a broad foundation in this interdisciplinary field, encompassing cognitive psychology, linguistics, artificial intelligence, neuroscience, and related disciplines. Required introductory courses survey basic phenomena and approaches; basic methodology courses impart the required methods of cognitive science; core courses provide foundations of disciplines within cognitive science; and elective courses allow students to pursue more advanced study in particular disciplines. A junior proseminar focuses on ongoing research in the field by Northwestern faculty. Qualified seniors may achieve honors by taking a senior seminar, conducting independent research under the guidance of department faculty, and writing a senior thesis. Interested students should contact the director of undergraduate studies prior to starting their senior year.

For additional information about the Program in Cognitive Science, see the program director.

### Major in Cognitive Science

*Required introductory courses (3):* 207, 210, 211

*Basic methodology requirements (3):* EECS 110 or 111; PSYCH 201, 205

*Core course requirements (3):* 1 course from three of the following five areas:

- Artificial intelligence: EECS 348
- Cognitive neuroscience: PSYCH 212, 361
- Cognitive psychology: PSYCH 228
- Learning sciences: LOC 212, 301
- Linguistics: LING 250, 260, 270

*Advanced proseminar requirement (1):* 366 (should be taken in the junior year)

*Advanced electives (6):* 6 courses, with at least 3 in one area (major emphasis) and at least 2 outside that area, chosen from

- Anthropology: ANTHRO 363, 389; 390; 395 or 595; 471
- Artificial intelligence: EECS 325, 337, 338, 348, 349, 432, 435 (certain sections of EECS 395 may also count toward this area; contact the cognitive science program for an approved list)

- Cognitive neuroscience: PSYCH 312-2, 321, 324, 342, 358, 363, 364, 460, 470; CSD 303, 310; BIOL SCI 302, 306, 314, 377 (see the Program in Biological Sciences for prerequisites for these courses)
- Cognitive psychology: PSYCH 333, 334, 335, 358, 362, 460, 461, 466
- Communication sciences and disorders: CSD 303, 306, 309, 350, 392, 406, 492, 495-1
- Learning and instruction: CSD 303, 306, 350, 392, 492; LOC 301 (if not counted as a core course); LRN SCI 401, 402, 429, 451; MUSIC ED 437
- Linguistics: LING 310, 311, 330, 331, 333, 334, 341, 350, 360, 361, 370, 371
- Music cognition: MUS THRY 351; MUSIC ED 437, 438
- Philosophy: PHIL 325, 327, 330, 335, 350, 426

Other 300- and 400-level courses may be counted as advanced electives with consent of the cognitive science adviser. It is strongly recommended that students pursue independent study (399) in cognitive science or in one of the departments listed above, and it may count as an advanced elective. For students pursuing honors, the second quarter of the honors seminar (398-2) may count as an advanced elective.

Cognitive science majors who wish to double-major must show a minimum of 11 courses not counted in any other major(s). Courses used to meet the major requirements may not be double-counted toward a minor in another discipline.

### Minor in Cognitive Science

The minor in cognitive science broadens the academic background of students majoring in related fields, providing them with the methods and foundations for understanding cognitive issues in an interdisciplinary framework.

#### Minor course requirements (8 units)

- *Introductory courses:* 2 courses chosen from 207, 210, 211
- *Basic methodology courses:* 2 courses (at least 1 from outside a student's major area) chosen from PSYCH 201, 205; EECS 110, 111
- *Electives:* 4 courses chosen from at least two areas, at least 3 at the 300 level and at least 3 outside the major (for available areas, see the advanced electives for the major; at least 1 course must be from the courses listed below)
  - Artificial intelligence: EECS 348
  - Cognitive neuroscience: PSYCH 212, 361
  - Cognitive psychology: PSYCH 228
  - Learning sciences: LOC 301
  - Linguistics: LING 250, 260, 270

### Courses

#### COG SCI 207-0 Introduction to Cognitive Modeling

Introduction to artificial intelligence and cognitive science from a nontechnical perspective. Fundamental questions

concerning thinking, beliefs, language understanding, education, and creativity.

**COG SCI 210-0 Language and the Brain** The study of language and its biological basis from linguistic, psychological, and neuroscientific perspectives.

**COG SCI 211-0 Learning, Representation, and Reasoning** Interdisciplinary study of the nature of the mind with emphasis on learning, representation, and reasoning.

**COG SCI 366-0 Cognitive Science Proseminar** New and ongoing research by Northwestern faculty. Prerequisite: consent of instructor.

**COG SCI 398-1,2 Senior Honors Seminar** Independent research for a senior thesis under the direction of department faculty. By invitation only.

**COG SCI 399-0 Independent Study** Faculty-directed research. Consent of instructor required.

## COMPARATIVE LITERARY STUDIES

The Comparative Literary Studies (CLS) Program is an interdepartmental, interdisciplinary program for the study of literature across national and linguistic lines. Those who work in the field of comparative literature are committed to the proposition that language is not an indifferent medium of expression but an integral dimension of every expressive act. Drawing on faculty from the various literature departments as well as from other disciplines (such as art history, film studies, music, and philosophy), the CLS program reflects the belief that literary texts can best be understood within the context of diverse literary traditions and other cultural phenomena. CLS encourages students not only to read and interpret works of literature but also to reflect on the assumptions, methods, and goals that shape literary and other humanistic studies.

In contrast to literature departments in which students trace the development of one literature in a particular culture over a specific time period, CLS juxtaposes literatures of different cultures and epochs in a variety of ways. Comparative literature studies the themes, conventions, and movements shared by distinct literary traditions as well as the features that differentiate them. Though the field has traditionally dealt with the canonical texts of the Western tradition, Northwestern's CLS program strongly encourages students to explore less traditional but equally crucial areas of research such as women's writing, the literatures of excluded or marginalized groups, and the texts of Asian, African, and other literatures outside the European and American canon.

CLS students also examine literary theories and critical approaches to literature. In considering texts ranging from the classics of ancient Greek and Roman civilizations to contemporary critical theory, students not only learn to understand specific literary works but also to raise questions about their relations to other forms of discourse (e.g., historical, scientific, and philosophical) and about the nature of literature itself. To this end, the CLS program emphasizes both the study of various types of specifically

literary theory (such as structuralist, poststructuralist, psychoanalytic, sociopolitical, and New Historical) and the examination of the theoretical and methodological concerns of other disciplines (such as anthropology, history, philosophy, gender studies, and sociology).

Finally, comparative literary studies considers literary texts in relation to other forms of creative production. The relationship of literature to other arts such as music, the fine arts, and new media is an important focus of interest in many comparative literature courses, and students of comparative literary studies are also encouraged to take courses in other fields and disciplines.

## Major in Comparative Literary Studies

Students in the CLS major pursue broadly based programs of literary study that may include work in a wide range of related disciplines. As part of their concentration, students are required to take at least 2 courses in a language other than English (exceptions to this rule are noted below).

Seven courses are required of all majors. They are meant to introduce students to the major texts and genres of the Western tradition from the ancient Greeks to the present; to make sure that students are acquainted with certain non-Western literatures and cultures; and to provide students with a range of theoretical approaches to literary texts in particular and the study of culture in general. The required senior seminar focuses on the writing of a substantial essay.

Majors in CLS declare a concentration by the spring of their junior year in consultation with an undergraduate program adviser. Students may concentrate, for example, on particular periods such as 18th-century literature or romanticism. They may combine their study of literature with interests in other disciplines such as philosophy or political theory. They may concentrate on the relationship between literature and other media — film or music, for example. A concentration should not focus on a single national literature or simply duplicate concentrations already available in other departments at Northwestern.

Students are encouraged but not required to write a senior honors thesis. The senior seminar, which is required of all majors, aims to help students write a major research paper, regardless of whether they pursue honors. Students who wish to qualify for honors should identify an honors adviser by the spring of the junior year. In addition to the senior seminar, honors students must enroll in at least 1 quarter of independent study, preferably during the winter. Senior theses are evaluated by the student's adviser and by at least one outside reader from the CLS faculty.

As of fall 2007, there is no application process for admission to the major.

## Requirements for all majors (14 units)

- 3 approaches to literature and culture courses (among the courses that may be used to fulfill this requirement are 205, 206, 207, 280, and 281)

- 2 units of 211
- 1 course in a non-Western literature
- 398
- 7 courses in a concentration; these must include
  - 2 or more 200- or 300-level courses on a nonanglophone literature taught in the original language. This requirement may be modified with the approval of the CLS director of undergraduate studies if the chosen major language does not offer instruction in literary texts at the 200 level (for example, Chinese and Arabic).
  - 4 or more courses at or above the 300 level in literature or in disciplines related to literary studies (for example, art history, film studies, gender studies, history, philosophy)

Examples of individual concentrations:

- Genres (novel, lyric, epic, etc.)
- Literature and related disciplines (literature and philosophy, literature and art history, literature and political theory)
- Literature in the context of other arts and media (such as film or music)
- Periods (Renaissance, romanticism, modernism, post-modernism, etc.)

## Double Major

Majors in comparative literary studies must show a minimum of 12 courses not double-counted in any other major(s).

## Study Abroad

The Program in Comparative Literary Studies encourages all majors who qualify to consider a year of study abroad as juniors.

## Courses Primarily for Freshmen and Sophomores

**COMP LIT 205-0 Diaspora/Transnational Literatures and Cultures** Exploration of narratives produced by diasporic groups — displaced groups of people who retain a collective sense of identity — and theories of diaspora in relation to other notions of identity (e.g., nation, race, etc.).

**COMP LIT 206-0 Literature and Media** Examination of the relationship between “literature” and “media” within Western culture, from Plato to the present, with particular focus on strategies of writing and representation and their relationship to problems of authority and power; material changes to the production of literature and technologies of transmission; and the impact of computer writing and imaging technologies on the production and definition of literature.

**COMP LIT 207-0 Introduction to Critical Theory** Focus on the related ideas of crisis, criticism, and critique in philosophical, literary, social, political, and cultural contexts. How critical theory grounds criticism systematically, disclosing the full range of the crisis to which any critical

impulse responds. Investigation of various aspects of critical theory, from abstract concepts and particular works of art to concrete social conditions and current political forms.

**COMP LIT 210-0 The Bible as Literature** Selected books of the Hebrew Bible and New Testament studied from a literary perspective; issues of plot, character, genre, narrative strategy, and theories of interpretation.

**COMP LIT 211-0 Topics in Genre** Analysis of major literary genres, including epic, drama, lyric poetry, novel, and autobiography. Study of either the historical development of a particular genre or the variety of genres at a particular period. May be repeated for credit with change in topic.

**COMP LIT 271-1,2,3,4 Japanese Literature in Translation** A set of 4 courses surveying Japanese literature from the eighth century to the present.

**COMP LIT 274-1,2,3 Introduction to Chinese Literature** Survey of Chinese poetry and fiction from the fifth century B.C.E. to the present.

**COMP LIT 275-0 Arabic Literature in Translation** Introduction to Arabic literary background; survey of literary genres from the pre-Islamic period to the present.

**COMP LIT 276-0 African Literature in Translation** Continental African literature. Content varies. May be repeated for credit with different topic.

**COMP LIT 278-0 Modern Hebrew Literature in Translation** Introduction to the main works of contemporary Israeli writers.

**COMP LIT 279-0 Modern Jewish Literature** A study of modern European, American, and Israeli Jewish literature in its historical context.

**COMP LIT 280-0 Interpreting Culture** Introduction to the theory and practice of interpreting “cultural texts,” the literary and other texts through which human culture imposes structures of meaning on the world.

**COMP LIT 281-0 From Modernism to Postmodernism in Literature, Theater, and Film** This course follows the trajectory of 20th-century literature, theater, and film from the various modernisms that held sway in Europe up to World War II to the postmodernism that pervades contemporary culture in Europe, the United States, and beyond.

## Courses Primarily for Juniors and Seniors

Comparative literary studies and language majors read the texts and are tested in their language or area of expertise whenever the course material allows.

**COMP LIT 301-0 Writing in Society** Studies in relations between literature and society through a series of theoretical readings in the sociology of literature, juxtaposed with literary examples from different societies.

**COMP LIT 303-0 Literature and History** Studies in the historicity of literature, with attention to the development of literary forms over time and to the historical circumstances in which literature is produced.

**COMP LIT 310-0 Studies in Literary Genres** Selected genres,



such as epic, pastoral, autobiography, comedy, satire, the essay. May be repeated for credit with different topic.

**COMP LIT 312-0 Studies in Drama** Content varies. May be repeated for credit with different topic.

**COMP LIT 313-0 Studies in Fiction** Content varies. May be repeated for credit with different topic.

**COMP LIT 362-1,2,3 Modern Drama** 1. Major developments from the late 19th century to the end of World War I. 2. 1920s–1950s. 3. From absurdist theater to the present.

**COMP LIT 365-0 The Avant-Garde** Nature, origins, and development of the avant-garde movements in Europe, North America, and Latin America since the early 20th century.

**COMP LIT 375-0 Literature and the Arts** Differences and similarities between literature and the visual arts and/or music. Content varies. May be repeated for credit with different topic.

**COMP LIT 383-0 Special Topics in Theory** For students with previous study of criticism and literary theory. Content varies. May be repeated for credit with different topic.

**COMP LIT 390-0 Topics in Comparative Literature** Content varies — for example, problems of literary translation, literature and psychoanalysis. May be repeated for credit with different topic.

**COMP LIT 398-0 Senior Seminar** Students learn the tools and techniques needed for writing sustained scholarly essays. Required of senior majors in comparative literary studies. Prerequisite: consent of program adviser.

**COMP LIT 399-0 Independent Study** (1–3 units)

## Related Courses in Other Departments

For descriptions of the following courses in literature in translation, consult the relevant department listings.

- CLASSICS 244, 245, 340, 345
- FRENCH 277, 279, 375, 376, 378
- GERMAN 226, 228, 230, 232, 234, 236, 238, 240, 322, 326, 328, 330
- ITALIAN 275, 380
- SLAVIC 210-1,2,3, 310, 311, 314, 318
- SPANISH 323, 397

## COMPUTING AND INFORMATION SYSTEMS

The Program in Computing and Information Systems (CIS) offers students the opportunity to study computer science within the context of Weinberg College's focus on liberal arts and sciences, as distinct from the engineering context in the McCormick School's Department of Electrical Engineering and Computer Science (EECS). The computer science requirements are identical in the two programs. Faculty and courses for the program are drawn from the McCormick EECS department, which has extensive computing facilities for student use.

Computer science is a highly interdisciplinary field, as the numerous links with other programs at Northwestern

reflect. These include cognitive science, psychology, learning sciences, communication studies, radio/television/film, computer engineering, and the Transportation Center.

The computing and information systems requirements include the following five parts. Undergraduates are encouraged to participate in research projects and to take advanced courses.

- *Background or related courses*: fulfill the general requirements of the University and school and provide the necessary background for study in computer science
- *Core courses*: what the faculty expects every CIS graduate to know
- *Breadth requirements*: areas of computer science to which every CIS graduate should be exposed
- *Depth requirements*: opportunities to explore one or two areas in detail
- *Project*: exposure to significant development and/or research work

For more information on the EECS department and its course offerings, see the McCormick School section of this catalog. Students are urged to speak regularly with advisers and to consult the EECS web site ([www.eecs.northwestern.edu](http://www.eecs.northwestern.edu)) for a detailed curriculum document.

## Major in Computing and Information Systems

### Background or related courses

- *Mathematics*: MATH 220 and 224 (or 212, 213, and 214), 230, and 240
- *Probability and statistics*: STATS 210 or MATH 310-1

The program also recommends courses in physics or biological sciences to satisfy the Weinberg College natural sciences distribution requirement.

### Core courses (6)

- EECS 101, 111 (students without programming experience may want to first take 110, ideally in the Python programming language), 211, 213, 310, 311

### Breadth courses (5)

Choose 1 course from each of the following five areas:

- *Theory*: EECS 328, 336, 356; MATH 374
- *Systems*: EECS 303, 322, 339, 340, 343, 345, 346, 350, 358, 361, 397, 440, 441, 442, 443, 450, 464
- *Artificial intelligence*: EECS 325, 337, 344, 348, 349, 360
- *Interfaces*: EECS 330, 332, 351, 352, 370
- *Software development*: EECS 338, 394

See the EECS web site for changes in this list. If appropriate, EECS 395 and 399 sections may be used; consult program advisers for information.

### Depth courses (6)

Choose 3 courses each from two of the following areas:

- *Theory*: EECS 328, 336, 356, 357, 457, 459; MATH 374
- *Systems*: EECS 322, 339, 340, 343, 345, 350, 358, 361, 440, 441, 442, 443, 450, 464



- *Artificial intelligence*: EECS 325, 337, 344, 348, 349, 360
- *Interfaces*: EECS 330, 332, 351, 352, 370
- *Security*: EECS 322, 339, 340, 343, 345, 350, 440, 441, 443, 450

See the EECS web site for changes in this list. If appropriate, EECS 395 and 399 sections may be used; consult program advisers for information.

Students should consult with advisers about depth areas. It is possible to petition for a single 6-course depth area.

### Project (2)

- 2 quarters of 399 or others from the department's project course list

## Computing and Information Systems Second Major for ISP Students

The Integrated Science Program (ISP) is a highly selective program in Weinberg College. Students majoring in ISP may complete a second major in computing and information systems through a curriculum tailored specifically to their needs:

- *Core requirements*: same as for major (6 courses)
- *Breadth requirements*: same as for major (5 courses)
- *Project*: 2 quarters of ISP 398 or EECS 399 (projects must be approved by advisers in both ISP and CIS)

## Minor in Computing and Information Systems

The program offers a minor in computing and information systems for students who wish to develop a strong competence in computer science while majoring in another area. Students choosing this minor are expected to have completed MATH 220 and 224 (or 212, 213, and 214), 230, and 240, which are prerequisites for most computer science courses.

### Minor course requirements (9)

- *Core requirements*: same as for major (6 courses)
- *Breadth requirements*: 1 course in each of three breadth areas chosen from the list under the major (3 courses)

## CRITICAL THEORY

Over the past three decades the term "critical theory" has come to designate, particularly in the United States, a type of study that cuts across disciplines to examine the premises, concepts, and categories that structure academic discourse in areas such as literary studies, art history, film studies, history, philosophy, and political theory, to name just a few. Critical theory is therefore not limited to a particular field or even to specific content; it is involved wherever methods, concepts, and social formations are not simply taken for granted but subjected to systematic and rigorous critical reflection.

The minor in critical theory is an interdisciplinary program of study enabling undergraduates to acquire understanding of critical theory's many dimensions and

fields of application. It aims to give students a chance to develop their interests in various dimensions of critical theory, with particular emphasis on literary theory, continental philosophy, and political theory.

## Minor in Critical Theory

### Minor course requirements (6 units)

- COMP LIT 207
- 5 interdisciplinary 300-level courses approved by the program, including at least 1 course, usually COMP LIT 390, taught by a visiting professor in critical theory; and at least 1 course each in literary theory, political theory, and philosophy (a list of approved courses may be obtained from the program director or by consulting the program web site at [www.wcas.northwestern.edu/complit](http://www.wcas.northwestern.edu/complit); examples from this list include PHIL 390, FRENCH 396, GERMAN 314, and POLI SCI 390)

## DRAMA

The Program in Drama offers undergraduates the opportunity to combine the study of dramatic literature in classics, comparative literary studies, English, and modern languages with performance studies and theater courses in the School of Communication. Recognizing the uniqueness of drama among literary genres as a performing art, the program seeks to develop an understanding and appreciation of dramatic literature informed by the study of acting, interpretation, design, playwriting, and/or directing. Major requirements ensure a balance of historical, literary, and theatrical approaches to drama; they are flexible enough to allow for special interests and concentrations, including study abroad and the study of non-English drama in the original language. All students electing this major must work out a long-range plan of study with the program's director.

## Major in Drama

### Program courses

*Introductory courses*: 2 units from the following sets of courses, 1 from Weinberg College and 1 from the School of Communication:

- Weinberg College: ENGLISH 212, 234
- Communication: GEN CMN 103, PERF ST 210-3, THEATRE 140-1,2, 143

*Major courses*: 12 courses, with a minimum of 9 300-level courses; to maintain a balance between literary and theatrical approaches to the study of drama, no more than 7 courses should be from one school

- At least 6 units must be in the history and criticism of drama, including 3 units in drama before 1850 (but not all in Shakespeare) and 2 units in drama after 1850. Eligible courses include the following:  
AF AM ST 259, 379  
CLASSICS 345  
COMP LIT 362-1,2,3

ENGLISH 312, 332, 334-1,2, 339, 342

FRENCH 272, 279

GERMAN 234

ITALIAN 202

SLAVIC 318, 369

SPANISH 321

THEATRE 307, 345-1,2,3, 354, 365-1,2, 366, 367, 368, 374

- At least 3 units must be in performance practices:  
PERF ST 216, 224, 307-1,2, 309-1,2,3, 318, 324-1,2, 326-1,2, 330
- THEATRE 241-1,2,3, 243-1,2, 312, 340-1,2, 341-1,2,3, 346-1,2, 347-1,2, 348-1,2
- 1 unit must be an advanced seminar, normally a 400-level course approved by the program director.

**Related courses:** 4 units at the 200 or 300 level in subjects related to the study of drama; must be approved by the program director; applicable areas include aesthetics, art history, criticism, film, history, humanities, music, literature, and sociology of culture

### Honors in Drama

Seniors with distinguished records in major courses who wish to be candidates for honors in the program do so by completing an independent project. Interested students should consult with the program director in the spring quarter of the junior year. See also Honors under Academic Policies earlier in this section of the catalog.

### Course

**DRAMA 399-0 Independent Study in Drama** Project for senior drama majors who have completed the required seminar and wish to be candidates for honors in drama. Prerequisite: approval of program director.

## EARTH AND PLANETARY SCIENCES (formerly Geological Sciences)

The earth and planetary sciences study the complex interacting physical, chemical, and biological processes that have shaped the earth and other planets throughout geologic time and will control their environmental conditions into the future. They therefore address fundamental scientific questions important for human society.

The degree program includes a highly interdisciplinary set of courses that investigate research questions spanning spatial scales from the submolecular to the interplanetary and time scales from the origin of the earth and solar system to the future evolution of our planet. Upper-level courses address both internal processes of the earth and other planets (studies of earthquakes, volcanoes, and plate tectonics) and surface processes that regulate environmental conditions in the oceans, on land, and in the atmosphere (studies of the carbon cycle and its role in climate change).

The goal of the Department of Earth and Planetary Sciences is to train young scholars who can make a difference for the future of science and society. Undergraduates select individual programs reflecting their interests and career goals, whether these are graduate study in the earth and planetary sciences, professional employment, or advanced study in areas such as environmental consulting, management, or law.

Majors are involved in the full spectrum of departmental activities beyond class work, including research, seminars, field trips, and social functions. Many do research projects with faculty and graduate students that lead to honors theses and scientific publications.

### Major in Earth and Planetary Sciences

The major offers two tracks. Track 1 is designed to provide a structured overview of the discipline. Track 2 is designed to accommodate individual interests of students seeking a more quantitative course of study. Requirements for each track are listed below.

Chemistry, mathematics, and physics prerequisites for 200- and 300-level courses should be taken at the earliest opportunity.

#### Track 1

##### Core courses

- 3 200-level courses: 201, 202, and 203
- 5 300-level courses: 300, 310, 320, 330, and 340

##### Research

- 1 quarter of 398 or 399

##### Related courses

- CHEM 101, 102, and 103 or 171 and 172
- MATH 220 and 224 (or 212, 213, and 214) and 230
- PHYSICS 135-1,2,3
- 2 additional courses in math, science, or social science, 1 of which may be 326

#### Track 2

##### Core courses

- 3 200-level courses: 201, 202 (350 may be substituted for 202), and 203
- 4 300-level courses chosen in consultation with an adviser

##### Research

- 1 quarter of 398 or 399

##### Related courses

- CHEM 101, 102, and 103 or 171 and 172
- MATH 220 and 224 or 212, 213, and 214; 230, 234, and 240 or 285-1,2,3 or 290-1,2,3 or 291-1,2,3; and 250; 281-1,2,3 substitutes for all of these requirements
- PHYSICS 135-1,2,3

## Minor in Earth and Planetary Sciences

The minor offers students in any major outside the department a flexible path to improved knowledge of earth and planetary sciences. With faculty advisers, students select paths that emphasize such fields as physical geology, geochemistry, geophysics, or a combination of these.

### Minor course requirements (6 units)

- 201 and 202
- 4 300-level courses in the department; 398 and 399 will not be credited toward the minor

## Four-Year BA/MS

Students with a professional interest in the earth sciences and a grade point average of 3.5 or above may be eligible for the four-year BA/MS honors program offered by the department, which only recommends students for this program; final acceptance is made by the Graduate School. Students may apply in the spring quarter of their junior year. By the end of that year, applicants should complete all courses required for the major in earth and planetary sciences and all (or nearly all) the Weinberg College BA requirements.

To fulfill the MS requirements, students must complete

- 12 courses approved by the student's advisory committee and bearing graduate credit in science or engineering (MATH 250, CHEM 342-1, and the 4 300-level courses taken for the BA may be counted)
- a final independent research report (not necessarily a formal thesis)

See Accelerated Master's Programs in the Undergraduate Education section of this catalog and consult with a department adviser.

## Honors in Earth and Planetary Sciences

Graduation with honors in earth and planetary sciences requires completion of a research project. For more information, consult the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

## Earth and Planetary Sciences Second Major for ISP Students

The Integrated Science Program (ISP) is a highly selective BA program within Weinberg College. Students majoring in ISP who wish also to complete a major in earth and planetary sciences must take 201 and 3 300-level courses in addition to 350. These requirements replace the usual major requirements noted above.

## Minor in the Study of Evolutionary Processes

The Department of Earth and Planetary Sciences is a contributing department to the interdisciplinary minor in the study of evolutionary processes (MSEP). The minor combines essential components from anthropology, biological

sciences, earth and planetary sciences, and physics and astronomy to develop graduates who understand the theoretical and practical aspects of evolution as they apply to modern society, medicine, and technology. More information can be found on page 67 and at [www.wcas.northwestern.edu/evolution](http://www.wcas.northwestern.edu/evolution).

With the change in the departmental name, course codes have been changed from GEOL SCI to EARTH, and upper-level courses have been renumbered. Previous designations are in parentheses in the course listings.

## Introductory Courses

**EARTH 101-0 Earth Systems Revealed** Minerals, rocks, and structures of the earth's crust; processes that modify the earth's surface; techniques used to reconstruct and interpret geologic history. Lectures, laboratory, weekend field trip.

**EARTH 103-0 Geologic Hazards** Examination of the principal sources of natural hazards (earthquakes, volcanoes, tsunamis, hurricanes, tornadoes) in the framework of modern geological theories. Lectures and discussion.

**EARTH 105-0 Climate Catastrophes in Earth History** Introduction to the fundamental components of the earth system that control climate and an exploration of how climate is changing today and how it has changed (sometimes catastrophically) in the geologic past. Lectures and discussion.

**EARTH 106-0 The Ocean, the Atmosphere, and Our Climate** The role of the world's oceans in the earth's climate system. Properties of the oceans and marine life. Interaction of oceans, atmosphere, and land. Lectures and discussion.

**EARTH 107-0 Our Dynamic Planet** How plate tectonics controls our planet's evolution, shapes its surface, fosters life, provides natural resources, and threatens society with natural disasters, including earthquakes, tsunamis, and volcanic eruptions. Lectures and discussion or lab.

**EARTH 108-0 Geological Impacts on Civilization** Impacts of geological processes and materials upon human civilizations. Geological, archaeological, and historical records. Societal responses to disasters, environmental changes, resource distributions, etc. Ancient and modern examples. Lectures and discussion.

**EARTH 110-0 Introduction to the Solar System** Origin of the solar system, accretion and differentiation of the earth, early history of the moon, abundance of elements, geologic time. Lectures and discussion.

**EARTH 111-0 Human Dimensions of Global Change** Natural and human causes of climate and environmental changes on land, in waters, and in the atmosphere. The earth system on long and short timescales. Lectures and discussion.

**EARTH 114-0 Evolution and the Scientific Method** Review of evolutionary theory and its scientific, philosophical, social, and religious impacts. Lectures and tutorials.

**EARTH 201-0 Surface Processes** Introduction to fundamental earth processes and their products, with emphasis

on surface processes and the climate system. Field trip. Prerequisites: CHEM 103 and MATH 220 or equivalents.

**EARTH 202-0 Earth's Interior** The earth as a planet: origin, composition, and evolution of the solar system and the earth; internal structure of the earth; plate tectonics.

Prerequisites: MATH 224, PHYSICS 135-1, and CHEM 103 or equivalents.

**EARTH 203-0 Earth System History** Evolution of the earth system and its record through geological time. Interactions among the atmosphere, hydrosphere, sediments, and life on earth. Prerequisite: 201 or equivalent.

### Advanced Courses

#### **EARTH 300-0 (GEOL SCI 302-0) Mineralogy and Petrology**

Origin, composition, and properties of earth materials from the crust to the core. Mineralogy from the atomic level to tectonic settings. Evolution of igneous and metamorphic rocks. Rock textures, compositions, mineral assemblages, phase diagrams, and analytical techniques. Prerequisites: 201 or CHEM 103, MATH 220, and PHYSICS 135-1.

**EARTH 301-0 (GEOL SCI 350-0) Physics and Thermodynamics of the Earth's Interior** Finite strain theory, solid solution thermodynamics, phase transitions, subduction zone processes, seismic velocity structures, mineral equations of state. Prerequisites: CHEM 103, MATH 230, and PHYSICS 135-1.

**EARTH 310-0 Introductory Aqueous Geochemistry** The geochemistry of rivers, groundwater, lakes, and seawater. Topics include the hydrologic cycle and water resources, acids and bases, pH and alkalinity, carbonate equilibria, redox chemistry, sorption processes and surface reactions, mineral solubility and weathering, and reaction kinetics. Prerequisites: CHEM 103 or equivalent.

**EARTH 311-0 (GEOL SCI 316-0) Sedimentary Geochemistry** Formation and diagenesis of carbonates; geochemistry of organic matter; petroleum formation; evaporite precipitation; paleoenvironmental reconstruction; isotope, organic, and trace and major element geochemistry. Prerequisites: 201, 330, and CHEM 103 or equivalents.

**EARTH 312-0 (GEOL SCI 318-0) Stable Isotope Geochemistry** Fractionation and distribution of stable isotopes (C, H, N, O, S) in the biosphere, hydrosphere, atmosphere, and geosphere. Isotopic biogeochemistry, environmental problems, and global climate change. Prerequisites: 201, 311, and 315.

**EARTH 313-0 (GEOL SCI 327-0) Radiogenic Isotope Geochemistry** The application of radiogenic isotopes to problems in geochemistry, groundwater hydrology, oceanography, ecology, and environmental science. Includes radioactive decay, nucleosynthesis, cosmochemistry, geochronology, and isotope mixing models. Prerequisites: 202 and CHEM 103 or consent of instructor.

**EARTH 314-0 Organic Geochemistry** The sources and fates of organic matter in the natural environment; global cycling

of organic carbon; applications to the study of modern and ancient environments. Prerequisites: 1 quarter of earth or environmental science and 1 quarter of chemistry.

**EARTH 315-0 (GEOL SCI 301-0) Geochemistry of Global Environments** Surficial processes and their geological and biological driving forces (atmosphere-land-water interactions, weathering, geochemical transport, sedimentation). Biogeochemical cycles and their role in the global environment. Prerequisite: 201.

**EARTH 316-0 Earth's Changing Climate** Fundamental controls on earth's climate system; global warming and cooling; atmospheric chemistry and role of biogeochemical cycles of land, ocean, and biosphere; major paleoclimatic events, such as Pleistocene glaciations. Prerequisite: 201 or equivalent.

**EARTH 320-0 (GEOL SCI 325-0) Global Tectonics** Kinematics of plate tectonics. Geometry, determination, and description of plate motions. Paleomagnetism, marine magnetism, and hot spots. History of ocean basins and mountain-building processes. Prerequisites: 202, MATH 240, and PHYSICS 135-2.

**EARTH 321-0 (GEOL SCI 309-0) Reflection Seismology** Acquisition, processing, and interpretation of reflection data. Hydrocarbon prospecting, structural geology, tectonics, stratigraphy, and deep continental reflection profiling. Prerequisites: MATH 230 and PHYSICS 135-1 or consent of instructor.

**EARTH 323-0 Seismology and Earth Structure** Elastic theory, seismic waves, seismometers and seismograms, ray paths, travel times; internal structure of the earth; field seismology. Prerequisites: MATH 250 and PHYSICS 135-2.

**EARTH 324-0 Earthquakes and Tectonics** Earthquakes: location, characteristics, origin, mechanism, and relation to plate motions; seismic hazard. Prerequisites: MATH 250 and PHYSICS 135-2.

**EARTH 325-0 (GEOL SCI 329-0) Tectonophysics** Quantitative kinematics of distributed deformation within plate boundary zones; gravity field and geoid; principle of isostasy; flexure of the crust and lithosphere. Prerequisites: MATH 250 and PHYSICS 135-2 or consent of instructor.

**EARTH 326-0 Data Analysis for Earth and Planetary Sciences** Types and characteristics of earth science data, development and applications of model types, observational and systematic sources of uncertainties and their characterization, spatial and temporal predictions.

**EARTH 327-0 (GEOL SCI 328-0) Geophysical Time Series Analysis and Inverse Problems** Analysis of seismic and other geophysical data. Sampling, windowing, discrete and fast Fourier transforms, z-transforms, deconvolution, filtering, and inverse methods. Prerequisite: MATH 250.

**EARTH 328-0 (GEOL SCI 307-0) Tectonics and Structural Geology** Deformation of rock masses: strain, fracture, slip, stress, and rheologic regimes; rock structures; folds, faults, foliations; seismic parameters in tectonic studies;

orogenic belts and their tectonic evolution. Lectures and lab. Prerequisites: 201, MATH 240, and PHYSICS 135-1 or equivalents.

**EARTH 330-0 (GEOL SCI 313-0) Sedimentary Geology**

Sedimentary rocks; stratigraphy; local, regional, and global correlation. Ancient depositional systems; facies analysis in context of tectonic, eustatic, and climatic controls on deposition. Prerequisite: 201 or equivalent.

**EARTH 331-0 (GEOL SCI 319-0) Field Problems in**

**Sedimentary Geology** Field methods in stratigraphy and sedimentology; interpretation of depositional systems, facies models, and sequence stratigraphy based on field observations. Continuation of 330; 3½-week field trip to Colorado and Utah in late August to mid-September, returning in time for fall classes. Prerequisite: 330.

**EARTH 340-0 (GEOL SCI 317-0) Paleobiology** Major fossil groups; origin and evolution of life; speciation and mass extinction; evolution of communities and ecosystems. Application of paleobiologic methods to paleoenvironmental reconstruction. Prerequisites: 101, 105, 106, 201, or 203 or consent of instructor.

**EARTH 350-0 (GEOL SCI 315-0) Physics of the Earth for ISP**

Solid-earth geophysics: the earth's gravity field, the earth's magnetic field, interior of the earth, heat flow, elementary wave propagation, plate tectonics. Prerequisite: second-year standing in ISP or comparable background in mathematics and physics.

**EARTH 398-0 Undergraduate Seminar** Opportunity for advanced work through supervised reading, research, and discussion. Open only by invitation of the department.

**EARTH 399-0 Independent Study** Special problems under direct supervision of one or more staff members. Comprehensive report and examination required. Open with consent of department to juniors and seniors who have completed field of concentration in the department.

## ECONOMICS

The program in economics enables students to understand the basic concepts, theories, and techniques of economics as they apply to economic problems and policies. These may focus on macroeconomics, applied microeconomics, quantitative economics, or economic history. Whatever courses students take, they will become familiar with the way economists think about problems and devise solutions to them. Although the program does not offer specialized professional training in economics, it provides excellent preparation for graduate work in economics, the study of law, and careers in business or government. Students should consult a department adviser about field courses that fit their needs.

### Major in Economics

The introductory courses 201 and 202 must be taken first and in that order. STAT 210 and MATH 220 should also be taken early in the program; the former is a prerequisite

for 281 and the latter for 310-1. 281 and the intermediate theory courses should be completed before 300-level field courses are taken. Although only MATH 220 is required, some 300-level field courses may require MATH 224, 230, or 232, all of which majors are strongly urged to take. Majors considering graduate work in economics are strongly advised to take additional mathematics courses and perhaps a double major in mathematics. Students wishing to pursue in-depth study of econometrics may take 381-1,2 without taking 281 first. For students who complete 381-1, 281 will be waived.

### Departmental courses

*Introductory courses:* 201, 202, 281

*Intermediate theory courses:* 310-1,2, 311

*Field courses:* 6 additional 300-level courses

**Related courses:** MATH 220 (or 212 and 213), STAT 210, and 3 additional courses in the social sciences, mathematics, or statistics, no more than 1 at the 100 level; 260 may be taken in partial fulfillment of this requirement

### Minor in Economics

The minor offers training in economic theory through the intermediate level, instruction in quantitative methods of econometrics, and opportunity for advanced work in students' areas of interest. The introductory and intermediate courses are the same as those in the major, except that only 2 of the intermediate theory courses are required (310-1 and 310-2 or 311). As in the major, MATH 220 and STAT 210 must be taken early in the program because they are prerequisites for required courses. Students wishing to pursue in-depth study of econometrics may take 381-1,2 without taking 281 first. For students who complete 381-1, 281 will be waived.

### Minor course requirements (8 units)

- *Introductory courses (3):* 201, 202, 281
- *Intermediate theory courses (2):* 310-1; 310-2 or 311
- *Field courses (3):* 3 additional 300-level courses

### Four-Year BA/MA

The department offers a four-year BA/MA for outstanding students in economics. Graduate-level courses in economic theory are required. Interested students should consult the director of undergraduate studies in their sophomore year and should see Accelerated Master's Programs in the Undergraduate Education section of this catalog.

### Honors in Economics

By invitation only, superior students in economics may pursue departmental honors by completing, in addition to the regular requirements of the major, one of the following three options: 398-1,2; 2 quarters of 399; or 2 400-level field courses in economics. Under each option, candidates must submit an honors thesis presenting original research. Interested students should consult with the director of



undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

## The Teaching of Economics

Weinberg College students pursuing a major in economics who also wish to be certified for secondary teaching of economics with history must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

## Courses Primarily for Freshmen and Sophomores

**ECON 201-0 Introduction to Macroeconomics** Scarcity and choice; elements of demand and supply, determinants of aggregate output, employment, inflation, growth, and international balance of payments.

**ECON 202-0 Introduction to Microeconomics** Consumers' and producers' influence on structure of output and prices and distribution of income. Social efficiency in resource allocation. Government impact on allocative efficiency and distributive equity. Prerequisite: 201.

**ECON 213-0 Economics of Gender** Analysis of gender differences in employment and earnings. Family, labor market, discrimination, segregation, historical and international conditions, and antidiscrimination legislation.

**ECON 250-0 Business and Government** Survey of the functions, origins, and evolution of government control over business decisions in the American economy. Emphasis on the modern structure of government regulation with attention to remote origins. Prerequisite: 202.

**ECON 260-0 Accounting and Business Finance** Accounting and managerial finance, including the principles of accounting, the elementary concepts of the theory of capital and its relationship to the objectives and problems of managing the firm. Prerequisites: 201, 202, or consent of instructor. (Note: Course changes from ECON 260 to BUS INST 260 effective winter quarter 2009.)

**ECON 281-0 Introduction to Applied Econometrics** Estimation and analysis of a variety of empirical econometric models. Descriptive statistics, univariate regression, multiple regression, simultaneous equations, and forecasting. Prerequisites: 201; 202; MATH 220; STAT 210 or equivalent.

**ECON 310-1,2 Microeconomics 1.** Consumer behavior and the theory of demand; production, cost, supply functions; choices under uncertainty, insurance; competitive equilibrium; subsidies, taxes, price controls; monopoly and monopsony. Prerequisites: 201, 202, MATH 220. **2.** Price discrimination and public utility pricing; monopolistic competition, oligopoly, duopoly models; game theory; factor demands; general equilibrium theory and welfare economics; information theory; externalities and public goods. Prerequisite: 310-1.

**ECON 311-0 Macroeconomics** Macroeconomics and monetary policy. Behavior of the economy as a whole. Income, inflation, unemployment, and growth; consumption, investment, and rate of interest; monetary and fiscal policy. Prerequisites: 201, 202, MATH 220.

## Courses Primarily for Sophomores, Juniors, and Seniors

**ECON 305-0 Comparative Economic Systems** Economic structure, policy, and performance in advanced industrialized nations; examination of economies in transition from socialism to capitalism in central and Eastern Europe. Prerequisites: 281, 310-1, 311.

**ECON 307-0 Economics of Medical Care** Effects of medical care on health; health insurance, public and private demand for medical care, and the market for medical care; regulation of hospitals and physicians; roles of nonprofit and for-profit organizations; technological change. Prerequisites: 281, 310-1.

**ECON 308-0 Money and Banking** Nature of money and bank credit. Development, functions, and operation of monetary standards and credit systems. Banking and credit policies; price levels. Interrelationships of domestic and foreign monetary systems. Prerequisites: 281, 310-1, 311.

**ECON 309-0 Elements of Public Finance** Theory and practice of public finance. Welfare aspects of taxation and public expenditure decisions. Budgeting, public investment, external costs and benefits, and public debt. Prerequisites: 281, 310-1,2.

**ECON 315-0 Topics in Economic History** Topics vary: for example, the decline of European feudalism, Malthusianism, convertibility and free trade, constant wage shares during growth, the origins of the welfare state. Prerequisites: 281, 310-1, 311.

**ECON 316-0 Advanced Topics in Macroeconomics** Topics may include growth, business cycles, unemployment and job search, monetary economics, macroeconomic policy, intertemporal choice, and general equilibrium. Prerequisites: 281; 310-1,2; 311; MATH 224 and 230 or 232.

**ECON 317-0 Topics in Economic Demography** The economics of fertility, migration, population growth, and demographic changes. Topics may include immigration, illegal migration, the baby boom, aging, retirement, and female labor force participation. Prerequisites: 281, 310-1, 311.

**ECON 318-0 History of Economic Thought** Development of economic thought from the advent of the mercantilists to the formation of current schools of economics. Prerequisites: 281, 310-1,2, 311.

**ECON 321-0 African American Economic History** Economic experiences of African Americans as slaves and free people in the pre-Civil War period and in post-Civil War agriculture. South-North migration, urbanization, civil rights movements, and global economic competition. Prerequisites: 281, 310-1, 311.



**ECON 322-0 Evolution of the Global Economy** Global integration and growth in the 19th and 20th centuries: historical perspectives and current controversies. Topics include international capital movements; mass migration; commercial policy and the growth of trade; evolution of the payments system; instability and war; comparative economic growth; development and underdevelopment. Prerequisites: 281, 310-1, 311.

**ECON 323-1,2 Economic History of the United States** Economic development of the United States with emphasis on changing structure and performance of the economy. 1. Colonial period to 1865. 2. 1865 to the present. Prerequisites: 281, 310-1, 311.

**ECON 324-0 Western Economic History** Western European developments, 1750 to the present: demographic, technical, social, and economic change. Prerequisites: 281, 310-1, 311.

**ECON 325-0 Economic Growth and Development** Macroeconomic aspects of long-term patterns of economic development. The effects of investment, education, population, and technological change on economic growth. Prerequisites: 281, 310-1,2, 311.

**ECON 326-0 The Economics of Developing Countries** Structure, performance, and problems of developing economies. Topics may include land use, labor, migration, credit, insurance, and famine. Prerequisites: 281, 310-1,2, 311.

**ECON 330-0 Behavioral Economics** Understanding how people make choices in economic situations. Incorporation of psychology and/or sociology into economics. Topics may include perceptions, judgment, biases, and social pressure. Prerequisites: 281, 310-1,2.

**ECON 331-0 Economics of Risk and Uncertainty** Models of decision making under uncertainty. Use of these models to understand economic phenomena such as investment in financial assets, insurance, contracting, and auctions. Prerequisites: 281, 310-1,2.

**ECON 336-0 Analytic Methods for Public Policy Analysis** Formulation of objectives, structuring decision problems, choices under uncertainty, interactive decisions, and the impact of organizational structure on project outcomes. Prerequisites: 281, 310-1,2.

**ECON 337-0 Economics of State and Local Governments** Economic functions and financing of state and local governments in theory and practice; costs and demands for local public services; role of government finance in urban and regional growth. Prerequisites: 281, 310-1,2.

**ECON 339-0 Labor Economics** Survey of economic problems growing out of employment relationships; theories and processes of wage and employment determination, income distribution, and the role of trade unions and issues of economic security. Prerequisites: 281, 310-1,2, 311.

**ECON 340-0 Economics of the Family** Application of microeconomic theory to the analysis of family issues: marriage, cohabitation, the decision to have children, divorce, credit and insurance, and legacies. Prerequisites: 281, 310-1,2.

**ECON 341-0 Economics of Education** The economic analysis of education, including return to schooling, education and economic growth, education production functions, school financing, vouchers, charter schools, and accountability. Prerequisites: 281, 310-1,2.

**ECON 349-0 Industrial Economics** Price and efficiency performance of American industries representative of various types of market structures and practices. Prerequisites: 281, 310-1,2.

**ECON 350-0 Monopoly, Competition, and Public Policy** Present public policy and unsettled issues with respect to structure and practices of industrial markets; concentration, vertical integration, and forms and effectiveness of competition. Prerequisites: 281, 310-1,2.

**ECON 351-0 Law and Economics** The impact of judicial decisions and statutory enactments — including corporate law and antitrust and regulation statutes — on economic behavior and markets. Prerequisites: 281, 310-1,2.

**ECON 354-0 Issues in Urban and Regional Economics** Factors affecting the spatial distribution of economic activity. Applications of economic analysis to problems of urban areas such as housing markets, zoning restrictions, and racial patterns of employment and housing. Prerequisites: 281, 310-1,2.

**ECON 355-0 Transportation Economics and Public Policy** The demand for alternative modes by passengers and shippers. Cost of providing transportation, competition, regulation, optimal pricing, subsidies, congestion pricing, and urban transit. Prerequisites: 281, 310-1,2.

**ECON 359-0 Economics of Nonprofit Organizations** The economic rationale for the nonprofit sector in a mixed economy. Topics include the objectives and behavior of nonprofit organizations, competition with commercial firms, volunteerism, and charitable donation. Prerequisites: 281, 310-1,2.

**ECON 360-0 Foundations of Corporate Finance Theory** How corporations allocate resources over time as facilitated by capital markets. Theory of asset evaluation, economic analysis of uncertainty, and capital budgeting and capital structure decisions. Prerequisites: 281, 310-1, 311.

**ECON 361-0 International Trade** International and inter-regional trade. Factors influencing trade in goods and services between areas. Reasons for and effects of impediments to trade, such as transport costs, tariffs, quotas, and voluntary export restrictions. Prerequisites: 281, 310-1,2; 311.

**ECON 362-0 International Finance** Determination of exchange rates, balance of payments, and international asset flows and prices; international transmission of macroeconomic disturbances. Prerequisites: 281, 310-1, 311.

**ECON 370-0 Environmental and Natural Resource Economics** Externalities and the role of property rights, pollution, waste disposal, common property problems, renewable resource management, nonrenewable resource use and depletion, recyclable resources, water allocation, and management of public lands. Prerequisites: 281, 310-1,2.

**ECON 380-1,2 Introduction to Mathematical Economics**

**1.** Noncooperative game theory, with applications to industrial organization, auctions, and theories of the firm. Prerequisites: 310-1,2; 311; MATH 224 and 230 or 232.

**2.** Cooperative and noncooperative game theory and decision making under uncertainty. Prerequisite: 380-1 or consent of instructor.

**ECON 381-1,2 Econometrics 1.** Probability and distribution theory, statistical inference, simple and multiple regression, specification error and multicollinearity, heteroskedasticity and serial correlation, measurement error, dummy variables. Prerequisites: STAT 210 or equivalent, 310-1, 311; MATH 224 and 230 or 232. **2.** Hypothesis testing, estimation with deficient data, distributed lags, panel data, simultaneous equation systems, limited dependent variables. Prerequisite: 381-1.

**ECON 383-0 Economic Forecasting** Techniques for making and evaluating economic and business forecasts, including univariate regressions, autoregressive and ARMA models, vector autoregressive models, and structural econometric models. Prerequisites: 281, 310-1, 311.

**ECON 395-0 Junior Seminar** Small seminars led by different department members on their special interests. Advanced work through supervised reading, research, or discussion. Prerequisites: 281; 310-1,2; 311; MATH 224 and 230 or 232.

**ECON 398-1,2 Senior Honors Seminar** For students of superior ability. Original research on a topic of interest to the student, culminating in a senior honors thesis. By department invitation only. Grade of K given in 398-1. Prerequisites: 281; 310-1,2; 311; MATH 224 and 230 or 232; at least 4 300-level economics electives.

**ECON 399-0 Independent Study** Advanced work through reading, research, and discussion to build on economics course work taken by the student. Project to be decided by mutual agreement with a faculty member.

**ENGLISH**

The Department of English values various kinds of critical inquiry and creativity. While some courses emphasize the formal qualities of literary works, other courses address questions such as what counts as “literary” and/or how we might characterize the relationships among literature, culture, and politics. Classes might discuss psychoanalysis, race and gender, or the history of the book. The particular kinds of texts examined also vary a good deal, as do their assumptions, methods, and emphases. The unity underlying this variety is a common emphasis on close reading and careful analysis of texts in general and the written word in particular. The department’s curriculum reflects both this range and specificity, and it enables each student to pursue a particular area of interest within a broader understanding of literary history and the range of literary study. In its creative writing courses, the department offers students disciplined training in the writing of verse, fiction, and

creative nonfiction. Virtually all of its courses also include practice in the writing of clear, concise, and persuasive expository prose. Rigorous training in thinking and writing is valuable for any career that an undergraduate may ultimately pursue and makes English an attractive major for students preparing for careers in law, IT, finance, and business as well as in writing, publishing, and the teaching of English at all levels. So too, courses in English and American literature may help students to hone their skills as critical citizens of global communities.

The department takes pride in the diversity of perspectives afforded by its courses. In addition to teaching classes in the department, English faculty contribute substantially to the course offerings in theater, drama, comparative literature, and American, African American, Asian American, and gender studies.

University Library is a valuable resource for advanced studies of British and American literature, maintaining notable collections and databases in 19th- and 20th-century materials and notable holdings in African literature. English majors also often profit from the University’s study abroad programs. Professors have taught courses in conjunction with the Newberry Library and other Chicago institutions.

**Majors in English**

A complete description of undergraduate English major programs may be obtained from the department office and the department’s web site at [www.english.northwestern.edu](http://www.english.northwestern.edu). Detailed descriptions of courses offered each quarter are published in “English Notes,” available from the department office three times a year in advance of registration, and available year-round from the department’s web site. In addition, a tentative list of course offerings for the following year is available each spring. Writing courses (206, 207, and 208) and other courses whose content varies (e.g., 313, 348, 378) may be repeated, but only with the consent of the department. It is strongly recommended that every major and minor meet with one of the official English advisers before registering each quarter.

*English Major in English and American Literature*  
**Departmental courses**

*Introductory courses (2):* any 1 of 210-1, 210-2, 270-1, or 270-2, followed by 298

*Major courses (11)*

- the remaining part of introductory series 210 or 270 (210-1, 210-2, 270-1, or 270-2, as appropriate)
- 10 courses other than the second half of the introductory series
- 9 of the 10 courses at the 300 level or above
- at least 8 of the 10 courses in the English department, or literature courses offered by related departments, or courses taught by English department faculty through other departments or programs and dealing substantially

with literary works originally written in English (i.e., not in English translation)

- at least 3 of the 10 courses must deal substantially with texts written before 1798, and at least 3 with texts written after 1798
- at least 1 of the 10 courses in American literature
- at least 1 of the 10 courses in literary criticism or theory

**Related courses (2):** 2 courses in fields outside of literature but still related to the student's demonstrated interests within the major (specific listings are available in the department office and on the department's web page)

### *English Major in Writing*

Students in English may also apply to major in writing. Admission to the writing major is competitive, based on a manuscript of creative work from 206, 207, or 208. The major offers an apprenticeship in the writing of poetry, fiction, and creative nonfiction, but it is not restricted to "creative" writing alone. A strong literature component and a course in the history and culture of literary production anchor the writing done in the practical workshop courses in poetry, fiction, and creative nonfiction within a context of general literacy.

Students may apply for admission to the writing major through the department in early spring of each year.

### **Departmental courses**

*Introductory courses (2):* 206 (required) and 207 or 208

*Major courses (11):*

- 1 yearlong theory and practice sequence: 393-F,W,T,S, 394-F,W,T,S, or 395-F,W,T,S
- 392
- 207 (if the student has already taken 208) or 208 (if the student has already taken 207)
- 6 300-level English department literature courses, including at least 2 that deal with works written before 1798, and at least 2 with works written after 1798

**Related courses (2):** 2 courses in fields outside of literature selected with the advice and consent of the student's writing major adviser; courses that provide a broad historical background for the study of literature are recommended

### **Minors in English**

The department offers both a minor in literature and a minor in writing; both offer experience in reading literary texts and writing critical analysis. Students pursuing either minor will be permitted to preregister in the department after declared English majors do so.

### **Minor in literature (7 units)**

- 3 200-level courses: either 210-1,2 or 270-1,2, followed by 298
- 4 300-level courses, 2 of which must deal with pre-1798 literature and 2 with post-1798 literature; 1 of these 4 courses may be in comparative literary studies

### **Minor in writing (7 units)**

- 206 (required) and 207 or 208
- 1 advanced writing sequence, either 393, 394, or 395 (counting as 3 units); and 2 300-level English department literature courses, 1 on literature before 1798 and the other on literature after 1798 (admission by application only to advanced writing sequences)

### **Honors**

#### *Honors in Literature*

Literature majors who wish to earn honors may apply during the spring of their junior year for admission to the 2-quarter senior honors sequence (398-1,2), which meets the following fall and winter quarters. All students admitted are expected to produce an honors essay. The sequence is under the general direction of the departmental honors coordinator, while individual students work directly under the guidance of a faculty specialist of their own choosing.

A number of collective meetings for students participating in the honors sequence in literature are held in the fall and winter, first for training in research methods and later for presenting works in progress and discussing common problems. (When special circumstances make participation in the fall-winter sequence impossible, the department may offer several alternative routes, in compliance with Weinberg College guidelines. See the director of undergraduate studies.) Admission to honors candidacy is competitive; candidates should be reasonably certain of attaining at least a 3.4 departmental average by the end of winter quarter of senior year. Students interested in honors through the writing major should consult with the director of that program. See also Honors under Academic Policies earlier in this section of the catalog.

All literature majors are encouraged to write at least one 12- to 15-page essay in their upper-division course work. Weinberg College's interdisciplinary junior research seminars and independent study courses, and as well as designated 300-level English courses including 390, offer the opportunity to complete substantive research papers.

#### *Honors in Writing*

Writing majors who complete the yearlong writing sequence and wish to pursue honors may apply to the 2-quarter senior honors program (398-1 and 399). All students admitted are expected to produce an honors-level creative writing project in poetry, fiction, creative nonfiction, or literary translation. A member of the writing major faculty directs the honors seminar, while individual students work directly with a writing faculty member assigned to them.

Admission to the honors program in writing is competitive. Eligible students must have a minimum 3.5 GPA in English department course work and must have demonstrated the seriousness, dedication, and discipline needed to complete an ambitious and sustained project.

## The Teaching of English

Weinberg College students pursuing a major in English who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

## Related Programs

Literature courses appear in the curricula of African American studies, American studies, Asian American studies, comparative literary studies, drama, and gender studies. Students also may pursue creative writing in courses offered by the writing arts program.

## Courses in Composition

See also the Writing Program.

**ENGLISH 105-0 Expository Writing** Emphasizes all phases of the composition process, research methods, and critical thinking. Careful review of student papers and reports.

**ENGLISH 106-1,2 Writing in Special Contexts** (.5 unit)

An introduction to expository writing similar to 105 but paired with a course in another discipline.

**ENGLISH 205-0 Intermediate Composition** Expository writing at an intermediate level. Emphasis on techniques for writing clearly, precisely, and persuasively.

**ENGLISH 304-0 Practical Rhetoric** The theory of writing and skills that underlie good writing; primarily for teachers in secondary schools and universities.

**ENGLISH 305-0 Advanced Composition** For students with previous formal training in composition. Admission by consent of department.

## Courses Primarily for Freshmen and Sophomores

Prospective writing majors must take 206 and either 207 or 208.

**ENGLISH 206-0 Reading and Writing Poetry** Forms and techniques of verse. May not be taken earlier than spring quarter of freshman year.

**ENGLISH 207-0 Reading and Writing Fiction** Forms and techniques of fiction. Prerequisite: 206.

**ENGLISH 208-0 Reading and Writing Creative Nonfiction** Forms and techniques of creative nonfiction. Prerequisite: 206.

**AF AM ST 210-1,2 Survey of African American Literature** See African American Studies.

**ENGLISH 210-1,2 English Literary Traditions** Chronological survey of British literature in its cultural contexts from Chaucer to the 20th century. 1. Chaucer to the late 18th century. 2. Late 18th century through the 20th century.

**ENGLISH 211-0 Introduction to Poetry** Elements of lyric and narrative poetry, with emphasis on the ways these can create meaning and elicit response.

**ENGLISH 212-0 Introduction to Drama** Fundamental

elements of drama as perceived in performance. How a play communicates from text to stage to audience.

**ENGLISH 213-0 Introduction to Fiction** How prose fiction, as practiced by various British and American authors from the 18th century to today, creates and communicates meaning.

**ENGLISH 234-0 Introduction to Shakespeare** Representative Shakespearean plays.

**AF AM ST 259-0 Introduction to African American Drama**

See African American Studies.

**ENGLISH 260-0 Introduction to 20th-Century British Literature** Principal writers and works from 1900 to World War II.

**ENGLISH 270-1,2 American Literary Traditions** Representative writers and works of American literature in cultural context. 1. Puritans to *Moby Dick*. 2. Mid-19th century to the present.

**ENGLISH 273-0 Introduction to 20th-Century American Literature** Principal writers and works since World War I.

**ENGLISH 275-0 Introduction to Asian American Literature** From the early 20th century to the present, covering a range of genres and ethnicities.

**ENGLISH 298-0 Introductory Seminar in Reading and Interpretation** Close reading of literary works in the light of various perspectives in literary study. Prerequisites: 210-1,2 or 270-1,2; students may take 298 concurrently with 210-2 or 270-2.

## Courses Primarily for Juniors and Seniors

**WRITING 301-0 The Art of Fiction** See Writing Arts.

**ENGLISH 302-0 History of the English Language** The English language from the earliest times to today.

**WRITING 302-0 The Art of Poetry** See Writing Arts.

**WRITING 303-0 The Art of Nonfiction** See Writing Arts.

**ENGLISH 307-0 Advanced Creative Writing** For nonwriting majors with previous formal training in creative writing. May be repeated for credit with different topic. Admission is by consent of department.

**ENGLISH 310-0 Studies in Literary Genres** Content varies.

**ENGLISH 311-0 Studies in Poetry** Content varies.

**ENGLISH 312-0 Studies in Drama** Content varies.

**ENGLISH 313-0 Studies in Fiction** Content varies.

**ENGLISH 320-0 Medieval English Literature** Representative works in their intellectual and cultural contexts.

**ENGLISH 322-0 Medieval Drama** Study of 15th-century English mystery cycles, miracle plays, and moralities in their cultural context.

**ENGLISH 323-1,2 Chaucer** 1. *The Canterbury Tales*. 2. *Troilus and Criseyde* and other works.

**ENGLISH 324-0 Studies in Medieval Literature** Content varies.

**ENGLISH 331-0 Renaissance Poetry** English poetry from the Elizabethan period to 1660.

**ENGLISH 332-0 Renaissance Drama** A survey of English drama (1590–1630) and its cultural contexts.

**ENGLISH 333-0 Spenser** Spenser's major poetry, with emphasis on *The Faerie Queene*.

**ENGLISH 334-1,2 Shakespeare** 1. Principal plays up to 1600. 2. Principal plays after 1600.

**ENGLISH 335-0 Milton** Milton's poetry, with those parts of his prose that illuminate his poetical and intellectual development.

**ENGLISH 338-0 Studies in Renaissance Literature** Content varies.

**ENGLISH 339-0 Special Topics in Shakespeare** Content varies.

**ENGLISH 340-0 Restoration and 18th-Century Literature** Representative works in their intellectual and cultural contexts.

**ENGLISH 341-0 Restoration and 18th-Century Poetry** Dryden, Pope, and other poets of the period 1660–1744.

**ENGLISH 342-0 Restoration and 18th-Century Drama** English drama from 1660 to the end of the 18th century.

**ENGLISH 343-0 18th-Century Prose** Swift, Johnson, Burke, Gibbon, Wollstonecraft, and other nonfiction prose writers.

**ENGLISH 344-0 18th-Century Fiction** Writers such as Defoe, Richardson, Smollett, Fielding, Sterne, Burney, Radcliffe, and Austen.

**ENGLISH 348-0 Studies in Restoration and 18th-Century Literature** Content varies — for example, biography and autobiography, literary careers, literature and social criticism.

**ENGLISH 350-0 19th-Century British Literature** Representative works in their intellectual and cultural contexts.

**ENGLISH 351-0 Romantic Poetry** Writers such as Blake, Wordsworth, Coleridge, Byron, Shelley, and Keats.

**ENGLISH 353-0 Studies in Romantic Literature** Content varies.

**ENGLISH 356-0 Victorian Poetry** The principal British poets from Tennyson to Hopkins.

**ENGLISH 357-0 19th-Century British Fiction** Important and representative novels written between 1800 and 1900.

**ENGLISH 358-0 Dickens** Representative major works of Charles Dickens.

**ENGLISH 359-0 Studies in Victorian Literature** Content varies.

**ENGLISH 360-0 20th-Century British and American Literature** Representative works in their intellectual and cultural contexts.

**ENGLISH 361-1,2 20th-Century Poetry** 1. Major British poets such as Yeats, Eliot, and Auden. 2. Major American poets from Frost and Robinson to Crane.

**COMP LIT 362-1,2,3 Modern Drama** See Comparative Literary Studies.

**ENGLISH 363-1,2 20th-Century Fiction** 1. Major British novelists from Conrad to World War II. 2. Major American novelists from James to World War II.

**ENGLISH 365-0 Studies in Postcolonial Literature** Themes, antecedents, and contexts of selected literature

produced in societies emerging from colonial rule.

**ENGLISH 366-0 Studies in African American Literature** Content varies.

**ENGLISH 367-0 Postwar British Fiction** Representative British novels since 1945.

**ENGLISH 368-0 Studies in 20th-Century Literature** Content varies.

**ENGLISH 369-0 Studies in African Literature** 20th-century African literature in English.

**ENGLISH 370-0 American Literature before 1914** Intellectual and cultural contexts of American literature from the Puritans to 1914.

**ENGLISH 371-0 American Novel** Writers such as Cooper, Alcott, Chopin, Hawthorne, Melville, Poe, Twain, James, Howells, Crane, Dreiser, and Wharton.

**ENGLISH 372-0 American Poetry** Writers such as Freneau, Bradstreet, Bryant, Poe, Whitman, Dickinson, Robinson, and Frost.

**ENGLISH 375-0 Topics in Asian American Literature** Content varies.

**ENGLISH 378-0 Studies in American Literature** Content varies.

**COMP LIT 383-0 Special Topics in Theory** See Comparative Literary Studies.

**ENGLISH 383-0 Special Topics in Theory** Topics in theory and criticism related to the study of literature and culture. Content varies.

**ENGLISH 385-0 Topics in Combined Studies** Special topics in literature and related disciplines. Content varies.

**ENGLISH 386-0 Studies in Literature and Film** Content varies.

**ENGLISH 390-0 Directed-Research Tutorial** Research-oriented projects with direction and support from advanced graduate students, culminating in a substantial paper. Open to junior or senior English majors. Pre-requisite: permission of director of undergraduate studies.

**ENGLISH 392-0 The Situation of Writing** The sociology of writers, writing, publication, dissemination of literature, and reading.

**ENGLISH 393-F,W,T,S Theory and Practice of Poetry** (3 units total) Sequence of 2 15-week courses. 1. Theory of prosody, including the major form of poetry in English (accentual-syllabic verse) and minor forms (accentual, syllabic, and free verse). 2. Intensive writing practice culminating in the production of a long poem. Pre-requisite: admission to sequence or writing major.

**ENGLISH 394-F,W,T,S Theory and Practice of Fiction** (3 units total) Sequence of 2 15-week courses. 1. Tenets of fictional realism and its substitutes, with practice in different applications of plot, narrative technique, and point of view. 2. Culminates in the writing of a novella. Prerequisite: admission to sequence or writing major.

**ENGLISH 395-F,W,T,S Theory and Practice of Creative Nonfiction** (3 units total) Sequence of 2 15-week courses. 1. Tenets of creative nonfiction, with practice in different



styles, form, and modes. **2.** Culminates in the writing of a long creative nonfiction project. Prerequisite: admission to sequence or writing major.

**ENGLISH 398-1 Senior Honors Seminar** (writing major) Fall quarter. For seniors preparing an honors manuscript in the writing major. Students pursue individual projects under the direction of a faculty adviser and the writing major honors coordinator. Admission by application.

**ENGLISH 398-1,2 Senior Honors Sequence** (literature major) For seniors preparing an honors essay in the literature major. Students pursue individual topics under the direction of a faculty adviser and the departmental honors coordinator. Admission by application. K grade given each quarter pending completion of essay.

**ENGLISH 399-0 Independent Study** Individual projects with faculty guidance. Open to majors with junior or senior standing and to senior minors. May be elected three times, but only 1 unit at a time. Prerequisite: consent of department or director of writing major.

## ENVIRONMENTAL POLICY AND CULTURE

The Environmental Policy and Culture Program is for students interested in the interdisciplinary study of how people affect and are affected by the natural environment. The minor in environmental policy and culture provides opportunities to engage in scholarly inquiry about issues and problems related to managing the natural environment. Courses that fulfill the minor's requirements come from many different departments and fall into three categories: the humanities (largely courses in history, philosophy, and religion), policy (largely courses in the social sciences), and the natural sciences. Although all students who minor in environmental policy and culture take at least 1 relevant course in the natural sciences, the emphasis is on courses in the humanities and social sciences.

Weinberg College requirements do not generally allow a student to count the same course toward both a major and a minor requirement. Students declaring a minor in environmental policy and culture should discuss the double-counting rule with the program director.

### Minor in Environmental Policy and Culture

A list of courses counting toward the minor in environmental policy and culture is available from the program. Minors may choose to concentrate in the humanities or the social sciences. The 7 courses counted toward the minor may include any mix of courses from these different categories, subject to the restrictions listed below.

- At least 2 courses chosen from the following:

HISTORY 215

PHIL 268

RELIGION 261

POLI SCI 367

GEOG 211

- At least 1 natural sciences course chosen from the following:  
BIOL SCI 204, 345, 346, 347  
CIV ENG 206, 360 (see the McCormick School section of this catalog)  
EARTH 111  
GEOG 235
- At least 4 of the 7 courses at the 300 level
- Because the minor is meant to include a focus on the humanities and social sciences, no more than 2 courses from the natural sciences list will be automatically approved for the minor. Exceptions to any of the above restrictions must be approved by the program director.

## ENVIRONMENTAL SCIENCES

A major challenge facing our species is to learn to understand and coexist with the natural environment. The environmental sciences major is designed to provide students with an understanding of the biological, chemical, and physical environment and the relations of humans to it. Environmental sciences necessarily differs from the more traditional divisions of scientific inquiry. The intellectual approach is that of synthesis, where the focus is concentrated on the integration of knowledge across disciplines, coupled with further refinement of knowledge within a particular scientific field. Also, the concern for translating theory into practice requires a strong association with engineering. With this approach, environmental sciences provides a mechanism for motivated students to work in an interdisciplinary framework with a common theme.

The major gives students the expertise to address issues of environmental concern, such as energy alternatives, environmental law, the relation of society to resources, and health problems of air and water pollution, from a scientific basis. It provides a background for employment in environmentally oriented firms or for graduate study in any of several different environmental sciences disciplines as well as an exceptional preprofessional experience for students interested in law or business. The program is coadministered by the Judd A. and Marjorie Weinberg College of Arts and Sciences and the Robert R. McCormick School of Engineering and Applied Science as part of the Program in Environmental Science, Engineering, and Policy.

### Major in Environmental Sciences

The major in environmental sciences has two tracks: one in science and one in policy. Foundation courses in science, the core curriculum, and senior-year research courses are the same for both tracks. Advanced course work differs depending on the track.

#### Foundations in science and math (9 or 10 units)

- CHEM 101, 102, and 103 *or* CHEM 171 and 172
- MATH 220 and 224 *or* 212, 213, and 214

- 5 courses chosen from BIOL SCI 210-1, 164; CHEM 210-1,2; ECON 201, 202; PHYSICS 135-1,2 (PHYSICS 130-1,2 may be substituted with consent of program director); STAT 210

### Core curriculum (3 units)

- 201, 202, 203

### Senior-year research (2 units)

- 398-1,2 or CIV ENG 398-1,2

### Advanced studies (6 units)

- 6 courses including 4 at the 300 level

Course selections vary depending on the track: Students in the science track choose 4 courses from the science list and 2 from the environment and society list; students in the policy track take ECON 281, 310-1, and 370 plus 3 additional courses, including 2 from the science list.

#### *Science list*

ANTHRO 312, 313, 315  
 BIOL SCI 341, 343, 345, 346, 347, 348, 349  
 CHEM 329, 342-1, 393  
 CIV ENG 358, 359, 360, 361, 363, 364, 366, 367, 370  
 EARTH 201, 311, 312, 315, 330, 331, 340  
 GEOG 211, 235, 341, 343  
 PHYSICS 301

#### *Environment and society list*

390  
 ANTHRO 306, 310, 383  
 ECON 370  
 GEOG 328  
 HISTORY 215  
 PHIL 268  
 POLI SCI 349, 367, 371  
 SOCIOL 312

### Second Major in Environmental Sciences for Integrated Science Program Students

The Integrated Science Program is a highly selective BA program in Weinberg College (see Integrated Science Program). Students majoring in ISP who wish to complete a second major in environmental sciences should fulfill the following requirements instead of those listed above. They may not substitute 398 or ISP 398 for the ISP-required course MATH 383 and must take the following additional courses:

- EARTH 201
- BIOL SCI 210-1
- 2 of the following courses: BIOL SCI 204; GEOG 235; GEOL SCI 202
- 2 courses from the environment and society list above
- 2 courses, not in the same department, from the two advanced studies lists above, except CHEM 342-1
- 2 quarters of 398 may be taken instead of ISP 398

### Advising and Course Selection

As soon as students have declared a major in environmental sciences, they should consult with the environmental sciences adviser to plan their programs. They should try to complete the foundations courses by the end of their sophomore year.

Premedical students and students interested in advanced study in environmental biology are advised to take the 200-level sequence in biological sciences and 1 or 2 additional quarters of organic chemistry.

### Core Courses

**ENVR SCI 201-0 Earth: A Habitable Planet** Chemical and physical perspective on the evolution of the planet; the emergence of life and the nature of biogeochemical cycles; the role of human activities that are now part of these cycles.

**ENVR SCI 202-0 The Health of the Biosphere** Population processes in nature; role of human population growth; interactions between populations; major impacts of human populations on the environment.

**ENVR SCI 203-0 Energy and the Environment: The Automobile** Integrated study of fundamental chemistry, industrial production, energy use, and public policy, using the automobile as an example.

### Other Courses

#### **ENVR SCI 390-0 Internship in Environmental Sciences**

(1–2 units) Participation in off-campus research activities of public and private environmental organizations under the supervision of faculty. Prerequisite: junior or senior standing and consent of program director.

#### **ENVR SCI 398-1,2 Environmental Research Seminar**

Independent research directed by environmental sciences faculty. Research design and scientific communication. Prerequisite: senior standing and major in environmental sciences.

### ETHICS AND CIVIC LIFE

The interdisciplinary Brady Program in Ethics and Civic Life provides students with the opportunity to examine and practice the ethics of citizenship and leadership. The three-year program includes academic, international, and service components. Brady Scholars are selected in spring of the freshman year.

As sophomores, Brady Scholars enroll each quarter in a seminar that addresses how to be a good individual, how to be a good friend and neighbor, or how to make their cities, the nation, and the planet better places in which to live. Each group of Brady Scholars selects one community problem for further study.

In the junior year Brady Scholars participate in a study abroad program and, in addition to their regular course work, learn how the foreign country addresses the problem selected by their group.

As seniors, Brady Scholars work with their group to solve some aspect of the chosen problem in the local community.

### Courses

Specific topics in these sophomore-year seminars will vary as different professors participate.

**PHIL 273-1** The Good One

**PHIL 273-2** The Good Neighbor

**PHIL 273-3** The Good Place

## EUROPEAN STUDIES

The origins of Europe as a geopolitical and cultural entity are not easy to define. Did a distinctively European culture and identity first come into being with the coronation of Charlemagne in 800? With the conversion of the Slavic and Scandinavian peoples to Christianity? Or, conversely, with the shattering of Christendom in the wake of the 16th-century Reformation? In our own day, particularly since the collapse of the Soviet empire in 1989, the rapidly accelerating economic and political unification of Europe has cast a new light on such questions. The major in European studies is an interdisciplinary program that gives attention to both humanities and social sciences and can readily accommodate a focus on history, politics, economics, literature, philosophy, or art. Students normally apply for the major in the spring quarter of their freshman or sophomore year. The European studies major culminates in the writing of a senior thesis.

### Major in European Studies

The history of European civilization sequence HISTORY 201-1,2 is prerequisite for all European studies majors. Majors also are expected to achieve proficiency in a European language other than English. To this end, requirements for the major include 2 300-level courses in a foreign language or its literature taught in the foreign language. These courses may be taken during study abroad. Students who demonstrate exceptional linguistic competence may take the courses in two different languages. Those who also complete a major or minor in a language department will automatically have met this requirement.

Students who enter the major as freshmen will be encouraged to spend either their whole junior year or the fall term of that year in the European country of their choice. In cooperation with the Institut d'Etudes Politiques de Paris (Sciences Po), Northwestern sponsors a study abroad program on the European Union in Paris. This is only one of several study abroad programs appropriate for European studies majors. Those who enter the major at the end of their sophomore year will be encouraged to complete a summer study abroad program between their junior and senior years. Ideally, majors study in non-English-speaking countries, though selected programs in Great Britain (e.g., at the London School of Economics or the University of Edinburgh) are also appropriate.

### Major course requirements

- 301-1,2,3; 390-1,2,3
- HISTORY 201-1,2
- 6 additional courses dealing with Europe, at least 4 at the 300 level
- 2 300-level language/literature courses taught in a continental European language
- With the exception of the 2 300-level language courses, none of the above courses may be double-counted toward the European studies major and another major.

### Courses

**EUR ST 301-1,2,3 Sequence for Majors** A yearlong sequence of seminars focused on a broad theme. The seminars integrate methods and materials from different disciplines. Limited to 15 students.

**EUR ST 390-1,2,3 Senior Thesis Seminar** Guided independent research and the writing of a senior thesis under the direction of a faculty adviser and honors coordinator. K grade given pending thesis completion.

## FILM AND MEDIA STUDIES

The Film and Media Studies Program brings together faculty and students from across the University who are interested in thinking about film and media within a broad intellectual framework. Students in this interdisciplinary program acquire critical tools for analyzing traditional and new media, as well as knowledge of some crucial historical and interpretive problems raised by the study of media within the context of the humanities and social sciences. Students who minor in film and media studies are encouraged to participate in the rich and varied media offerings of the University, including film series and individual film screenings, workshops, performances, exhibitions, and presentations by invited speakers.

### Minor in Film and Media Studies

Students must formally apply to minor in film and media studies in the School of Communication's Department of Radio/Television/Film.

### Minor course requirements (7 units)

- RTVF 220 (see the School of Communication section of this catalog)
- COMP LIT 206
- 5 additional courses with a primary emphasis on film and/or media studies, including at least 3 at the 300 level

Relevant courses are offered by departments and programs in both Weinberg College and the School of Communication, including comparative literary studies, some language departments, and radio/television/film. A list of eligible courses is available from program advisers and on the program page at the School of Communication web site, [www.communication.northwestern.edu/programs/minor\\_film\\_media\\_studies](http://www.communication.northwestern.edu/programs/minor_film_media_studies). Other courses also may be

counted toward the minor with the approval of a film and media studies adviser.

## FINANCIAL ECONOMICS

See Financial Economics in the Cross-School Programs section of this catalog for description of the new Kellogg School of Management certificate program.

## FRENCH AND ITALIAN

Studies in French and Italian provide unique insights into the language, thought, and character of cultures different from our own. Such knowledge builds an awareness of our own society's diversity and the ways it resembles and differs from others. As the merging of domestic and international events increasingly affects the material and intellectual life of every individual, the ability to communicate with other peoples assumes vital importance. Whether a student is planning a career in teaching, government, science, the professions, or business, the study of a foreign language, literature, and culture is a valuable component of any university education.

Programs in the department are varied. Language courses, from the elementary through the graduate levels, develop communication skills that allow students to function at ease with foreign texts or in a foreign environment. Courses in literature and civilization not only broaden and deepen insights into the thought and writing of another culture but also train students to think independently, to organize and analyze materials thoughtfully, and to discuss ideas effectively.

The department offers a minor in French, a major in French studies, MA and PhD programs in French, and a minor and a major in Italian. These may be supplemented by study abroad, which allows students to increase their knowledge of a foreign language and society while continuing university work abroad in a variety of fields. It is not necessary to be a major to participate in these programs. An excellent library, modern audiovisual resources, and a distinguished faculty further strengthen studies in French and Italian.

### *French*

#### Major in French

The program for majors in French studies consists of 15 quarter-courses; at least 10 must be at the 300 level. Courses at a level lower than 202 do not count toward the major. Students may count toward the major up to 5 200-level courses chosen from 202, 203, either 210 or 211, and at most 2 from 271, 272, and 273. Of the 15 courses, up to 2 may be French department courses taught in English. All majors must take 2 courses in the 310, 312, 314, 316 sequence (at least 1 pre-1800). At least 1 additional 300-level course must be on literature and culture before 1800. All majors must take 396 and 397 during their senior year.

Students returning from a study abroad program in

France or any other francophone country may receive up to 7 credits (depending on program length) if the content of the courses taken abroad relates in a substantive way to some aspect of French or francophone culture. All returning majors must take 2 units of senior seminar.

#### Minor in French

The goal of the minor in French is to give students a solid grounding and good fluency in the French language and to provide a basic familiarity with important aspects of French culture and society. Together these accomplishments will enable students to pursue their interests in French and in countries where French is used.

The minor is designed for students who have a strong interest in French but cannot fulfill the requirements of the French major, either because their knowledge of French was nonexistent or elementary when they came to Northwestern, or because they are engaged in another major with requirements that preclude pursuing a second major. Except for a possible course at the 300 level, all courses are conducted in French, with class discussion and papers also in French.

Students choosing to minor in French are assumed to have completed 201 or the equivalent.

#### Minor course requirements (9 units)

- up to 5 200-level courses chosen from 202, 203, either 210 or 211, and at most 2 from 271, 272, and 273
- at least 4 300-level courses: 2 chosen from 301, 302, 303, 305, 309, or 391; 2 other courses in literature or civilization, 1 of which may be a French department course taught in English (309 may be counted either as a language course or as a literature/civilization course)

Students returning from a study abroad program must enroll in at least 1 300-level course in the department other than 301, 302, and 303.

#### Four-Year BA/MA

The department offers a four-year BA/MA program in French for outstanding undergraduate majors. Interested students should consult with the department chair and should refer to Accelerated Master's Programs in the Undergraduate Education section of this catalog.

#### Honors in French

Students who have a grade point average of 3.4 or higher in the major and are interested in writing an honors thesis should declare their intention of doing honors work no later than the spring quarter of their junior year. They should also consult with the director of undergraduate studies. The honors project is produced through 1 or 2 quarters of 399. It may build on previous work done in a 300-level course. These courses will count toward the 15 required credits for the major. See Honors under Academic Policies earlier in this section of the catalog.

## The Teaching of French

Weinberg College students pursuing a major in French who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

## Introductory and Intermediate Language Courses

**FRENCH 111-1,2,3 Elementary French** Conversation, grammar, reading, and writing for beginners. Four class meetings a week.

**FRENCH 115-1,2 Intensive Elementary French** For students with some previous experience in French. Review and development of skills in speaking, understanding, reading, and writing as preparation for work at the second-year level. Four class meetings a week. Prerequisite: department placement.

**FRENCH 121-1,2,3 Intermediate French** Grammar review, conversation, reading, and writing. Four class meetings a week. Prerequisite: 111 or 115.

**FRENCH 125-1,2,3 Intensive Intermediate French** French language and culture: conversation, composition, reading of cultural and literary texts, and grammar review. Three class meetings a week. Prerequisite: 115 or placement.

**FRENCH 198-0 Independent Study** Credit possible for 1 quarter only. Approval of department required.

**FRENCH 201-0 Introduction to French Studies** Development of fluency, accuracy, and creativity in speaking, comprehension, reading, and writing French; introduction to social, cultural, and literary topics. Prerequisite: 121-3, 125-3, or department placement.

**FRENCH 202-0 Writing Workshop** Practical study of French grammar and structure; students develop and improve writing skills through practice in preparing short compositions. Prerequisite: 201, AP score of 4, or consent of department.

## Introductory Literature and Culture Courses

**FRENCH 203-0 Oral Workshop** Practical course to increase listening comprehension, build vocabulary and idiom use, and enhance communication skills. Prerequisite: 201, AP score of 4, or consent of department.

**FRENCH 210-0 Reading Literatures in French** Study of texts illustrating various genres from the Middle Ages to the present such as poetry, drama, fairy tale, novel, and autobiography. Prerequisite: 202, AP score of 5, or consent of instructor.

**FRENCH 211-0 Reading Cultures in French** Introduction to French and/or francophone cultures through study and analysis of major themes, issues, and debates. Prerequisite: 202, AP score of 5, or consent of instructor.

**FRENCH 271-0 Introducing the Novel** Fundamental concepts and significant achievements of the novel in French.

Prerequisite: 210 or 211, AP score of 5 in literature, or consent of instructor. Credit not allowed for both 271 and 278.

**FRENCH 272-0 Introducing Theater** Basic concepts and representative works of French and/or francophone theater. Principles of tragedy and comedy; contemporary developments. Prerequisite: 210 or 211, AP score of 5 in literature, or consent of instructor. Credit not allowed for both 279 and 272.

**FRENCH 273-0 Introducing Poetry in French** Reading lyric poetry written in French from the 16th century to the present, focusing primarily on the history of major poetic movements. Credit not allowed for both 273 and 276. Prerequisites: 210 or 211, AP score of 5 in literature, or consent of instructor.

## Courses with Reading and Discussion in English

No prerequisite in French; readings, discussions, papers, and examinations in English.

**FRENCH 276-0 Poetry in Translation** Introduction to French poetry of different periods and genres. Focus is on major themes and trends in French literary history, but students also learn about French versification and poetic forms. Credit not allowed for both 273 and 276.

**FRENCH 277-0 Literature of Existentialism** Existentialism in its literary, philosophical, and cultural manifestations.

**FRENCH 278-0 The Novel in Translation** Introduces students to the French novel through analysis of texts from different periods or subgenres. Content varies. Credit not allowed for both 271 and 278.

**FRENCH 279-0 Theater in Translation** Representative French plays from the 17th through the 20th centuries; basic concepts of genre; social and historical context. Credit not allowed for both 279 and 272.

**FRENCH 372-0 Medieval Movies** Films representing medieval and Renaissance culture; films that a medieval viewer would have understood.

**FRENCH 374-0 Proust** Introduces the works of Marcel Proust, a central figure of European literature and thought.

**FRENCH 375-0 French Film** Topics in French cinema: for example, French classical cinema, the New Wave, post-colonial French film, the cinema of Marguerite Duras.

**FRENCH 376-0 Gender and Sexuality** Major trends and perspectives in gender studies such as first- and second-wave feminisms, lesbian writers, AIDS literature, queer theory, gender and orientalism, cross-cultural feminism.

**FRENCH 378-0 Contemporary Theory** Introduction to some major trends in contemporary French theory and the way they have influenced literary studies in the United States.

## Courses with Prerequisites in French

**FRENCH 301-0 Advanced Grammar** Review and study of French grammar. Functional implementation of rules through oral and written exercises. Prerequisite: 202 or consent of instructor.

**FRENCH 302-0 Advanced Composition** Development of



written expression organized according to language functions (describing, summarizing, hypothesizing, persuading, etc.) and communicative needs (e.g., social and business correspondence). Prerequisite: 301 or consent of instructor.

**FRENCH 303-0 Advanced Conversation** Oral practice based on short readings, visual media, and spontaneous scenarios. Prerequisite: 301 or consent of instructor.

**FRENCH 305-0 French Phonetics** Study of syllabic division, intonation, rhythm, accent, linking, vowels, consonants. Practical exercises to improve pronunciation. Prerequisite: 302 or consent of instructor.

**FRENCH 309-0 French in Commerce and Industry** Introduction to fundamentals of the French business world in historic, economic, social, and political contexts. Acquisition of language skills for communication in commerce and business. Prerequisite: 302 or consent of instructor.

**FRENCH 310-0 The Middle Ages and Renaissance** Study of literary texts of the French Middle Ages and Renaissance with emphasis on their historical and literary-historical contexts. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 312-0 Classicism and Enlightenment** Study of literary texts from Classicism to Enlightenment and the Revolutionary period with emphasis on their philosophical, literary, and cultural contexts. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 314-0 The Age of Revolutions and Colonialism** Study of literary texts from the period between the French Revolution and World War I with emphasis on their historical and literary-historical contexts. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 316-0 The Contemporary French-Speaking World** Study of literary texts from the 20th and 21st centuries with emphasis on their philosophical, literary, and cultural contexts. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 320-0 Medieval French Song** Songs of the troubadours, songs of courtly love, social and political songs, women's songs. Study of musical setting and performance. No musical training required. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 322-0 Medieval French Narratives** Major narrative works of the French Middle Ages in historical context. Content varies; may include epics such as the *Song of Roland*, romances such as Chrétien de Troyes's *Perceval*, and narratives of childhood. Texts read in modern French versions. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 335-0 17th-Century Literature** Topics and issues related to the literature and culture of 17th-century France. Content varies; topics covered previously include theater and its social and political contexts, the rise of rational thought, and the development of fiction and poetry. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 340-0 Sexual Politics and the Ancien Régime** Literary, intellectual, and political role of women in view of the debates generated by the issues of women's

power in the public sphere before and during the French Revolution. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 342-0 France in the Age of Scandals** Examination of political, financial, and religious scandals that racked 18th-century France. Analysis of writings, especially novels, that both denounced and celebrated scandal. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 344-0 Rousseau and the French Revolution** Analysis of Rousseau's political thought and major literary works and their impact on Revolutionary ideology and culture. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 346-0 The Enlightenment and the World** Authors such as Rousseau, Diderot, Montesquieu, Graffigny, and Moreau de Saint-Méry in relation to Enlightenment debates about religion, political authority, human nature, colonialism, gender, and slavery. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 350-0 The Novel in French** Content varies; may include the novel of the ancien régime, the psychological novel, and the Bildungsroman in France. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 355-0 The Invention of Modernity** Study of the origins of modernity in the 19th century, addressing such issues as the rise of mass culture, urbanization, and the beginnings of consumer society. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 360-0 From Modernism to Postmodernism:**

**Experiments in Narrative Form** Crises and reinventions of French prose from the modernist moment of the early 20th century to the ambiguities of "engaged" literature of the 1930s to postmodernism. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 362-0 African Literatures and Cultures** Major issues, trends, and authors from francophone Africa. Content varies; may include Shahrzade, narratives of gender relations, law and literature, violence, and writing. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 364-0 Caribbean Literatures and Cultures** Major issues, trends, and authors from the francophone Caribbean and its diasporas. Content varies; may include creolization in Caribbean women writers; slavery, history, and memory; Caribbean identities. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 365-0 The Maghreb and the Middle East** Major issues in the literatures and cultures of North Africa and the Middle East. Content varies. May include exile in writing; politics of language and translation. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 366-0 France and East Asia** Interdisciplinary approaches to the history of French–East Asian relations, including French representations of East Asia. May include translation, japonisme, cinema, literary and philosophical avant-gardes, and culture and globalization. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 380-0 Political and Social Thought in France**

Major political and social trends in France from the ancien régime to the 20th century. Content varies. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 382-0 Literature and Exoticism** Various modalities of the rhetoric of exoticism, including orientalism, throughout the history of French literature and in popular culture. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 384-0 Women Writing in French** Analysis of texts by women authors with regard to their respective social, cultural, political, and historical contexts. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 386-0 Gender and Writing** Issues of gender and sexuality in the production of literary and other creative texts in various historical periods. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 390-0 Topics in Culture** Topics, issues, and questions in French and francophone culture. Content varies; may include French and francophone cinema, the intellectual in France. May be repeated for credit with different topic. Prerequisite: 271, 272, or 273 or consent of instructor.

**FRENCH 391-0 Theory and Practice of Translation**

Intensive course integrating previously acquired skills through the comparative study and translation of English and French. Prerequisite: 301, 302, study abroad, or consent of instructor.

**FRENCH 396-0 Contemporary Thought in the French-Speaking World** An examination of different perspectives and paradigms for understanding literature and culture. Prerequisite: senior status or consent of undergraduate adviser.

**FRENCH 397-0 Studies in Literature and Culture** In-depth research and analysis of a problem or topic concerning cultural representation. Prerequisite: senior status or consent of undergraduate adviser.

**FRENCH 399-0 Independent Study** Independent reading and research. Topics arranged through consultation with an instructor and approval of the department.

*Italian***Major in Italian Literature and Culture**

The program for majors in Italian literature and culture consists of 14 courses, of which at least 10 must be offered by the Italian department; up to 4 others may be courses dealing with Italian culture offered by other departments, including 1 or more courses on literary theory. Courses taken outside the department must be approved by the director of undergraduate studies. Of the 10 courses taken in the Italian department, no more than 5 may be courses taught in English. Of the 14 courses required for the major, at least 8 must be at the 300 level; 100-level courses do not count toward the major.

Students returning from a study abroad program in Italy may receive up to 8 credits (depending on program length) if the content of the courses taken abroad relates

in a substantive way to some aspect of Italian culture. All returning students must take 2 300-level courses in Italian in their senior year.

**Minor in Italian**

The minor in Italian consists of 7 courses, of which at least 4 are at the 300 level. No more than 3 courses may be Italian courses taught in English. Students returning from study abroad must take at least 1 300-level course in Italian in their senior year.

**Honors in Italian**

Students who have a grade point average of 3.4 or higher in the major and are interested in writing an honors thesis should declare their intention to do honors work no later than the spring quarter of their junior year. They should also consult the director of undergraduate studies. The honors project is produced during 1 or 2 quarters of 399. It may build on previous work completed in a 300-level course or, with consent of the instructor, in a graduate seminar. These courses will count toward the 14 credits required for the major. See Honors under Academic Policies earlier in this section of the catalog.

**Courses Taught in Italian**

Prerequisites for all 300-level courses taught in Italian: 2 200-level courses in Italian or equivalent.

**ITALIAN 101-1,2,3 Elementary Italian** Pronunciation, grammar, composition, reading, and conversation. Drill in language laboratory. Five class meetings a week.

**ITALIAN 102-1,2,3 Intermediate Italian** Grammar review, conversation, composition, and readings in modern prose and drama. Four class meetings a week. Prerequisite: 101-1,2,3 or equivalent.

**ITALIAN 133-1,2,3/134-1,2,3 Intensive Italian** This intensive double course covers two years of Italian language, the equivalent of 101 and 102, in a single academic year. Students enroll concurrently in 133 and 134 and receive 2 credits per quarter. Four two-hour class meetings per week.

**ITALIAN 201-0 Italian through Media** Issues from Italian media; frequent oral and written reports: for instance, America in Italian media, advertising, immigration, youth culture. Students produce a newspaper or newscast at the end of the quarter. Prerequisite: 102-3 or 133-3/134-3 or equivalent.

**ITALIAN 202-0 Italian through Performance** Practice in spoken Italian through a survey of various performance arts in Italian culture. Content may vary: for example, Italian theater, Italian opera, commedia dell'arte. Prerequisite: 102-3 or 133-3/134-3 or equivalent.

**ITALIAN 203-0 Creative Writing in Italian** A course meant to improve written Italian through exercises and experiments in a variety of genres and styles. Prerequisite: 102-3 or 133-3/134-3 or equivalent.

**ITALIAN 204-0 Introducing Italian Literature** An introduction to the history, genres, and themes of Italian literature for students who have completed the Weinberg College language requirement. Course content may vary, focusing on reading, comprehension, and interpretive skills. Prerequisites: 102-3 or equivalent proficiency.

**ITALIAN 301-0 Italian through Cinema** An analytic approach to the language of cinema through a detailed reading of selected films and their scripts. Emphasis on colloquial and dialectal Italian. Students produce script or film treatment at the end of the quarter.

**ITALIAN 302-0 Italian through Translation** An intensive workshop meant to improve spoken and written Italian through the practice of translation.

**ITALIAN 303-0 Reading Italian Cities** An approach to Italian culture and civilization through an exploration of representative Italian cities.

**ITALIAN 304-0 Modern Italian Cultural Studies** Culture of Italy from World War II to the present. Novels, films, popular culture.

**ITALIAN 305-0 The Future of Tradition** Italian cultural traditions as seen in major works from the Middle Ages to the present.

**ITALIAN 306-0 Borders and Margins** Italian literary practice in contact with groups that Italy has defined as other — either beyond or within its geographical boundaries. Prerequisite: 102-3 or equivalent proficiency.

**ITALIAN 399-0 Independent Study** Supervised independent reading. Consult the director of undergraduate studies.

### Courses with Reading and Discussion in English

No prerequisites in Italian.

**ITALIAN 265-0 Body and Soul from Rome to the Renaissance** Comprehension of the human body and soul in Italy from Augustan Rome to the Renaissance.

**ITALIAN 270-0 The Arts in Renaissance Italian Culture**

A multidisciplinary survey exploring the development of a wide variety of artistic traditions in Italian culture, including painting, sculpture, architecture, music, opera, fashion, and design.

**ITALIAN 275-0 Dante's *Divine Comedy*** Introduction to the *Divine Comedy*, its artistic and intellectual achievement, and its cultural and historical context.

**ITALIAN 290-0 Memory, Exile, and the Italian Diaspora** The theme of exile in Italian culture; the memory of Italy as it survives in the Italian diaspora, inside and outside Italy.

**ITALIAN 360-0 From the Avant-Garde to the Postmodern**

Major authors and movements animating the modern and contemporary literary scene. Content varies — for example, futurism, feminist Italian fiction, intellectuals and politics from D'Annunzio to Pasolini, Calvino, Eco, and the postmodern.

**ITALIAN 370-0 Mapping Italian Literature** Major texts of Italian literature read in the context of European and world literature. Content varies — for example, Leopardi

and European romanticism; Calvino, Borges, and Pynchon; the Theater of Memory; Svevo and Joyce; futurism.

**ITALIAN 375-0 Topics in Italian Culture** Content varies — for example, perspectives in the Renaissance, Leonardo's method, the Baroque imagination, body and sexuality in Italian culture, Italian women writers, fascism and culture, philosophy and literature.

**ITALIAN 380-0 Topics in Italian Cinema** Introduction to major Italian filmmakers and cinematic trends.

## GENDER STUDIES

The Gender Studies Program is a dynamic interdisciplinary program that draws on faculty and courses from more than 20 departments and several schools — including Weinberg College, the School of Communication, the School of Law, the Feinberg School of Medicine, and the Henry and Leigh Bienen School of Music. The program offers an adjunct major and minor for Northwestern undergraduates, as well as a certificate for graduate students. It includes 11 core faculty members with joint appointments as well as affiliated faculty. Gender studies faculty teach courses and pursue research in the history and theory of gender, feminism, women's studies, and sexuality studies, including gay, lesbian, and queer studies.

The many approaches, methods, and topics in gender studies at Northwestern are united in focusing on gender, sex, and sexuality as key but often underexamined categories in history, scholarly study, and daily life. At the same time, they attend to questions of identity and sexual politics in ways that do not take for granted the particular sex/gender categories of the modern Western world.

A full range of courses is offered, from freshman seminars to graduate courses. They provide information and analysis of culture, society, history, and politics, often from a transnational and international perspective. Each year a number of undergraduate majors choose to write honors theses in gender studies.

### Adjunct Major in Gender Studies

Since the gender studies major is an adjunct major, students majoring in gender studies must also fulfill the requirements of another major in Weinberg College or another school in the University. The major in gender studies must show a minimum of 9 courses not double-counted in any other major.

#### Program courses (at least 11 units)

*Core courses (3):* 3 courses selected from 210, 230, 231, 240, 250, and SOCIOL 216

*Electives (8):* 1 theory course, such as 374, 381, 395, or 397; 6 other courses including 4 at the 300 level and no more than 2 cross-listed courses offered by other departments; and completion of either a senior thesis (398 and 399) or 1 additional 300-level course. Students who complete a senior thesis may be nominated for departmental honors.

Examples of courses that fulfill the elective requirement include but are not limited to the following:

- AF AM ST 334
- ANTHRO 354
- FRENCH 384
- MUSICOL 340 (see the Bienen School of Music section of this catalog)
- PERF ST 307 (see the School of Communication section of this catalog)

## Minor in Gender Studies

Students may earn a minor in gender studies while pursuing a departmental major in any undergraduate school. Students qualify for the minor by satisfactorily completing the requirements listed below and presenting a minimum of 5 courses not double-counted in their majors.

### Minor course requirements (7 units)

- 2 core courses chosen from 210, 230, 231, 240, 250, and SOCIOL 216
- 5 electives chosen in consultation with an adviser in the Gender Studies Program; at least 3 courses must be at the 300 level; 3 must be gender studies courses; the remaining 2 may be gender studies courses or courses from any department cross-listed under gender studies (for sample electives, see the list under Adjunct Major in Gender Studies)

## Courses

### **GNDR ST 210-0 Gender, Power, and Culture in America**

Relationship of gender to issues of political, economic, and cultural power in personal and public life; intersections of gender, race, class, and sexuality.

**GNDR ST 230-0 The Roots of Feminism** Introduction to milestone texts in the development of 200 years of British, European, and American feminist thought, with particular attention to emerging arguments and strategies around issues of gender and sexuality.

### **GNDR ST 231-0 Gender, Sexuality, and Representation**

Representations in art and literature within their historical, social, and political contexts. Theories of spectatorship, resistance, and revision.

**GNDR ST 240-0 Gender Studies for a Small Planet** Transnational and global perspectives on gender and sexuality.

**GNDR ST 250-0 Gender Issues in Science and Health** Aspects of gender in the cultures of science and medicine.

**GNDR ST 321-0 Gender, Sexuality, and History** Historical considerations of gender and/or sexuality. Topics may cover different historical time periods. Content varies by quarter; may be repeated for credit with different topics.

### **GNDR ST 324-0 American Gay and Lesbian History**

Social, cultural, and political history of same-sex desire in the United States, emphasizing the last 150 years.

### **GNDR ST 331-0 Sociology of Gender and Sexuality**

Gender and issues of social reproduction and social change, with an emphasis on sexuality and reproduction.

### **GNDR ST 332-0 Gender, Sexuality, and Health**

Health-related topics concerning gender and/or sexuality. Topics include reproductive health, HIV/AIDS, the women's health movement, environmentalism, and eating disorders. Content varies by quarter; may be repeated for credit with different topics.

### **GNDR ST 341-0 Transnational Perspectives on Gender and Sexuality**

Studies of gender and sexuality in relation to globalization or non-U.S./non-Western cultures. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 345-0 Gender, Sexuality, and Ideology** Studies in ideology, ontology, and ethics concerning gender and sexuality. Content varies by quarter; may be repeated for credit with different topics.

### **GNDR ST 351-0 Gender, Sexuality, and Public Policy**

Studies of legal systems and public policy. Specific topics may include domestic violence and abortion legislation. Content varies by quarter; may be repeated for credit with different topics.

### **GNDR ST 352-0 Gender, Sexuality, and Political Theory**

Studies in political theory relating to gender and sexuality. May count toward the major's theory requirement. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 353-0 Gender and Citizenship** Examinations of conventional conceptions of political participation and counter-public spheres informed by feminist activism and feminist and gender theory.

**GNDR ST 361-0 Gender, Sexuality, and Literature** Studies of literary texts in the context of gender theory, feminism, or sexuality studies. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 362-0 Gender, Sexuality, and Drama** Studies in gender and/or sexuality in the context of theater and drama in or across historical periods. Content varies by quarter; may be repeated for credit with different topics.

### **GNDR ST 363-0 Postcolonial Studies and Gender and Sexuality**

Postcolonial approaches to literature and theory. Topics include orientalism and diaspora theory as they relate to gender and sexuality. Content varies by quarter; may be repeated for credit with different topics.

### **GNDR ST 371-0 Gender, Sexuality, and Popular Culture**

Cultural studies perspective on selected topics in popular culture as they relate to gender and/or sexuality. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 372-0 Gender, Sexuality, and Performance** Selected topics concerning theories of performance in relation to gender and/or sexuality. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 373-0 Gender, Sexuality, and Film** Primary emphasis on representations of gender and sexuality in

film and film theory. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 374-0 Gender, Sexuality, and Digital Technologies**

Theories concerning gender and sexuality in digital representations, particularly Internet related. Content varies by quarter. Fulfills the major's theory requirement.

**GNDR ST 375-0-0 Internship in Gender Studies** Field research and practical work experience in activist organizations; biweekly meeting with the instructor and other interns for discussion of internship experiences and common readings. Prerequisite: consent of instructor.

**GNDR ST 380-0 Black Feminist Theories** Introduction to black feminist studies and its impact in the late 20th century. Fulfills the major's theory requirement.

**GNDR ST 381-0 Queer Theory** Survey of queer theories and methodologies. Fulfills the major's theory requirement. Content varies by quarter; may be repeated for credit with different topics. Prerequisite: introductory course in gender studies or course in literary theory.

**GNDR ST 382-0 Race, Gender, and Sexuality** Literature and theory concerned primarily with the intersections of race and/or ethnicity and gender and sexuality. Content varies by quarter; may be repeated for credit with different topics.

**GNDR ST 390-0 Topics in Gender Studies** Topics vary — for example, masculinity; gender, race, and reproduction; gender, law, and public policy; Asian American women's history; women artists and their publics.

**GNDR ST 391-0 Writing Women's Lives** Seminar launching each student on a research project that illuminates the life of a woman or group of women. Exploration of archives, theories of the self, and historical contexts. Prerequisite: consent of instructor.

**GNDR ST 392-0 Gender, Sexuality, and Autobiography** Investigations of women and men as readers and producers of autobiography. Exploration of memory and construction of self in relation to gender, culture, and ethics. Prerequisite: introductory course in gender studies or consent of instructor.

**GNDR ST 395-0 Sexuality and Its Discontents** Social and historical constructions of sexuality; emergence of lesbianism and homosexuality as categories; issues of sexuality, race, and class; problems of sexual domination and violence. Fulfills the major's theory requirement. Prerequisite: introductory course in gender studies or consent of instructor.

**GNDR ST 396-0 Feminist Therapy** Theoretical basis for the feminist critique of traditional psychotherapy. Exploration of problems presented by female clients; gender-related causes and feminist strategies for resolution. Prerequisites: 1 course in gender studies or psychology; junior/senior standing.

**GNDR ST 397-0 Gender Theory** Survey of gender and feminist theory. Content may vary by quarter. Fulfills the major's theory requirement.

**GNDR ST 398-0 Senior Research Seminar** Students work with an adviser and begin research on a senior thesis project, meeting on a reduced schedule over two quarters. Prerequisite: consent of instructor.

**GNDR ST 399-0 Independent Study** Individual tutorials or research projects. Prerequisite: consent of instructor.

## GEOGRAPHY

The Program in Geography offers three types of courses to students who seek a knowledge of the physical earth and its various modes of human occupancy. Introductory courses develop global perspectives on environments that are relevant to many social and physical science fields. Courses in regional geography present a unique way of understanding how nature and culture have interacted over time to give character to specific places or regions. Advanced courses focus on the concepts and techniques of professional geography, especially on the construction of maps and on the uses of maps in solving geographical problems.

Programs of study may lead to a major or a minor in geography. In addition to the following requirements, students majoring in geography also must complete a major in a related social or natural science field.

### Adjunct Major in Geography

*Program courses:* 211 or 235; 240; 341; and 3 additional geography courses, including 1 unit of research (399)

*Related courses:* ECON 201, 202; MATH 220, 224; STAT 210; or equivalent

### Minor in Geography

The minor in geography supplements the academic programs of students who major in related social and natural sciences by training them in the theory and method of geographical analysis. In addition to the courses listed below, students choosing to minor in geography must complete MATH 220 and 224 or equivalent and STAT 210.

### Minor course requirements (6 units)

- 211 or 235, 240, 341
- 3 additional courses approved by the geography program adviser

### Introductory Courses

**GEOG 211-0 World Biogeography** Geography of the world's major ecosystems based on the global climate model.

Physical processes of soil formation and vegetation development in various ecosystems. Human impacts on natural systems resulting from past and present land-use practices.

**GEOG 235-0 Atmosphere and Climate** Nature and composition of the atmosphere, principles of atmospheric motion, global circulation model, cyclonic storms; climates and climatic change.

**GEOG 240-0 Economic Geography** Population, natural resources, land use, commodity production, and trade, with an emphasis on the world scale. Industrial location theory and global economic structures.



## Regional Geography Courses

### **GEOG 312-0 Geography of Chicago and Its Region**

Chicago as an example and model of city form. Physical environments of the Chicago region and their influence on settlement. Evolution of the geography of Chicago and its suburbs from the 19th century to the present, with an emphasis on recent trends. Prerequisite: junior standing.

**GEOG 313-0 North America** Detailed study of the regional geography of the United States and Canada. The regional distribution of landform types. Patterns of culture, history, and economic development that underlie the distribution of distinctive lifeways in the two countries.

## Advanced Courses

**GEOG 328-0 The Human Use of the Earth** Geography of the earth's natural environments as modified by human agency. Natural versus anthropogenic environmental change. Processes of habitat alteration in hunter-gatherer societies. Impacts of modern agriculture and forestry.

**GEOG 341-0 Principles of Cartography** Design, construction, and use of thematic maps for effective presentation of spatial data. Typography and symbolization. Coordinate systems and map projections. Prerequisites: MATH 220 and 224.

**GEOG 343-0 Geographic Information Systems** Methods and techniques of digital cartography; encoding and analysis of spatial information; applications to archaeology, environmental sciences, and business geographics. Prerequisite: 341.

**GEOG 399-0 Independent Study** Independent research projects. Open to qualified advanced students with consent of department.

## GEOLOGICAL SCIENCES

The Department of Geological Sciences has changed its name to Earth and Planetary Sciences.

## GERMAN

The Department of German offers courses in three separate tracks, giving students a choice in satisfying their educational needs and interests. Courses are designed to

- offer students wishing to acquire basic knowledge of the German language (either to fulfill the college language requirement or as part of the requirements for a German major or minor) an opportunity to use a variety of audiovisual materials and cultural and literary readings to expose them to different styles of written and spoken language and to the culture and people of German-speaking countries
- expose German majors and minors to a course of study in language, literature, culture, and history that forms the basis from which they may pursue their interests in specific areas of concentration (the program emphasizes the modern period — 18th century to the present)
- provide a basis for the understanding of the intellectual and cultural life of Germany for students who are not proficient in German

## Major in German

The major in German consists of 15 courses: 12 core courses and 3 courses in a concentration. Students choose one of five concentrations: business studies, critical thought, German-Jewish studies, history and culture, or literature and culture.

Courses listed as prerequisites for an advanced course may not be taken for credit after the advanced course has been completed. Majors returning from a study abroad program must enroll in at least 1 300-level quarter-course in the department.

### *Core courses (12)*

#### **Language (4 units)**

- 2 quarter-courses at the 200 level (1 from 201, 203-1,2; 1 from 205-1,2, 207, 209)
- 2 quarter-courses at the 300 level (from 303, 305, 307)

#### **History and culture (2 units)**

- 1 quarter-course at the 200 level and 1 quarter-course at the 300 level or 2 quarter-courses at the 300 level (from 222, 224, 228, 311, HISTORY 344 or 349)

#### **Literature and culture (6 units)**

- 3 quarter-courses at the 200 level (from 211, 221-1,2,3, 223, 225, 227, or 245) and 3 quarter-courses at the 300 level (from 321-1,2,3, 323, 325, 327, 329, 331, 333, 335, 337, 345, or 398)

### *Concentrations (3 units)*

#### **Business studies**

- 209, 309-1,2

#### **Critical thought**

- 3 quarter-courses at the 300 level (322, PHIL 310 or 314, and an undergraduate or graduate seminar in German or comparative literature)

#### **German-Jewish studies**

- 234-1,2 and 1 quarter-course at the 300 level (from HISTORY 344, 349, RELIGION 230, 331, 333, 334, or 339)

#### **History and culture**

- 1 quarter-course at the 200 level and 2 quarter-courses at the 300 level or 3 quarter-courses at the 300 level (chosen from 222, 224, 228, 311, HISTORY 344 or 349)

#### **Literature and culture**

- 1 quarter-course at the 200 level (from 221-1,2,3, 223, 225, 227, 245, 226, 230, 232, 236, 238, 240, or 246)
- 2 quarter-courses at the 300 level (from 321-1,2,3, 323, 322, 324, 325, 326, 327, 328 329, 331, 333, 335, 337, 345, or 398)

## Minors in German

The Department of German offers two minors, one in German and one in business German. Each minor consists of 9 courses. The minor in German is designed to give students solid language proficiency and significant knowledge of German culture. The minor in business German

is designed to prepare students for careers in government service or international business or for graduate study in international economics, management, trade, or law.

Courses listed as prerequisites for an advanced course may not be taken for credit after the advanced course is completed. Minors returning from a study abroad program must enroll in at least 1 300-level quarter-course in the department.

#### *Minor in German (9 units)*

##### **Language (4 units)**

- 2 quarter-courses at the 200 level (1 from 201, 203-1,2, 1 from 205-1,2, 207, 209)
- 2 quarter-courses at the 300 level (from 303, 305, 307)

##### **History and culture (1 unit)**

- 1 quarter-course at the 200 or 300 level (222, 311, HISTORY 344 or 349)

##### **Literature and culture (4 units)**

- 2 quarter-courses at the 200 level (from 211, 221-1,2,3, 223, 225, 227, or 245)
- 2 quarter-courses at the 300 level (from 321-1,2,3, 323, 325, 327, 329, 331, 333, 335, 337, 345, or 398)

#### *Minor in Business German (9 units)*

##### **Language (4 units)**

- 2 quarter-courses at the 200 level (1 from 201, 203-1,2, 1 from 205-1,2, 207, 209)
- 303, 305

##### **Business German (3 units)**

- 209, 309-1,2

##### **History and culture (1 unit)**

- 1 quarter-course at the 200 or 300 level (222, 311, or HISTORY 344 or 349)

##### **Literature and culture (1 unit)**

- 1 quarter-course at the 200 level (211, 221-1,2,3, 223, 225, 227, or 245)

### **Studying Abroad**

The Department of German works carefully with individual students to integrate a period of study in Germany, Austria, or Switzerland into their overall academic plans. By interacting with native German speakers and travelers, students typically return with a much firmer grasp of both written and spoken German as well as a more balanced international perspective. Students who have special interests and needs are welcome to investigate other programs and discuss them with the departmental study abroad adviser.

### **Business German Examinations**

Students completing a major with a concentration in business studies or a minor in business German may take one or both of the internationally recognized business German examinations offered through Northwestern. Business German credentials are important in today's job market for two reasons: German is a leading language in the European market, and German corporations have more

than 2,500 subsidiaries and affiliates in the United States that employ nearly 600,000 Americans.

Students successfully completing 1 quarter of 209 may take the *Zertifikat Deutsch für den Beruf*, an examination developed jointly by the Goethe-Institut and the Deutscher Volkshochschulverband. Students successfully completing German 309-1 and 309-2 may take the *Prüfung Wirtschaftsdeutsch International*, an examination developed by the Goethe-Institut, the Association of German Chambers of Industry and Commerce, and the Carl Duisberg Centers.

For more information on these examinations, see the German department's web site at [www.german.northwestern.edu](http://www.german.northwestern.edu).

### **Honors in German**

Superior students majoring in German may qualify for departmental honors by completing 2 quarters of 398 or 399; 2 quarters of 400-level courses; or 1 quarter of 398 or 399 and 1 quarter of a 400-level course. In addition, they must present a research paper at the end of their second quarter of honors study. Interested students should consult with the department's director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

### **The Teaching of German**

Weinberg College students pursuing a major in German who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

### **Courses Taught in German**

**GERMAN 101-1,2,3 Beginning German** This sequence emphasizing the four modalities — speaking, listening comprehension, reading, and writing — offers students a systematic introduction to German language and culture. No prerequisite in German.

**GERMAN 102-1,2,3 Intermediate German** This sequence offers students a systematic review of German language and culture. The class fosters learning in the four modalities: speaking, listening comprehension, reading, and writing. Prerequisite: 101-3 or equivalent.

**GERMAN 111-1,2,3 Beginning Yiddish** The beginning Yiddish sequence offers students a systematic introduction to Yiddish language and culture emphasizing the four modalities: speaking, listening comprehension, reading, and writing. No prerequisite in Yiddish.

**GERMAN 197-0 Focus Reading: Perspectives in Yiddish Life and Culture** This course is for students in beginning Yiddish who would like to explore Yiddish texts in addition to taking a language course. Provides an

overview of Jewish life in Eastern Europe. Prerequisite: 111-2. Does not count for the language requirement.

**GERMAN 201-0 Focus Reading: Perspectives on German Life and Culture — The Voice of the Outsider** This course is for students who would like to explore German texts in more depth. Examines contemporary German culture. Prerequisite: 102-2. Does not count for the language requirement.

**GERMAN 203-1 Focus Speaking: Current German-American Images** Practical training in listening comprehension and speaking. Focuses on descriptions and comparisons. Prerequisite: 102-2. Does not count for the language requirement.

**GERMAN 203-2 Focus Speaking: Documenting Past, Present, and Future** Practical training in listening comprehension and speaking. Focuses on retelling past events and on present and future events. Prerequisite: 102-2. Does not count for the language requirement.

**GERMAN 205-1 Focus Writing: Berlin: Faces of the Metropolis** This course furthers written proficiency in German through analysis and production of portraits, descriptions of places, narratives, and newspaper reports. Prerequisite: 102-3.

**GERMAN 205-2 Focus Writing: Identities in Flux; German, European, and Transatlantic Perspectives** This course furthers written proficiency in German through work with reviews of films and cultural events, reports, argumentative essays, advertisements, and interpretations of literary works. Prerequisite: 102-3.

**GERMAN 207-0 Current Events in German Media** Exploration of current events in a variety of German media (newspapers, TV, Internet, etc.). Topics include politics, music, film, sports, and literature. Prerequisite: 102-3.

**GERMAN 209-0 German in the Business World** German language study oriented toward business-related communication situations such as social interactions with customers, business travel, and basic business letters. Prepares students for the Zertifikat Deutsch für den Beruf exam. Prerequisite: 1 200-level course in German.

**GERMAN 211-0 German Culture through Film** Introduction to 20th-century German cinema. Discussion of German identity, culture, history, and politics. Course emphasizes cultural knowledge and German language skills. Prerequisite: 1 200-level course in German.

**GERMAN 221-1 Introduction to Literature, 1800–1900** Introduces students to representative texts and writers of 19th-century German literature and familiarizes them with literary analysis and genres. Prerequisite: 1 200-level course in German.

**GERMAN 221-2 Introduction to Literature, 1900–45** Introduces students to representative German texts and German writers of the first half of the 20th century, when the First World War, the Weimar Republic, and the Third Reich marked the demise of the German Empire. Prerequisite: 1 200-level course in German.

**GERMAN 221-3 Introduction to Literature, 1945–Today** Introduces students to representative short stories by

major German-speaking authors writing since 1945. The stories selected represent a dynamic period in German literature and highlight important social, political, and intellectual issues. Prerequisite: 102-3.

**GERMAN 223-0 Contemporary Austrian Literature** Overview and introduction to contemporary Austria — the land, its people, and cultural institutions — through newer writers such as Hackl, Handke, Haslinger, Helfer, Jelinek, Nöstlinger, Reichart, Schlag, and Turrini. Prerequisite: 1 200-level course in German.

**GERMAN 225-0 Contemporary Swiss Literature** Overview and introduction to Switzerland — the land, its people, and cultural institutions — through various Swiss authors such as Frisch, Dürrenmatt, Muschg, Hohler, Lötscher, and Bichsel. Prerequisite: 1 200-level course in German.

**GERMAN 227-0 Popular Literature as Cultural History** Study of popular German texts of the last 100 years. Provides insights into the cultural and historical fabric of 20th- and 21st-century Germany, discussion of popular culture's role in society, and introduction to theories of popular literature. Prerequisite: 1 200-level course in German.

**GERMAN 245-0 Special Topics in German Literature and Culture** Studies of a major author, a prominent theme in German literature or culture, a movement, or a genre. May be repeated for credit with different topic. Prerequisite: 1 200-level course in German.

**GERMAN 303-0 Speaking as Discovery: Exploring Standpoints, Developing Arguments, Expressing Points of View** A course to improve German listening comprehension and speaking skills to the advanced level. Uses current cultural texts, films, and television broadcasts. Prerequisite: high-intermediate skills in listening, reading, and speaking German.

**GERMAN 305-0 Writing as Discovery: Communicating Correctly, Clearly, and Persuasively** Practice of advanced and sophisticated structures of written German through a series of linguistic exercises, including a biographical piece of writing. Prerequisite: high-intermediate skills in listening, reading, and speaking German.

**GERMAN 307-0 Current Events and Issues in German-Language Media** Current political, socioeconomic, and cultural events in Germany and Europe. Topics from German-language media, including newspapers, magazines, Internet sources, and news broadcasts. Discussion of journalistic differences among media sources. Prerequisite: high-intermediate skills in listening, reading, writing, and speaking.

**GERMAN 309-1 Advanced Business German: Understanding the German Economy** Students acquire a solid understanding of Germany's economy, its current problems, German business practices, and differences from the U.S. system. Begins preparation for the internationally recognized exam Prüfung Wirtschaftsdeutsch International. Prerequisite: high-intermediate skills in reading, writing, and speaking.

**GERMAN 309-2 Advanced Business German: German for Marketing and Management** Students gain skills to function in a multitude of German business contexts, such as management and marketing. They also increase their cross-cultural knowledge and intercultural competency. Course prepares students for the internationally recognized exam Prüfung Wirtschaftsdeutsch International. Prerequisite: high-intermediate skills in reading, writing, and speaking.

**GERMAN 311-0 Business Dynasties in Germany** Examination of representative entrepreneurial families in Germany since 1800 and the means by which they built their firms' and nation's disproportionately significant place in the world economy. Prerequisite: high-intermediate skills in writing and speaking and advanced skills in reading.

**GERMAN 321-1 Reason, Revolution, and Despair: Lessing to Büchner** Discussion of key texts in German intellectual history from the Enlightenment to the prerevolutionary period in the 1830s. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 321-2 Myth and Disenchantment: Nietzsche to Brecht** Discussion of key texts to acquaint students with the literature and thought, events and ideologies that helped shape German cultural, political, and social life during a period that saw the rise and final collapse of the imperial tradition, a short-lived experiment with democracy (the Weimar Republic, 1918–33), and the rise of the Nazi state. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 321-3 Recoveries and Transitions: Böll to the Present** Examination of the relationship of literature and film to the sociopolitical sphere since 1945. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 323-0 Rhyme and Reason: German Poetry since 1700** Introduction to German poetry from the early 18th century to the present. Concentrates on the main formal categories of poetry (meter, rhyme, verse, and poetic genres) as well as the main topics and themes of German poetry. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 325-0 The Greeks in German Culture** Analysis of the extraordinary importance of ancient Greek art and philosophy to German culture from 1750 to the present. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 327-0 Expressionism: Modernity, Madness, Eros, and Revolution** Focuses on German Expressionism in its most extreme literary and artistic reactions to the impact of modernity, war, and revolution and on the individual and collective experience in Berlin from 1910 to 1920. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 329-0 Brecht: Theater, Film, and Media in the 1920s** Introduction to Bertolt Brecht's theater in the 1920s and early 1930s during the Weimar Republic. Historical

critical review of the still-evolving media of film and radio. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 331-0 Memory and Representation in Postwar Literature** Examination of the role of German literature and art in the creation of historical consciousness in the postwar period. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 333-0 Postwar to Post-Wall GDR Literature** Study of the literature and culture of the German Democratic Republic within social, political, and historical contexts. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 335-0 Minority Voices in Germany** Study of minority literatures in Germany (including Turkish, Italian, Afro German, and Jewish) within social, political, and historical contexts. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 337-0 Science and Culture in Germany, 1780–1880** Exploration of key texts popularizing major scientific innovations — such as rational mechanics, analytical chemistry, thermodynamics, and evolutionary biology — in their cultural context. Prerequisite: high-intermediate skills in speaking and advanced skills in reading and writing.

**GERMAN 345-0 Topics in German Literature and Culture** In-depth study of topics in German literature and/or pivotal periods in German culture. May be repeated for credit with different topics. Prerequisite: advanced skills in speaking, reading, and writing.

**GERMAN 398-0 Undergraduate Seminar** (1–3 units) Advanced work through supervised reading, research, and discussion. Prerequisite: advanced skills in speaking, reading, and writing.

**GERMAN 399-0 Independent Study** Open to outstanding German majors with senior standing. Prerequisite: advanced skills in speaking, reading, and writing.

## Courses with Reading and Discussion in English

No prerequisites in German.

**GERMAN 222-0 German History 1789–1989** Survey of German political, economic, social, intellectual, and diplomatic history from the consolidation of the nation in the aftermath of the French Revolution to reunification at the end of the Cold War.

**GERMAN 224-0 Contemporary Germany** The German political, social, and cultural scene after 1945. May be repeated for credit with different readings.

**GERMAN 226-0 New Voices in German Literature** An introduction to contemporary German literature in English translation. Topics may vary and may include the contemporary historical novel, short story, novel, or memoir.

**GERMAN 228-0 The German Film** In-depth study of German films and cultural background. Topics may vary — for example, the pioneer film or “new” German cinema. May be repeated for credit with different topic.

**GERMAN 230-0 Existentialist Thought and Fiction** Traces the development of the Existentialist movement in the 19th and 20th centuries. Readings may include selections from Nietzsche, Heidegger, Sartre, Mann, Kafka, and Rilke.

**GERMAN 232-0 The Theme of Faust through the Ages** Faust theme in literature and music through shifting intellectual and social climates from the 16th century to the present.

**GERMAN 234-1 Jews and Germans: An Intercultural History I** Exploration of Jewish encounters with German culture. German Jewry from the 18th century to the end of the 19th century, when Jews were granted legal standing as German citizens.

**GERMAN 234-2 Jews and Germans: An Intercultural History II** Jewish culture—German culture exploration. German-speaking Jewry from the late 19th century to 1935.

**GERMAN 236-0 Kafka and Nietzsche** Exploration of two key figures in German modernity. Analysis of the relation between philosophy and literature; inquiry into the idea of the “ascetic ideal.”

**GERMAN 238-0 Turn-of-the-Century Vienna: In Search of New Values** Literature and thought of fin de siècle Vienna and their impact on modern consciousness. Fiction, poetry, essays, and plays by Freud, Schnitzler, Wittgenstein, Hofmannsthal, Musil, Karl Kraus, and Schoenberg.

**GERMAN 240-0 Berlin: Weimar Culture** Literature, philosophy, fine arts, and architecture of the Weimar Republic as expressions of its intellectual debates and social upheavals. Remarque, Piscator, Mann, Spengler, the Bauhaus.

**GERMAN 246-0 Special Topics in German Literature and Culture** Topics vary — for example, the fairy tale, Germanic mythology. May be repeated for credit with different topic.

**GERMAN 322-0 German Contributions to World Literature** Topics vary — for example, Rilke’s poetry; Nietzsche’s influence on literature; Thomas Mann; Hesse, the German novel, and the mystic tradition; German intellectual history. May be repeated for credit with different topic.

**GERMAN 324-0 Modern German Drama** From the perspective of the stage as a “moral institution,” plays by authors ranging from Heinrich von Kleist to Peter Weiss.

**GERMAN 326-0 German Cultural Studies** Exploration of key concepts, major figures, and cultural and literary themes in German studies and interdisciplinary fields such as music, art, political science, media studies, and popular culture.

**GERMAN 328-0 German Cultural Criticism from Kant to Kluge** Exploration of major texts in German cultural criticism from the late 18th to early 21st century, including philosophical, philological, scientific, and essayistic texts.

**GERMAN 330-0 Introduction to Yiddish Literature in Translation** Traces the history of Yiddish literature from the 17th century to the late 20th century, focusing on three Yiddish “classic” writers: S. Y. Abramovich (*Mendele the Bookseller*), Y. L. Peretz, and Sholem Aleichem. The course provides insight into Jewish life in Eastern Europe.

## GLOBAL HEALTH STUDIES

Global health problems are of concern to policy makers, public health professionals, and those who work for international agencies. Solving these problems requires not only financial resources but, more important, a deep understanding of the interaction of domestic and global forces and the cultural and political realities that affect the design and implementation of solutions in specific settings. The interdisciplinary Global Health Studies Program is designed to provide skills for dealing with complex international health issues. Students learn about domestic and international approaches to international crisis management as well as about perspectives on specific health issues within the diverse U.S. population.

### Minor in Global Health Studies

The minor in global health studies is designed for students from a variety of backgrounds, including those interested in medicine and the health sciences. It combines course work and international experiences, drawing on many different disciplines.

Elective courses may be drawn from anthropology, biological sciences, economics, history, international studies, political science, sociology, and social policy. Requirements may also be met by taking eligible courses in Northwestern’s study abroad programs in public health. A complete list of eligible courses is available from program advisers and the program web site at [www.wcas.northwestern.edu/globalhealth](http://www.wcas.northwestern.edu/globalhealth).

### Minor requirements (7 units)

- 301
- 2 core courses chosen from 302, 303, 304, 390
- 4 approved elective courses
- International experience requirement: Those minor-ing in global health studies must also gain substantial public health experience abroad by participating in one of Northwestern’s public health programs in China, France, Mexico, Uganda, or South Africa or in another supervised international health experience preapproved by the program director.

### Courses

#### GBL HLTH 301-0 Introduction to International Public Health

Social, economic, and cultural influences on variation in human health and well-being in populations worldwide; the continuum between health and sickness and the related impact of distal, chronic, and acute forces; heightened awareness of the need for ethical oversight of research in desperately poor settings.

**GBL HLTH 302-0 Global Bioethics** Ethical challenges to the safety, freedom, and dignity of human and animal life resulting from advances in biotechnologies and health research on a global scale. Readings drawn from various disciplines (philosophy, anthropology, public health, medicine),



perspectives (feminist, religious, secular, applied, pluralist, universalist, cultural relativist), and regions (Europe, United States, sub-Saharan Africa, Japan, Middle East).

**GBL HLTH 303-0 Gender and Global Health: Beyond**

**Reproduction** How cultural constructions of gender, sex, and sexuality shape a woman's risk and experience of breast cancer, mental illness, intimate partner violence, substance abuse, HIV/AIDS, and other diseases as well as access to health resources. Discussion of special health issues in the lesbian and disabled communities in the United States.

**GBL HLTH 304-0 International Perspectives on Violence**

Violence and the creation of public health and legal problems in the domestic and international arenas; origins of different forms of violence in the United States and abroad, their scope, and possible legal and public health interventions. Topics include gun violence, child abuse, domestic violence, sex trafficking, and the interaction between mental health and violence.

**GBL HLTH 310-1,2 Supervised Global Health Research**

Minors are encouraged to do supervised public health research on campus. Supervised research does not fulfill elective or core course requirements, however.

**GBL HLTH 390-0 Special Topics in Global Health** Advanced work in areas of developing interest and special significance. Can be repeated for credit with a different topic. Recent course titles have included Managing Global Health Challenges, Disability and Global Health, and International Perspectives on Mental Health.

## GREEK

See Classics.

## HISTORY

The Department of History is distinguished by the breadth of its faculty's expertise. The faculty includes nationally distinguished scholars in United States, European, Latin American, African, and Asian history. Faculty resources enable the department to offer major fields of study in the history of the Americas, English/European history, African/Middle Eastern history, and Asian/Middle Eastern history. The department is particularly strong in social, cultural, and intellectual history.

Most history courses are open to any undergraduate. Few have specific prerequisites, although freshmen are generally advised to try 100- and 200-level courses before attempting 300-level courses. History majors have priority in registering for classes, but the majority of students enrolled in most history courses are majoring in other departments and schools. The history faculty welcomes this diversity of students.

Since all courses listed below cannot be given in any one year and the quarters in which they are offered are subject to change, see the online quarterly class schedule from the Office of the Registrar for actual offerings.

## Major in History

The purpose of the major is to help students understand themselves as products and makers of history by introducing them to historical patterns and problems in a variety of areas and periods as well as to different historical materials and techniques of analysis. It encourages students to learn to think critically and to search deeply in at least one concentration. Achievement of these goals depends heavily on effective use of faculty advice, and each student should see his or her adviser as soon as one is assigned. Thereafter, each student should confer with the adviser at least once each quarter to ensure smooth progress through the program of study.

Students majoring in history select one of four concentrations:

- history of the Americas
- English/European history
- African/Middle East history
- Asian/Middle East history

Students may arrange to emphasize certain special fields within the context of one of these four areas.

The program for majors consists of 11 graded quarter-courses in history and 5 graded quarter-courses in related subjects, none of which may be substituted by advanced placement credits. These courses, chosen by the student in consultation with the adviser, are distributed as follows.

### Departmental courses (11 units)

- 2 undergraduate seminars: 395 plus 1 chosen from 101, 102, 103, 392, 394
- 9 200- or 300-level quarter-courses: 5 in one of the four areas of concentration listed above and 4 that lie outside the area of concentration and are distributed to provide both geographical and chronological variety
- 1 quarter of 395 Research Seminar, preferably taken in the junior or senior year (the seminar need not be within the student's concentration)
- at least 2 of the 11 courses in fields other than modern European or U.S. history (e.g., courses in European history before 1800 or in African, Asian, Middle Eastern, or Latin American history in any period)

**Related courses (5 units):** 5 quarter-courses of related subjects at the 200 or 300 levels, at least 2 of which must be at the 300 level and chosen from at least two programs or departments in the social sciences and humanities (the courses should bear some coherent relationship to the student's major program; students are encouraged to discuss their related courses with their advisers)

## Minor in History

The minor in history encourages students majoring in other fields to study history and to organize their historical studies in a coherent way. The structure of the minor requires students to gain both depth and breadth in history. Students must select a concentration, which enables

them to acquire significant knowledge of one area of the world, and take courses outside the concentration, which encourages an understanding of diverse cultural contexts.

### Minor course requirements (7 units)

- 7 history courses at the 100, 200, or 300 level; at least 3 must be at the 300 level
- 4 of the 7 courses must be in one of the following areas of concentration:
  - Europe, including Britain
  - United States
  - Latin America
  - Asia
  - Middle East
  - Africa
- at least 2 of those 4 concentration courses must be at the 300 level
- 3 of the 7 courses must be outside the area of concentration

### Honors in History

Superior students may qualify for departmental honors by enrolling in the honors seminar (398-1,2,3) during their senior year and completing a senior thesis judged to be of honors quality. See Honors under Academic Policies earlier in this section of the catalog.

### The Teaching of History

Weinberg College students pursuing a major in history who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

### Introductory Colloquia

The following 3 courses are colloquia, each limited to 15 undergraduates, which introduce students to modes of historical analysis through the study of various topics in history. Specific subjects will be listed in the Class Schedule. Open to freshmen and sophomores only.

**HISTORY 101-6 Freshman Seminar: European History**

**HISTORY 102-6 Freshman Seminar: American History**

**HISTORY 103-6 Freshman Seminar: Non-Western History**

### African History Courses

**HISTORY 255-1,2,3 Background to African Civilization and Culture** Historical approach to society, economy, polity, and culture in Africa. **1.** Agricultural origins to the 17th century. **2.** 16th through 19th centuries. **3.** 1875 to 1994.

**HISTORY 355-0 Islam in Africa** Africa is currently home to one-fourth of the world's Muslims. Important course themes include roles of women, schooling, slavery,

statecraft, mysticism, and colonial rule in shaping Africa's Muslim societies from the 17th century to the present.

**HISTORY 356-1,2 History of South Africa 1.** From the African iron age to the establishment of the multinational gold mining industry, emphasizing the rise of African states and the contest for land with white settlers.

**2.** Emphasis on the 20th century, the rise of African nationalism, and the clash with the apartheid state.

**HISTORY 357-0 East Africa** Selected topics in East African history.

**HISTORY 358-1,2 West Africa** Selected topics in West African history: economy, society, and government.

### Asian History Courses

**HISTORY 281-0 Chinese Civilization** Chinese history to the 16th century, emphasizing cultural and intellectual history.

**HISTORY 284-1,2 Japanese History 1.** Ancient and medieval Japan (200–1600), from the first evidence of civilization on the archipelago through the Warring States Period.

**2.** Social, cultural, and political developments in the Tokugawa Period (1600–1868).

**HISTORY 285-0 Indian Civilization** History of Hindu culture from antiquity to the 20th century. Change and continuity in religious ideas, practices, institutions, caste, and family life.

**HISTORY 381-1,2 History of Modern China 1.** Late Imperial China, 1600–1911. **2.** 20th-century China, 1911–present.

**HISTORY 382-0 The Modern Japanese City** Social and cultural history of urban Japan.

**HISTORY 384-1,2 History of Modern Japan 1.** Japan: the modern state, 1860–1943. **2.** War and postwar Japan, 1943–present.

**HISTORY 385-0 History of India** India since the mid-18th century. Focus on Hindu and Islamic cultural renovation movements, the politics of nation building, and socio-economic change.

### England and the British Isles History Courses

**HISTORY 260-1,2 British History, 1066 to the Present**

**1.** The British Isles from the Norman Conquest to the Glorious Revolution. **2.** Britain from the Glorious Revolution to the 21st century.

**HISTORY 362-1,2,3 Modern British History 1.** Social, political, and institutional history, 1688–1815. **2.** The age of industrialization and liberalism, 1780–1900. **3.** The welfare state, democracy, and total war, 1900–present.

**HISTORY 363-0 Modern Ireland in Historical Perspective** History of Ireland from the Celts to the “troubles” in Northern Ireland; emphasis on 19th and 20th centuries.

**HISTORY 364-1,2 Social and Intellectual History of Modern Britain 1.** Rise and fall of Victorian culture, 1780–1900.

**2.** Main themes in 20th-century society and thought, 1900–present.

## European History Courses

**HISTORY 201-1,2 European Civilization** 1. Culture and structure of preindustrial society, high medieval through mid-18th century. 2. Impact of industrial and political change and development of modern society to the present.

**HISTORY 202-0 The Culture and History of Eastern Europe** Taking a cultural approach, this course introduces students to the rich historical background of Eastern Europe from the Roman days until the end of the Communist era.

**HISTORY 330-0 Medieval Sexuality** Fluidity of sex and gender roles in an age before “sexual orientation”; impact of and resistance to Christian theology’s negative assessment of sexuality; the cult of chastity.

**HISTORY 331-0 Women in Medieval Society** Examination of medieval women’s lives in both secular and religious spheres through the different ideologies (religious, philosophical, scientific) that shaped them.

**HISTORY 332-1,2,3 The Development of Medieval Europe** 1. Early Middle Ages, 300–1000. 2. High Middle Ages, 1000–1300. 3. Late Middle Ages, 1300–1500.

**HISTORY 333-0 The Age of the Renaissance** Decline and revival of European civilization, 1350–1530. Cultural, political, economic, and social developments.

**HISTORY 334-0 The Age of the Reformation** Europe in the 16th century, especially origins, evolution, and effects of changes in religion.

**HISTORY 337-0 History of Modern Europe** Survey of the political and social history of Europe between 1815 and 1945, with emphasis on the political integration and disintegration of the Continent and the causes and effects of social and economic change.

**HISTORY 338-1,2 Europe in the 20th Century** Growth of mass politics, fascism, the home fronts, rise of the welfare state, loss of empire, economic resurgence and integration. 1. 1900–45. 2. 1945–present.

**HISTORY 342-1,2,3 History of Modern France** 1. The ancien régime and the French revolution, 1715–99. 2. 19th-century France. 3. 20th-century France.

**HISTORY 343-0 Modern Italy** Italy from the Enlightenment to the present, concentrating on the *Risorgimento*, the world wars, Mussolini and fascism, the postwar economic miracle, and terrorism.

**HISTORY 344-0 Weimar and Nazi Germany** German social, economic, political, and cultural developments between 1918 and 1945.

**HISTORY 345-1,2,3 History of Russia** 1. Emergence of the Kievan and Muscovite states, 800–1700. 2. Russia from Peter to the Revolution, 1700–1917. 3. The Soviet Union and its successor states, 1917–present.

**HISTORY 346-0 East Central Europe under Communist Rule and Beyond, 1945 to the Present** The history of East-Central Europe from the World War II to the collapse of Soviet rule and beyond.

**HISTORY 349-0 History of the Holocaust** Origins and

development of the massacre of European Jewry during World War II.

**HISTORY 350-1,2,3 The Intellectual History of Europe**

1. Heritage from antiquity and the Middle Ages. 2. From the Renaissance to the end of the 18th century. 3. 19th century.

## Latin American History Courses

**HISTORY 365-0 The Formation of Latin American Society**

Development of Latin American socioeconomic structures, political institutions, and cultural tendencies from the pre-Columbian and Iberian backgrounds through the colonial period.

**HISTORY 366-0 Latin America in the Independence Era** The 18th-century background to Latin American independence and its 19th-century aftermath. The process of achieving independence, changing social structures and economic patterns, and the problem of forming new nations.

**HISTORY 367-0 The History of Modern Brazil** Historical roots of modern Brazilian society: its rush toward economic modernization; radical social and economic inequalities; racially and culturally hybrid national identities; quest for effective democracy and universal citizenship.

**HISTORY 368-1,2 Revolution in 20th-Century Latin America** 1. Mexico and its revolutions. Mexican history, from the modernizing regime of Díaz, through the revolutionary upheaval and the consolidation of a new regime, to contemporary problems. 2. Comparative study of the origins and aftermaths of major Marxist revolutions in Cuba and South and Central America.

**HISTORY 369-0 Development and Inequality in Modern Latin America** Examination of various models of economic development that have been implemented in 20th-century Latin America, exploring the cultural, social, political, and economic roots of such policies and their impact on the region’s poorest and most marginalized populations.

## Middle East History Courses

**HISTORY 270-0 Middle Eastern/Islamic Civilization** Influence of Islam on the components of Middle Eastern societies (nomads, agrarian and urban populations) from the inception of the faith (A.D. 7th century) to the modern period.

**HISTORY 370-1,2,3 History of the Islamic Middle East**

1. 600–1200: the classical Islamic community; medieval Islamic civilization. 2. 1200–1789: the great empires — Mamluks, Ottomans, and Safavids; cultural and economic decline. 3. 1789–present: Jewish and Arab nationalism, oil diplomacy, Islam in the modern context.

**HISTORY 372-0 The History of Ancient Egypt (3100–c. 1000 B.C.E.)** The Old Kingdom: centralized government, divine kingship. The Middle Kingdom: new monarchic principles in the aftermath of social disorder. The New Kingdom: imperialism in response to foreign aggression; religious revolution of Akhenaton.

**HISTORY 374-0 Historical Background of Jewish-Muslim**

**Relations** Formation of Jewish-Muslim relations in the medieval Near East; how a common heritage became a basis for contention as well as mutual understanding.

**United States History Courses**

**HISTORY 210-1,2 History of the United States** Interpretative survey from the 17th century to the present. **1.** Precolonial to the Civil War. **2.** Reconstruction to the present.

Lectures, discussion sections.

**HISTORY 212-1,2 Survey of African American History**

**1.** From the 16th century through the Civil War. **2.** Since the Civil War.

**HISTORY 214-0 Asian American History** Introduction to the history of Asians in the United States, with a focus on their impact on American society as well as their experiences within the United States.

**HISTORY 215-0 Western Hemisphere Environments from 1492 to the Present** Environmental change in the history of North and South America. Conquest, exploitation, and restoration of common resources. Human activity in the shaping of Western Hemisphere environments. Emergence of environmental movements. Emphasis on hemispheric aspects of environmental change.

**HISTORY 303-1,2 American Women's History** Women and gender in American life, with attention to differences among women based on class, race, and ethnicity. **1.** To 1865. **2.** Since 1865.

**HISTORY 304-0 Asian American Women's History** Exploration of race, gender, and the contours of U.S. history from the perspective of Asian American women's experiences. Considers migration, exclusion, labor, marriage, family, sexuality, and cross-racial alliances.

**HISTORY 305-0 American Immigration** Origins, social characteristics, cultural values, and assimilation of immigrants in the 19th and 20th centuries. Consequences of immigration in comparative and historical perspective.

**HISTORY 306-1,2 History of the American South** From colonial settlement in the 17th century to the civil rights movements of the 1950s and 1960s. **1.** The rise of slavery and the plantation system, formation of slave family and culture, sectional conflict, the Civil War, and emancipation. **2.** Reconstruction, segregation, and civil rights movements.

**HISTORY 310-1,2 Early American History** **1.** Conquest and colonization: to 1688. **2.** The age of the American Revolution: 1688–1789.

**HISTORY 314-0 The Civil War and Reconstruction** “Middle period” of American history, emphasizing origins of the Civil War, its revolutionary nature, and its immediate and long-term consequences for the South and the nation.

**HISTORY 315-1,2,3 The United States since 1900** America's domestic history and role in world affairs since 1900.

**1.** Early 20th century. **2.** Mid-20th century. **3.** Late 20th century to the present.

**HISTORY 316-0 The Sixties** Examination of one of the most tumultuous eras in U.S. history, its roots in the reshaping of American society after World War II, and its legacies for the present. Emphasis on social movements of the period, particularly the civil rights movement, and political and cultural change.

**HISTORY 317-1,2,3 American Cultural History** Changing values of the American people, how they have been transmitted, and how they have shaped American society, politics, and the economy. **1.** Early America. **2.** 19th century. **3.** 20th century to the present.

**HISTORY 318-1,2 Legal and Constitutional History of the United States** **1.** Development of legal institutions, constitutionalism, law and social change, law and economic development, colonial period–1857. **2.** Law in industrial society: administration, race relations, corporations, environmental protection, civil liberties, 1857–present.

**HISTORY 319-1,2,3 History of American Foreign Relations** Evolution of American foreign policy, emphasizing domestic and international background and constitutional and military problems involved in planning policy. **1.** 1763–1900. **2.** 1900–45. **3.** 1945–present.

**HISTORY 322-1,2 Development of the Modern American City** Characteristics of urban society in America from the period of settlement to the present. **1.** To 1870. **2.** 1870–present.

**HISTORY 324-0 American Lesbian and Gay History** Gender, sexuality, and the rise of modern lesbian and gay identities. Lecture and discussion.

**HISTORY 326-0 American Intellectual History** Central questions in America's intellectual past: inquiries into human nature and the self; 19th-century debates about freedom, race, and slavery; the emergence of pragmatism and the social sciences in the progressive era; and intellectual and scientific debates emerging from and contributing to social and economic practices.

**History of Science and Technology Courses****HISTORY 275-1,2 History of Western Science and Medicine**

**1.** Origins of science and medicine in early modern Europe: science, religion, and cosmology; anatomy and sexual difference; the Enlightenment and social science. **2.** Modern science and medicine in Europe and America: quantum physics and the A-bomb; Darwinism, genetics, and eugenics; DNA typing and “racial science.”

**HISTORY 325-0 History of American Technology** American history through its material culture; industrialization and its discontents; consumer culture and household technology; mass communication and democracy; technological utopia and the computer revolution.

**HISTORY 376-1,2 Science and Modern Society** **1.** Rise of science in early modern Europe and colonial America; relationship with philosophy, theology, and Enlightenment culture; science, society, and utopian thought. **2.** Science in Europe and America, 1800–present: physical sciences and

the power to transform the world; biological and medical sciences and changing social values.

**HISTORY 377-0 Medicine in American Society** Development of medical theories, practices, and institutions in North America, from colonial times to the present, with emphasis on the 19th century.

### Courses Primarily for Majors in History

**HISTORY 391-0 Special Lectures** Lecture courses on special topics not covered in regular course offerings. Content varies. May be repeated for credit with consent of department.

**HISTORY 392-0 Topics in History** Advanced work through reading, research, and discussion in area of special significance. Graduate students permitted in some courses. Prerequisite: consent of instructor.

**HISTORY 395-0 Research Seminar** Students research and complete a term paper on a topic of choice. Required of majors.

**HISTORY 398-1,2,3 Honors Seminar** Advanced work through supervised reading, research, and discussion. Admission by written application, to be reviewed by department. Grade of K given in 398-1 and 398-2.

**HISTORY 399-0 Independent Study** Reading and conferences on special subjects for advanced undergraduates. Open only with consent of student's adviser and instructor.

### Undergraduate Leadership Program Course

**HISTORY 295-0 Leaders in History** Emphasis on the historical context within which leadership is exercised. Figures, periods, and cultures vary from year to year.

### History Courses in Other Departments

A history major may take no more than 2 quarter-courses listed below to satisfy the 11-course history requirement.  
AF AM ST 214-1,2

CLASSICS 211, 212, 321-1,2,3

ECON 315, 318, 321, 323-1,2, 324

## HUMANITIES

The humanities are those branches of knowledge that are concerned with human thought and culture, including the traditional liberal arts such as philosophy, literature, and art. They may also include fields of study that are classified as social sciences, in particular history and art history, as well as some aspects of anthropology, sociology, and psychology.

### Kaplan Institute for the Humanities

The Alice Kaplan Institute for the Humanities fosters interdisciplinary conversation among humanists working with different materials and texts. Each year the institute organizes several major public lectures on topics of wide-ranging importance in the humanities. The institute offers a number of interdisciplinary courses taught by its former faculty fellows, Northwestern faculty, and Jean Gimble

Lane Humanities Professors. The institute includes the Kaplan Humanities Scholars Program and also administers an internship program that places undergraduates in Chicago humanities and arts institutions.

For more information, visit the institute web site at [www.humanities.northwestern.edu](http://www.humanities.northwestern.edu), call 847-491-7946, or e-mail [hum@northwestern.edu](mailto:hum@northwestern.edu).

### Kaplan Humanities Scholars Program

Open to interested freshmen from the natural and social sciences as well as the humanities, the Kaplan Humanities Scholars Program is a rigorous and innovative program of study in the humanities with the theme of "the good society." Students take 2 specially designed lecture courses and 2 seminars in their yearlong investigation of the long-standing debate about "the good society." They read works of enduring value, conduct site visits, and pursue research projects.

### Minor in Humanities

The minor in the humanities exposes undergraduate students from a wide range of backgrounds to diverse examples of human thought and culture that make up the ever-changing array of topics and objects studied in the various humanities disciplines. Humanities courses also present the different interdisciplinary methods and theories used in humanities scholarship. The minor is rooted in the idea that the opportunity to study an assortment of humanities topics from a wide range of perspectives provides an excellent complement to the more closely focused course work undertaken in any major, whether inside or outside the humanities.

#### Minor course requirements (7 units)

- up to 3 courses at the 200-level drawn from 201, 210, 211, and 260; each may be repeated for credit with a change in topic
- remaining courses drawn from 301, 302, and 395; each may be repeated for credit with a change in topic
- 390 and/or 399 may be used to fulfill the minor requirement with consent

### Courses in the Humanities Scholars Program

Specific topics in these courses will vary as different professors participate.

**HUM 101-6 Freshman Humanities Seminar**

**HUM 102-6 Freshman Humanities Seminar**

**HUM 210-0 The Good Society 1**

**HUM 211-0 The Good Society 2**

### Other Humanities Courses

**HUM 201-0 Thinking through and across Traditions**

What is a cultural tradition, and what part may it play in engendering identification and community as well as violence and war? How is a tradition created, passed down, transmitted across cultures, and transformed in



the process? What aspects of a tradition do writers single out for adaptation to specific social and political struggles? How do different cultural traditions respond differently to similar themes and story lines? Course content varies; it may concentrate on works that come from a particular cultural tradition (e.g., Western European, Japanese, Russian, African American) or cut across cultural boundaries.

**HUM 260-0 Humanities Explorations** A multifaceted exploration of significant topics of wide humanistic interest, such as the nature of the self, encounters with the transcendent, and the nature of the good society, from different points of view and a variety of sources and methodologies — e.g., aspects of love, the feminine divine in cross-cultural perspective, imagining democracy, and the city as metaphor. May be repeated for credit with change in topic.

**HUM 301-0 Topics in the Humanities** Interdisciplinary issues and current research in the humanities — e.g., biology, citizens, and communities in the 19th and 20th centuries; the Andes imagined — culture, conflict and modernity in the 20th century; narration, exile, and survival; India in the Victorian imagination. May be repeated for credit with change in topic.

**HUM 302-0 New Perspectives in the Humanities** New issues in the humanities and current innovative research — e.g., poetry and diaspora; race, gender, and the politics of beauty; role and place of negritude in contemporary African thought. May be repeated for credit with change in topic.

**HUM 390-0 Humanities Internship** Placement at a Chicago cultural institution or theater, such as the Chicago Humanities Festival, Art Institute, Lyric Opera, or Newberry Library, for approximately 10 hours per week; entails a research project supervised by a Northwestern faculty mentor. Prerequisites: grade point average of 3.0 or higher and consent of institute.

**HUM 395-0 Humanities Seminar** Interdisciplinary course offered by the current Jean Gimble Lane Humanities Professor, an eminent scholar invited to address important issues in the humanities — e.g., cities as modern utopia/dystopia in Europe, Asia, and America; the afterlife of Marxism; the politics of reputation; being animal, being human. Prerequisite: consent of institute.

**HUM 399-0 Independent Study** Individual projects with faculty guidance. Open to junior and senior minors. Prerequisite: consent of instructor.

## INTEGRATED SCIENCE

The Integrated Science Program (ISP) is a highly selective curriculum of natural sciences and mathematics presented predominantly in small classes at an accelerated pace. Courses emphasize the common base and relationships between the traditional sciences, including the importance of mathematics and the development of first principles, leading to interdisciplinary topics at the forefront of science today. The goal is to provide students who are interested in careers in science and mathematics with a broad quantitative background that will

give them superior preparation for further work in graduate or professional schools or permanent employment. The curriculum is composed of 23 courses, up to 3 of which may be independent research, as well as a regular seminar series. Most students take advantage of the opportunity to pursue research in a world-class laboratory at Northwestern and are able to publish peer-reviewed papers in professional journals. ISP may lead to a three-year bachelor of arts degree if, by the end of the third year, the student has completed 36 or more courses and satisfied all other college requirements.

Students must be accepted to Northwestern to be eligible for admission to ISP, which requires a separate application to the program director. For more information on admission procedures, see the description of ISP under Academic Options in the Undergraduate Education section of this catalog. Also see the Admission section for the achievement tests required.

The curriculum consists of specially designed courses taught by faculty members of science and mathematics departments. Course descriptions are found in the appropriate departments in this catalog. Though listed in a three-year format, the program is often spread over four years, particularly if a student wishes to combine an ISP major with a second major in a traditional department such as biological sciences, chemistry, computing and information systems, environmental sciences, earth and planetary sciences, materials science, mathematics, physics, or psychology. Specific second-major requirements for ISP students can be found under individual departments in this catalog. For more information, see the ISP web page at [www.isp.northwestern.edu](http://www.isp.northwestern.edu).

## Major in Integrated Science

- *First year:* 101-1,2,3; CHEM 171, 172; MATH 281-1,2,3; PHYSICS 125-1,2,3
- *Second year:* BIOL SCI 212-1,2; CHEM 212-1, 348; EARTH 350; MATH 381, 382; PHYSICS 339-1,2
- *Third year:* ASTRON 331; BIOL SCI 310, 311; MATH 383; PHYSICS 339-3

INTG SCI 398 may be substituted for up to 3 of the following courses: ASTRON 331; BIOL SCI 310 or 311; MATH 382 or 383; PHYSICS 339-3.

## Courses

**INTG SCI 101-1,2,3 Computing Applications** (1/3 unit each quarter) Introduction to the formulation and solution of scientific problems using advanced computational programming methods.

**INTG SCI 398-0 Undergraduate Research** Advanced independent study and research for superior students. Consent of ISP director required.

## INTERNATIONAL STUDIES

International studies is an undergraduate adjunct major, complementing and taken in conjunction with a disciplinary major. It is open to students in all schools.

The adjunct major provides students with an interdisciplinary understanding of the international system as it has developed and as it affects contemporary politics and society. Students are required to take a core set of courses in history, political science, sociopolitical development, and economics that are designed to introduce key elements and concepts related to the historical development of the global political and economic system. They then choose thematic and regional areas of focus, taking courses from a variety of disciplines such as history, political science, economics, anthropology, literature, art, linguistics, global health, music, and religion. Students complete the major with either an integrating project seminar related to the thematic focus or an honors thesis that includes a 3-quarter honors seminar.

### **Adjunct Major in International Studies**

Twelve quarter-courses are required, as well as proficiency in a language other than English at a level equivalent to two full years of instruction. Five of the courses are the core courses; 3 are electives in a thematic cluster; 3 are regional (area studies) electives; and 1 is an integrating project seminar. Students may opt to complete the regional cluster through study abroad, but in any event must take 12 quarter-courses. Students may also substitute the honors program for a project seminar. Students may double-count no more than 4 courses toward both their international studies and other disciplinary majors.

#### *Program of Study*

##### **Core courses (5 units)**

- 201-1,2
- HISTORY 319-3 or POLI SCI 344
- ECON 201
- POLI SCI 240

##### **Thematic cluster (3 units)**

Students take 3 courses in one of these themes:

- Issues in international security
- Global commons
- Culture and society
- International political economy and development

Lists of eligible courses can be found each quarter at the program office and on the web site. Thematic clusters must be completed with courses from at least two different disciplines. Students with coherent interdisciplinary programs of study that do not fit into one of the four themes listed may petition to create a self-designed thematic cluster.

##### **Regional cluster (3 units)**

Students choose 3 quarter-courses related to a geographic region of the world; 1 course must be historical, 1 in literature or the arts, and 1 in belief and social systems. The program web site and advisers have lists of appropriate courses, and advisers will discuss substitutions if courses

are not available for a particular region. An exception to the three-content-area requirement is made for students who choose to use study abroad to fulfill the regional cluster. These students may either count 3 courses taken abroad for the regional cluster or ask for a regional cluster exception and take 3 additional international studies-related courses at Northwestern. Study abroad does not lessen the 12-course total requirement, however. Language instruction does not count toward the regional cluster.

##### **Integrating project seminar or honors thesis**

Most international studies majors in their junior or senior year take an integrating seminar linked to their thematic cluster. The seminar provides a format to complete a research project that integrates a variety of disciplines to address an issue in international culture, society, economics, or politics. Students admitted to the international studies honors program do not take an integrating seminar but instead participate in the 3-quarter honors seminar and write an integrated honors thesis.

#### *Advising*

Each student has a different combination of major courses. Because international studies majors must show a minimum of 8 courses not double-counted in any other major(s), students should see an international studies adviser when designing their programs.

##### **Minor in International Studies**

The minor in international studies requires completing the 5 core courses and 3 quarter-course electives in either a regional or a thematic cluster.

##### **Honors in International Studies**

The honors program is for outstanding and engaged majors who wish to take on the challenge of actively researching and writing about an international topic. Participants are required to have enough comprehension of a foreign language to draw on its research resources. Students accepted into the honors program enroll in a 3-quarter-long seminar (spring junior year and fall and winter senior year) during which they plan, research, and write their theses. Juniors studying abroad may be exempted from the spring-quarter honors seminar, though they must demonstrate progress in formulating a research project during that time.

Acceptance into the honors program is competitive. Students apply in January of their junior year or, if they plan on spending junior year abroad, in their sophomore year. Applicants propose a thesis topic, including a research question, describe their preparation for this research, and are interviewed about their language competence. For more information and application guidance, consult the associate director of international studies. See also Honors under Academic Policies in this catalog.

## Courses

**INTL ST 201-1,2 Global History** This sequence introduces the political and social forms organizing human societies over the centuries. **1.** Teaches students how to analyze variations in geopolitics, demographic cycles, long-distance commerce, and world imperial religions over time.

**2.** Examines how Western expansion through colonization gradually brought all societies into the orbit of a single world economy and traces the processes of global integration and disintegration up to present-day globalization.

### **INTL ST 390-0 Special Topics in International Studies**

Additional courses focus on international topics to augment offerings of departments. Different topics in different quarters, as announced.

**INTL ST 395-0 Integrating Project Seminar** Small research seminars allow international studies majors to conduct research in their chosen themes.

**INTL ST 398-1,2,3 Honors Seminar** Students on campus must enroll in 398-1 in the spring quarter of their junior year; juniors studying abroad apply to the honors program in January of their sophomore year. 398-2,3 are required for completion of the honors program.

**INTL ST 399-0 Independent Research** Advanced research is carried out under the supervision of a Northwestern professor. Independent study may be counted toward completion of either a regional or a thematic cluster. Consent of the director of the undergraduate's major is required following submission of a written proposal.

## ITALIAN

See French and Italian.

## JEWISH STUDIES

The Jewish Studies Program focuses on Judaism, not only in its narrow sense as a religious phenomenon but also in its broader sense as a phenomenon of culture and civilization. A good case can be made that the roots of Western culture lie in two places: Athens and Jerusalem. The traditional education of the humanist scholar recognized this by requiring not only the mastery of Greek and Latin but also of Hebrew. Thus, the study of Judaism in this program considers the many and varied dimensions of the phenomenon of Jewish civilization. A typical program of study includes, in addition to the religious dimension, the historical, sociological, linguistic, philosophic, and artistic dimensions. The Jewish Studies Program offers two minors: Jewish studies and Hebrew studies.

### **Minor in Jewish Studies**

The minor in Jewish studies requires successful completion of 7 courses in three areas:

- a 3-course survey of Jewish history that provides a basis for advanced work, including 1 course on ancient or biblical Judaism (such courses include RELIGION 220 or any course on the history of ancient Israel); 1 course

on the history or culture of the Jewish people in the Middle Ages (consent of director of undergraduate studies required); and 1 course on some aspect of modern Jewish history (consent of director of undergraduate studies required)

- 2 courses on Jewish religion offered in the Department of Religion or approved by the director of undergraduate studies; eligible courses include RELIGION 230, 320, 332, 333, and 339
- 2 additional courses chosen from the fields of Jewish literature and Jewish philosophy — e.g., courses covering thinkers such as Maimonides, Rosenzweig, and Levinas — or the sociology/anthropology of Jewish communities (these courses must be approved by the director of undergraduate studies)

Up to 2 of the 7 courses may be double-counted toward a major.

For students who also satisfactorily complete two years of language study in Hebrew, requirements for the minor consist of the successful completion of 5 courses: 3 in the first area and 1 each in the second and third areas above.

### **Minor in Hebrew Studies**

The minor in Hebrew studies requires the successful completion of 6 courses, at least 2 of which must be at the 300 level, in four areas. Before signing up for the Hebrew studies minor, a student must complete or place out of the second year of Hebrew (AAL 102-1,2,3).

#### **Minor course requirements (6 units)**

- 2 courses conducted in Hebrew — for example, third-year Hebrew (AAL 203-1,2,3)
- 1 course on a classical (premodern) Hebrew text read in Hebrew (eligible courses are typically on biblical, rabbinic, or mystical texts — for example, RELIGION 329 or 339)
- 1 course on modern Hebrew literature, using Hebrew literary texts from the Haskalah through the contemporary periods, either in the original language or in English
- 1 course on modern Israel, exclusive of Israeli literature, typically in history, political science, sociology, or anthropology; must be approved by the director of undergraduate studies
- 1 elective chosen from Hebrew literature or Jewish literature, in translation or in the original; Israel studies; courses in the Department of Linguistics relevant to Semitic languages; courses covering classical Hebrew texts in translation or in the original; or courses conducted in Hebrew (e.g., AAL 203-1,2,3, 355-1,2,3)

## Course

### **JWSH ST 350-0 Representing the Holocaust in Literature**

**and Film** Analysis of artistic, ethical, and historical questions about representing the Holocaust in different genres.

## LATIN

See Classics.

## LATIN AMERICAN AND CARIBBEAN STUDIES

The Program in Latin American and Caribbean Studies allows students to pursue a coherent interdisciplinary course of study on this region of the world, including courses offering a variety of perspectives: social, historical, linguistic, political, and cultural. The program requires a set of core courses and also offers a series of elective courses in several different departments. Students also are encouraged to study in a Latin American or Caribbean country through the programs offered by the Study Abroad Office.

### Minor in Latin American and Caribbean Studies

Eight courses are required for the minor in Latin American and Caribbean studies. All students in the program are expected to have an effective reading knowledge of Spanish, Portuguese, or another language spoken in the region. To qualify for the minor, students must present a minimum of 5 courses not double-counted in their majors. Students who would like more information about the minor should contact the program director.

*Core courses:* The minor has 4 core courses, each in a specific department: anthropology, history, political science, and Spanish and Portuguese. Students normally select the courses from the following list. Alternatives and exceptions must be approved by the program director.

- ANTHRO 390 or 490 (when relevant to Latin America, the Caribbean, and/or U.S. Latinos)
- HISTORY 365, 366, 368, 369, 391, or 392 (when relevant to Latin America or the Caribbean)
- POLI SCI 353 or 356
- SPANISH 260, 261, 361, or 390 or 395 (when relevant to Latin America, the Caribbean, and/or U.S. Latinos)

*Elective courses:* Students should take an additional 4 courses on Latin America and the Caribbean chosen from the course list below. Many departments, especially anthropology, history, political science, and Spanish and Portuguese, regularly offer courses on Latin America, the Caribbean, and/or U.S. Latinos; these may be counted toward the minor with the consent of the program director. The program strongly recommends that 1 of these elective courses focus on Latinos in the United States. Students are advised to consult the department web site at [www.wcas.northwestern.edu/lacs](http://www.wcas.northwestern.edu/lacs) for the most up-to-date course listings.

### Courses

**LATIN AM 251-0 Introduction to Latino Studies** Introduction to major material and historical themes that have shaped U.S. Latina/o communities, with focus on parallels of colonization, assimilation and cultural resistance,

*mestizaje*, and contemporary expressions of cultural innovation. The course primarily addresses Mexican American and mainland Puerto Rican communities, histories, and experiences, stressing commonalities and distinctness of *latinidad* in the United States, discussing Cuban Americans and Central Americans, and examining the role of race, gender, sexuality, and sexual orientation in the shaping of Latina/o histories and identities past and present.

**LATIN AM 351-0 Topics in Latino Studies** Topics may include Latino literature, Latino art, immigration issues, Latinos and the law, borderlands ethnography, Latinos and Latinas (gender issues), Latino drama and theater, Latino history, and sociology of Latinos and Hispanics in the United States.

### LATIN AM 389-0 Introduction to Urban Field Research

Theory and methods of ethnographic field research; preparation for field research projects with community-based organizations serving Latin American and Caribbean communities in Chicago; introduction to creative ways of communicating research, such as exhibitions, forums, or related public education programs.

**LATIN AM 396-0 Gender in Latin America** Exploration of the varied expressions of masculinity and femininity across Latin America, the Caribbean, and the Latin United States from pre-Columbian times to the present. Case studies and emphases may vary from year to year.

### Related Courses in Other Departments

- AF AM ST 245, 345, 381
- ANTHRO 328, 330, 368, 390 (when relevant)
- ART HIST 228, 235
- COMP LIT 312, 313 (when relevant)
- FRENCH 365
- HISTORY 365, 366, 367, 368-1,2, 369, 391 or 392 (when relevant)
- HUM 301 (when relevant)
- POLI SCI 353, 356, 390 (when relevant)
- SPANISH 211, 260, 261, 301, 340, 341, 342, 343, 344, 345, 346, 347, 361, 380, 390, 395, 397 (when relevant)
- THEATRE 369

## LEGAL STUDIES

The Legal Studies Program challenges students to use various academic perspectives and methodologies to study legal issues and to use the conceptual framework of the law to illuminate empirical and theoretical concerns in the social sciences and humanities. It is not a “prelaw” program. This program conceives of law broadly to include the study of legal institutions, legal actors, and legal processes. The law has become an important institution in American society and throughout the world; as such, it warrants study in its own right and provides an excellent lens through which students may learn about and critically examine a variety of themes central to other academic disciplines.

## Adjunct Major in Legal Studies

Open to undergraduate students in all schools, legal studies is an adjunct major that may be taken only in conjunction with a departmental major.

Students are required to have completed or be in the process of completing at least 2 legal studies electives before admission to the program. These 2 courses will later count toward the adjunct major. Students apply for the adjunct major and admission to the Advanced Research Seminar (398-1,2) in the spring of their sophomore year. The adjunct major requires completion of both quarters of 398, typically during the junior year.

In addition to the Advanced Research Seminar, adjunct majors are required to complete a total of 9 approved legal studies electives taught in legal studies or drawn from other departments, including 1 course from each of five categories of electives.

*Core courses:* 398-1,2

*Electives:* Courses that fulfill the elective requirement for the adjunct major may be chosen from the following five categories: argument and communication; global and comparative studies; institutions, organizations, economics; law and inequality; theory and philosophy. All five categories must be represented among the 9 courses chosen. A list of approved courses for the adjunct major is available on the Legal Studies Program web site ([www.northwestern.edu/legalstudies](http://www.northwestern.edu/legalstudies)). Up to 2 of the 9 electives may be double-counted toward another major.

## Minor in Legal Studies

Students may earn a minor in legal studies while concurrently pursuing a departmental major in any undergraduate school. Students qualify for the minor by satisfactorily completing a total of 8 approved law-related courses taught in legal studies or drawn from other departments, including 1 course from each of five categories of electives.

*Minor course requirements:* The 8 courses for the minor may be chosen from the five categories of electives listed under the adjunct major. All five categories must be represented among the 8 courses to be counted toward the minor.

## Honors in Legal Studies

Students who achieve a grade point average of 3.5 or higher in courses completed for the adjunct major and who write a research seminar thesis of distinction may be considered for honors. For more information about honors, consult the program director.

## Courses

**LEGAL ST 376-0 Topics in Legal Studies** Topics such as McCarthyism and free speech, antitrust law and economics, human rights, wrongful conviction, and community policing. May be repeated for credit with consent of instructor or program director.

**LEGAL ST 398-1,2 Advanced Research Seminar** Exposure to theoretical and empirical approaches to the study of law and legal institutions and their relationship to society; emphasis on analytic skills and interdisciplinary research experience. Readings in legal studies; preparation and presentation of research projects and papers. Varying class format incorporating meetings, group exercises, and small tutorials led by faculty-supervised graduate teaching fellows. Consecutive enrollment required in both courses in the sequence. Prerequisite: Acceptance to program as adjunct major.

**LEGAL ST 399-0 Independent Study** Readings and conferences on special subjects for students pursuing a specific area of interest in legal studies.

## LINGUISTICS

Linguistics is the scientific study of language, its structure and function as a means of communication, its acquisition, and the mental and physiological processes involved in its use. Knowledge of the structure, origins, and functions of language can provide deep insight into human nature and behavior. The major in linguistics prepares students for professional studies in law, medicine, technology, education, and business, as well as for graduate work in linguistics, cognitive science, and related disciplines.

Three introductory courses examining the sound structure of human language, the structure of words and sentences, and the structure of linguistic meaning make up the core of the major and provide the foundation for more advanced work. More specialized courses in linguistics introduce students to the activities of working researchers in various subfields.

Linguistics majors are encouraged to participate in faculty research and to develop independent research. Students often enhance their linguistics major through interdisciplinary studies in cognitive science, communication sciences and disorders, psychology, philosophy, international studies, mathematics, or computer science. Students with a strong record in their major courses and an interest in pursuing linguistics at the graduate level are encouraged to enroll in 400-level courses.

## Major in Linguistics

### Departmental courses

*Introductory courses:* 250, 260, 270

*Advanced courses:* 9 courses beyond the 200 level, including 350, 360, and 370 (a methods course chosen from 330, 331, 332, 333, or 334 may be substituted for 1 of these courses); only 1 of the 9 may be 398 or 399; certain exceptions or substitutions, such as COG SCI 210, may be granted with the consent of the undergraduate adviser

**Related courses:** 4 courses selected from other departments in consultation with the linguistics undergraduate adviser



## Minor in Linguistics

The minor in linguistics broadens the academic background of students majoring in related fields such as cognitive science, communication sciences and disorders, psychology, philosophy, foreign languages, mathematics, and computer science by offering training in the theory and methods of linguistic analysis.

### Minor course requirements (8 units)

- 250, 260, 270
- 5 courses beyond the 200 level, including 2 chosen from 350, 360, or 370 (a methods course chosen from 330, 331, 332, 333, or 334 may be substituted for 1 of these courses)

## Four-Year BA/MA Program

Students with a strong record in their major courses and an interest in graduate study are eligible to apply for the four-year BA/MA program in linguistics. Applications should be made no later than spring quarter of the junior year. To be considered for this program, students must demonstrate that they will be able to complete by the end of their senior year all Weinberg College requirements for the BA degree plus the department's requirements for the MA degree. See Accelerated Master's Programs in the Undergraduate Education section of this catalog.

## Honors in Linguistics

At the invitation of the department, an outstanding senior majoring in linguistics may be eligible for departmental honors by successfully completing a self-designed, faculty-supervised research project on a topic of his or her choice. The research project culminates in a senior thesis that, in conjunction with the student's record in linguistics and related courses, forms the basis for the awarding of honors. For more information about guidelines and requirements for earning honors, consult the department.

## Courses

All 200-level linguistics courses have an experimental requirement. Students may fulfill this requirement by participating in any combination of two one-hour experiments or video showings. The experiments will be part of ongoing departmental research and illustrate features of language structure and use relevant to topics covered in the core linguistics curriculum. Similarly, the videos will be on topics covered in the core curriculum.

**COG SCI 210-0 Language and the Brain** See Cognitive Science.

**LING 220-0 Language and Society** Introduction to the study of language in its social context. Language variation by gender, race/ethnicity, social class, and region. Language norms and attitudes. Multilingualism and public policy.

**LING 221-0 Language and Prejudice** Linguistic manifestations of prejudice from various sources: region, gender,

race, ethnicity, social class, sexual orientation, and country of origin. Speech codes, the balance between rules of civility and freedom of speech, "politically correct" language, the language policies of schools and governments, and the imposition of language standards.

**LING 222-0 Language, Politics, and Identity** The role of language in constructing, preserving, and manipulating political and national identities. Topics include linguistic nationalism, language laws, rights of minority languages, language discrimination, language and religion, alphabet issues, language and dialect as ethnic identity, standard language, and others. Regional content varies depending on interests and expertise of instructor.

**LING 223-0 Language Myths** Introduction to the scientific study of language through examination of various well-known myths surrounding language and its use.

**LING 224-0 Languages of Chicago and the Midwest**

Introduction to the fundamentals of linguistic theory and the basic phonological, morphological, and syntactic tools needed to describe and analyze an unfamiliar language. The structure and sociolinguistic profiles of immigrant languages of the Chicago area are discussed, including Spanish, Polish, Urdu, Arabic, and Serbo-Croatian as well as aboriginal languages of the area, such as Potawatomi.

**LING 240-0 Languages of the World** Survey of the world's major language families. Varying and universal features of human language. Topics include human versus nonhuman systems of communication, the sounds and gestures of human language, writing systems, word formation and inflection, sentence structure, and word order variation.

**LING 250-0 Sound Patterns in Human Language** Introduction to the formal and instrumental analysis of the sound structure of language. The description of speech sounds in terms of articulation in the human vocal tract, physical acoustic output, and human perception. Cross-linguistic similarities and differences. The patterning of speech sounds to convey meaning. Introduction to contemporary speech technology.

**LING 260-0 Formal Analysis of Words and Sentences** Formal structure of words (morphology) and sentences (syntax) in natural language. Biological basis of human language.

**LING 270-0 Meaning** How information is encoded in words and sentences and how speakers and listeners use language to communicate.

**LING 300-0 Topics in Linguistics** Topics in linguistic theory. Content varies. May be repeated for credit with different topic.

**ENGLISH 302-0 History of the English Language** See English.

**LING 310-0 Psycholinguistics** Introduction to experimental and developmental psycholinguistics. Mental processes underlying the comprehension, production, and acquisition of language. Structure of the human lexicon and parser. Innateness versus learning in acquisition.

**LING 311-0 Child Language** Introduction to first language

acquisition. How infants and children learn the grammar (structure of sounds, words, and sentences) of their native language. Innate and environmental factors in linguistic development. Emphasis on experimental and corpus-based methods of inquiry.

**LING 312-0 Second Language Acquisition** Major theories of second language acquisition and current issues in the field. Cognitive, linguistic, and sociocultural variables affecting second language learning.

**LING 320-0 Sociolinguistics** Linguistic diversity in multi-dialectal and multilingual societies. Correlations between linguistic variables and social categories. Language planning and policy; diglossia.

**LING 321-0 Bilingualism** Social and linguistic factors in the acquisition of two or more languages. Effects of bilingualism on phonology, syntax, the lexicon, and cognition.

**LING 322-0 Language Variation** Differences in language that correlate with historical periods, geographic regions, and societal groupings (e.g., age, race, ethnicity, gender, social class).

**LING 323-0 Language and Gender** Differences in the language used by and about men and women. Cross-cultural gender differences in language and language attitudes.

**LING 324-0 Linguistics and English Composition** Recent trends in the study of the uses and forms of writing and the processes of written composition. The learning and teaching of written language.

**LING 325-0 Language and Medicine** Analysis of language patterns used in medical settings, including doctor-patient interaction and technical language use. Prerequisite: 200-level course or senior standing.

**LING 327-0 Language and Sexuality** The use of language to construct, negotiate, and conceal sexual identity, focusing on the language of and about gay men and lesbians. Topics include heteronormativity, identity labels, gender versus sexuality, and cross-cultural sexual diversity. Prerequisite: a course in linguistics or consent of instructor.

**LING 330-0 Research Methods in Linguistics** Methods of linguistic data collection, management, and analysis with an emphasis on the use of computational, experimental, and statistical methods.

**LING 331-0 Formal Foundations of Linguistic Theory** Topics include set theory, trees and lattices, feature structures and unification, formal languages, complexity, and probabilistic grammars. Prerequisite: 250, 260, or 270.

**LING 332-0 Linguistic Field Methods** Collection of primary linguistic data from an unfamiliar language. Lexicon and grammar development focusing on phonology, morphology, and syntax. Prerequisite: 250, 260, or 270.

**LING 333-0 Methods in Developmental Linguistics** Methods of investigating children's knowledge of grammatical structure. Experimental design; review and application of statistics; executing developmental linguistic research and reporting of results. Prerequisite: 311.

### **LING 334-0 Introduction to Computational Linguistics**

Hands-on introduction to computational methods in empirical linguistic analysis and natural language processing. Topics include the use of text corpora and other sources of linguistic data; morphological analysis, parsing, and language modeling; and applications in areas such as information retrieval and machine translation.

**LING 340-0 Historical Linguistics** Introduction to the study of how and why language changes. Topics include the comparative method, the regularity of sound change, syntactic change, distant genetic relationships, and language evolution.

**LING 341-0 Language Typology** A comparison of varying and universal features of the world's languages. Prerequisite: 250, 260, or 270.

**LING 342-0 Structure of Various Languages** Phonological, morphological, or syntactic structure of a particular language. May be repeated for credit with change in language.

**LING 350-0 Fundamentals of Laboratory Phonology** Articulatory and acoustic phonetics. Syllable structure, phonotactics, prosody, and intonation. Fundamentals of experimental design and data analysis. Prerequisite: 250 or consent of instructor.

**LING 360-0 Fundamentals of Syntax** Fundamental principles of theoretical syntax. Phrase structure, argument structure, movement operations. Emphasis on argumentation, hypothesis formation and testing, and analytic methods. Prerequisite: 260 or consent of instructor.

**LING 361-0 Morphology** Issues in theoretical morphology. The internal structure of words. Linguistic and psycholinguistic findings about the representation and processing of word structures. Prerequisite: 250, 260, or 270.

**LING 370-0 Fundamentals of Meaning** Theoretical approaches to the study of linguistic meaning. Topics include word meaning, argument and event structure, sentence meaning, truth conditions, and inference types (e.g., entailment, implicature, presupposition). Prerequisite: 270 or consent of instructor.

**LING 371-0 Reference** Linguistic and philosophical approaches to the study of reference, focusing on the role of context in utterance production and interpretation. Topics include definiteness, genericity, deixis, and anaphora.

**LING 372-0 Pragmatics** Introduction to extrasemantic meaning, focusing on the role of context in utterance production and interpretation. Topics include the semantics-pragmatics boundary, implicature, presupposition, reference, information structure, and speech acts. Prerequisite: 250, 260, or 270.

### **LING 380-0 Spoken English for Nonnative Speakers**

Conversational English addressing all oral language skills; primarily for international graduate students who are non-native speakers of English. Content varies.

**LING 381-0 Written English for Nonnative Speakers** Written argumentation skills and all aspects of academic writing; primarily for international graduate students who are non-native speakers of English.

**LING 398-0 Undergraduate Seminar in Linguistics** By invitation of the department. For students of superior ability, with choice of topic left to the group.

**LING 399-0 Independent Study**

## MATERIALS SCIENCE

Materials science is the study of processing-structure-property relationships in materials of importance to society, such as metals, ceramics, polymers, semiconductors, and their combinations (composites). Materials scientists pay special attention to “microstructure” — i.e., how materials are constructed on the microscopic, submicroscopic, and even the nanometer levels, and how this affects their properties. Given the wide range of uses for materials, their properties of interest are similarly broad, from mechanical (e.g., strength) to electrical (e.g., semiconduction) to biological (e.g., biocompatibility).

By offering the opportunity to study materials science within the context of the liberal arts and sciences, the Material Science Program in Weinberg College is distinct from the program in the Department of Materials Science and Engineering in the Robert R. McCormick School of Engineering and Applied Science. The Weinberg program has strong connections with Weinberg’s physical and biological sciences departments in addition to its links with McCormick’s various engineering disciplines. Students in other majors are strongly encouraged to pursue a dual major or a minor in materials science.

### Major in Materials Science

Students majoring in materials science in Weinberg College choose from two tracks: general materials or soft materials. (Students interested in solid-state materials should see the materials physics concentration in the Department of Physics and Astronomy; they may double-major in materials science.)

Requirements include foundation courses in mathematics and science and advanced electives. Course descriptions for materials science courses are listed in the McCormick School section of this catalog.

#### Foundations in mathematics (5 or 6 units)

- MATH 220 and 224 *or* 212, 213, and 214; 230, 234, and 240 *or* 281-1,2,3 *or* 285-1,2,3 *or* 290-1,2,3 *or* 291-1,2,3

#### Foundations in science (5 or 6 units)

- CHEM 101; 102; 103 *or* 171; 172
- PHYSICS 135-1,2,3 *or* 125-1,2,3

Students in the soft materials track who are interested in biomaterials and/or medicine are encouraged to take additional courses in biology; BIOL SCI 210-2 is highly recommended.

#### Core curriculum (5 units)

- MAT SCI 201 *or* 301, 315, 316-1,2, 351-1

#### Program track (5 units)

- Students take courses in their chosen track:

##### *General materials track*

- CHEM 210-1 *or* 212-1
- CHEM 342-1 *or* MAT SCI 314
- MAT SCI 331; 2 courses chosen from 332, 351-2, 361

##### *Soft materials track*

- CHEM 210-1,2 *or* 212-1,2
- CHEM 342-1 *or* MAT SCI 314
- MAT SCI 331; 335 *or* 370

#### Advanced studies (3 units)

3 elective courses must be taken in at least two areas, including 1 in materials science, chosen from the following:

- 332, 333, 336, 340, 341, 351-2, 355, 360, 361, 370, 376, 380, 390, 391, 395, 398
- CHEM 210-3 *or* 212-3, 333, 342-2, 342-3
- EARTH 300
- MATH 250; 351 *or* 381
- PHYSICS 332, 333-1, 333-2, 337, 339-3, 357, 358, 359-3

Students completing the materials physics concentration in physics and astronomy and wishing to double-major in materials science are required to take an additional advanced studies course for each course duplicated between the two programs (e.g., MAT SCI 316-1,2, 332, 355, 360, 361, 380). The replacement courses should be in disciplines other than physics.

### Minor in Materials Science

#### Foundations in mathematics and science

- MATH 220 and 224 *or* MATH 212, 213, and 214; MATH 230 and 234 *or* equivalent (e.g., 290-2,3 *or* 291-2,3)
- CHEM 101; 102; 103 *or* 171; 172
- PHYSICS 135-1,2,3 (or 125-1,2,3)
- 1 course in thermodynamics: MAT SCI 314 *or* CHEM 342-1 *or* PHYSICS 331

#### Core courses (6 units)

- 201, 203, *or* 301; 315; 316-1,2
- 2 other 300-level materials science courses (excluding 394, 396-1,2, 399)

### Materials Science Second Major for ISP Students

The Integrated Science Program (ISP) is a highly selective BA program within Weinberg College. Students majoring in ISP who wish to complete a second major in materials science must take MAT SCI 201, 315, and 316-1,2 plus 2 300-level MAT SCI electives.

### Honors in Materials Science

Seniors who have done outstanding work in the classroom and research laboratory may be eligible for graduation with honors in materials science. To be recommended for

honors, students must maintain a grade point average of 3.3 or higher in all math and science courses. They must also complete 2 units of research (from CHEM 398, 399, MAT SCI 396-1,2, 394, PHYSICS 398, or 399) and a written research report.

## MATHEMATICAL METHODS IN THE SOCIAL SCIENCES

A central feature of modern social, behavioral, managerial, and policy sciences is the use of mathematics, statistics, and computers, both as languages and as methods of abstraction and analysis. Most undergraduate programs in the social sciences do not incorporate mathematical approaches in an organized and consistent manner, however. The Mathematical Methods in the Social Sciences Program (MMSS) was created to give undergraduate students an opportunity to combine the study of social sciences with training in formal analytical methods.

The program is for students with high mathematical aptitude and strong interest in social problems and issues, including policy and research implications. It provides excellent preparation for graduate study in social or managerial sciences as well as for careers requiring quantitative skills and a solid background in the social sciences.

MMSS students pursue a double course of study: a common mathematics/quantitative methods sequence and the social science major of their choice. (In some cases, students have chosen their joint major from outside the social sciences.) In the first two years of the program, students enroll in a coordinated sequence of 12 1-quarter courses (2 courses per quarter) covering mathematical methods and their applications in the social sciences. These courses are open only to MMSS students and are taught at an appropriately advanced level. In their senior year, all MMSS students participate in a senior seminar in which they write a thesis. There are no other required MMSS courses, but students must fulfill the requirements of their joint major.

### Adjunct Major in MMSS

#### Required courses

- *First year:* 211-1,2,3; MATH 285-1,2,3
- *Second year:* 311-1,2; MATH 300, 385, 386-1,2
- *Senior year:* 398-1 and 398-2 or 398-3

Admission to the MMSS program is very selective and is limited to entering freshmen and to Northwestern sophomores with superior academic records and a demonstrated strong aptitude in mathematics.

A full-year course in calculus is prerequisite for admission consideration. High school students fulfilling this prerequisite are encouraged to enter the program as freshmen. Students lacking calculus but planning to enter the program as sophomores should complete at least 2 quarters of calculus (MATH 220 and 224) in their freshman year.

Applicants who wish to enter MMSS as freshmen must apply both to Northwestern and to the program. Students who plan to apply as sophomores are advised to register for a 200-level calculus/linear algebra sequence such as MATH 290-1,2,3, 291-1,2,3, or ES APPM 252-1,2,3 in their freshman year. Students with less mathematics preparation will be considered for admission but may be required to take all or part of the first-year MMSS math sequence.

Northwestern applicants or current students who wish to be considered for the program may request an application from the MMSS director, Walter Annenberg Hall, Room G26, Evanston, Illinois 60208-2630.

### Major in Mathematics for MMSS Students

MMSS students seeking a sophisticated understanding of mathematics and formal analysis of models are encouraged to pursue a major or minor in mathematics as well as their joint major in MMSS and another social science. To receive a mathematics major, MMSS students must complete MATH 320-1,2,3 or 321-1,2,3 and take 3 quarter-courses chosen from MATH 310-2,3, 330-1,2,3 or 331-1,2,3, 334, 344, 366-1, or 368, in addition to the other required MMSS courses (including MATH 285-1,2,3, 300, 385, and 386-1,2). MMSS students who receive permission to skip MATH 300 must substitute another 300-level mathematics course. Those considering graduate work in mathematics should take 330 or 331.

### Minor in Mathematics for MMSS Students

To receive a minor in mathematics, MMSS students must successfully complete MATH 320-1,2,3 or 321-1,2,3, as well as the other required MMSS courses (including MATH 285-1,2,3, 300, 385, and 386-1,2). MMSS students who receive permission to skip MATH 300 must substitute another 300-level mathematics course.

### Honors in Mathematical Methods in the Social Sciences

MMSS students who write an outstanding senior thesis may be nominated by the faculty to graduate with program honors. A Weinberg College committee awards honors after reviewing recommendations. Typically, more than half of all MMSS students graduate with program honors.

### Courses

#### MMSS 211-1,2,3 Quantitative Social Science for MMSS:

**First Year 1.** Intermediate microeconomics. **2.** Game theory. **3.** Formal models in political science.

**MATH 285-1,2,3 Accelerated Mathematics for MMSS: First Year** See Mathematics.

**MATH 300-0 Foundations of Higher Mathematics** See Mathematics.

#### MMSS 311-1,2 Quantitative Social Science for MMSS:

**Second Year 1.** Advanced microeconomic theory. **2.** Advanced formal models in political science.

**MATH 385-0 Probability Theory for MMSS** See Mathematics.

**MATH 386-1,2 Econometrics for MMSS** See Mathematics.

**MMSS 398-1,2,3 Senior Thesis Seminar**

## MATHEMATICS

Mathematics, often celebrated as the “Queen of the Sciences,” has long been an indispensable tool in the physical sciences, engineering, and commerce. Today it is also used in sophisticated ways in the social sciences and humanities. Students majoring in mathematics have the opportunity to learn about its diverse applications, as well as to acquire an understanding of both the foundations and the frontiers of the discipline.

The department offers a major and a minor in mathematics. The mathematics major is flexible, accommodating students interested in the foundations of the modern mathematical sciences; those primarily interested in the application of mathematics to the biological, social, and behavioral sciences; and those interested in management or engineering.

Students with sufficiently strong preparation who are interested in a more rigorous approach to the subject are encouraged to enter the Mathematical Experience for Northwestern Undergraduates Program (MENU). The department also encourages appropriately prepared students to enroll in its graduate courses.

All majors are encouraged to discuss their programs of study with the director of undergraduate studies as well as their classroom professors.

### Major in Mathematics

*Basic courses:* 220, 224 (or 212, 213, 214), 230, 234, 240 (or 281-1,2,3 or 285-1,2,3 or 290-1,2,3 or 291-1,2,3), or equivalent

*Required courses:* a total of 9 courses offered by the department at the 300 level or above; these must include at least 1 of the complete sequences 310-1,2,3, 320-1,2,3, 321-1,2,3, 330-1,2,3, or 331-1,2,3. In addition, 334 is required of all majors who do not take at least 1 quarter from 320-1,2,3, 321-1,2,3, 330-1,2,3, or 331-1,2,3. With the prior approval of the director of undergraduate studies, as many as 3 of these 9 courses may be at the 300 level or above in other departments that focus on serious applications of mathematics or have substantial mathematical content. This option is especially recommended to those interested in the applications of mathematics to other areas of study.

A course in computer science is often a valuable adjunct to a mathematics major. Students interested in probability and statistics or in becoming actuaries should take 310-1,2,3 and 1 or more courses in statistics (e.g., STAT 350, 351, 352, 355). They should try to include some courses from real analysis (320 or 321), computer science, and areas where probability and statistics are used. Those interested in economics should take 320-1,2,3 or 321-1,2,3, and 310-1,2,3 and as well as ECON 380-1,2 and/

or 381-1,2. Double majors in mathematics and economics should consult the director of undergraduate studies in economics about possible adjustments to their economics requirements.

### Minor in Mathematics

*Basic courses:* 220, 224 (or 212, 213, 214), 230, 234, 240 (or 281-1,2,3 or 285-1,2,3 or 290-1,2,3 or 291-1,2,3), or equivalent

*Required courses:* a total of 6 courses offered by the department at the 300-level or above, including at least 1 2-quarter sequence chosen from 310-1,2, 320-1,2, 321-1,2, 330-1,2, or 331-1,2

To fulfill the sequence requirement, students may ask the director of undergraduate studies for permission to substitute where appropriate 310-2,3, 320-2,3, 321-2,3, 330-2,3, or 331-2,3 or other regularly offered 2-quarter mathematics sequences that provide a focused, in-depth introduction to a subfield of mathematics.

With the prior approval of the director of undergraduate studies, up to 2 of the 6 required courses may be courses with a substantial mathematical component offered by departments other than mathematics. No such course, however, may be simultaneously counted toward the student's major or school requirements.

### MENU Program

The Mathematical Experience for Northwestern Undergraduates Program (MENU) is designed for students who love mathematics and have a solid background in calculus. It is ideal for mathematically talented undergraduates who are considering a major in mathematics, the physical sciences, or economics, but by no means is it limited to them.

MENU offers two parallel, specially designed tracks: one (291/321/331) for students who are particularly skilled in and passionate about pure mathematics, and the second (290/360) for those more interested in applications. Movement between the two tracks is possible in the initial two weeks of the program.

Successful completion of 290/291 fulfills one of the prerequisites for application to the Kellogg School of Management's certificate programs in financial economics and managerial analytics.

Since admission to 290 and 291 is based on results of the CEEB Advanced Placement Examination (preferably the BC exam), high school students with a keen interest in mathematics should take this exam. Students who have a solid grasp of calculus of one variable (including both differentiation and integration) and who have not taken an AP examination are encouraged to speak to the MENU director about enrolling in 290 or 291 instead of 230.

Students who have done very well in 220 and 224 should speak with the MENU director about continuing their study of calculus in MENU. The director of MENU



is available as an adviser for all MENU students, regardless of their major, during their time at Northwestern.

Further information on MENU is available on the mathematics department web site.

### Mathematics Second Major for ISP Students

The Integrated Science Program (ISP) is a highly selective BA program in Weinberg College (see Integrated Science Program). Students majoring in ISP who wish to have a second major in mathematics must also complete 1 of the full-year sequences 320-1,2,3, 321-1,2,3, 330-1,2,3 or 331-1,2,3 in lieu of all major requirements listed above. They may not substitute ISP 398 for any mathematics course in the ISP curriculum. It is recommended but not required that ISP students planning graduate work in mathematics take both a real analysis (320/321) and an algebra (330/331) sequence.

### Mathematics Second Major or Minor for MMSS Students

Students who have completed all the requirements for the MMSS major may complete an additional major or a minor in mathematics. Please see Mathematical Methods in the Social Sciences for information.

### Honors in Mathematics

Majors with outstanding records may be nominated for graduation with departmental honors. They must have completed both 320-1,2,3 (or 321-1,2,3) and 330-1,2,3 (or 331-1,2,3). In exceptional cases, students who have not completed these courses may be considered for honors.

To be nominated for departmental honors, a student must also complete with distinction 2 quarters of independent study or 2 quarters of a graduate course, as well as an acceptable project that culminates in an honors thesis. Finally, the student must have a grade point average of 3.5 or above in courses used to satisfy major requirements. (Basic courses are not used in this computation.)

For more information on honors, consult the director of undergraduate studies and the department's web site. See also Honors under Academic Policies earlier in this section of the catalog.

### The Teaching of Mathematics

Weinberg students majoring in mathematics who wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete the relevant requirements outlined in the SESP section of this catalog. They should contact the Office of Student Affairs in SESP as early as possible in their academic careers.

### Course Recommendations for Entering Students

Students enrolled in the McCormick School, ISP, or MMSS should consult their programs to determine the appropriate beginning mathematics course.

Students who have not taken any calculus normally enroll in 220. Those with particularly weak mathematics backgrounds should consult the director of calculus about the possibility of starting in 212. Students intending to major in a behavioral science other than economics and those from Medill may take 202 and 211 rather than 220/224/230, especially if they are concerned about their math skills. Those who wish only to fulfill the Area II distribution requirement and plan no further study of mathematics also may take 104, 110, or 111.

Students who have taken calculus in secondary school should determine their beginning math course as follows:

- Those who have studied linear algebra or multivariable calculus should consult the director of undergraduate studies.
- Those invited to MENU should take 290 or 291; they may consult the MENU director about which is appropriate.
- Those who have taken a year of calculus with grades of A- or better should consult the MENU director about admission to MENU.
- Those who have taken a year of calculus with grades of B or B+ should enroll in 230.
- Those who have taken a semester of calculus with grades of B or better should enroll in 224.
- Those whose calculus grades were below B should consult the director of calculus.

Substantial portions of the material from 230, 234, 240, 250 are also covered in the sequences 281-1,2,3, 285-1,2,3, 290-1,2,3, 291-1,2,3, and ESAM 252-1,2,3. Those uncertain about the exact equivalencies should consult with the director of undergraduate studies. Students should not attempt to mix and match courses on their own, since they will not be allowed credit for programs that result in excessive duplication of subject matter.

### Courses

Prerequisites for mathematics courses may be waived by the director of undergraduate studies but may not be taken for credit after completion of courses for which they were prerequisites. No 100-level course may be taken for credit after a 200- or higher-level course has been completed. See the course descriptions for other restrictions.

**MATH 104-0 Introduction to Game Theory** Introduction to the mathematical theory of strategic competition; optimal strategies and equilibria; the Prisoner's Dilemma; bargaining and negotiation; strategic voting; applications to economics and political science. For nonscience students seeking a gentle introduction to the subject without the technical details or prerequisites of a more advanced course. Familiarity with high-school mathematics is assumed.

**MATH 110-0 Introduction to Mathematics I** This course explores the beauty and mystery of mathematics through a study of the patterns and properties of the natural

numbers 1, 2, 3, ... . Topics include counting, probability, prime numbers, Euclidean algorithm, and unique factorization. Recommended for students with little mathematical background.

**MATH 111-0 Introduction to Mathematics II** Similar in spirit to 110, with topics chosen from number theory, topology, probability, geometry, cryptology, and algebra. Recommended for students with little mathematical background. 110 is not a prerequisite.

**MATH 202-0 Finite Mathematics** Primarily for the behavioral sciences. Topics chosen from elementary linear algebra and its applications, finite probability, and elementary statistics.

**MATH 211-0 Short Course in Calculus** Elements of differential and integral calculus. Examples drawn from the behavioral and social sciences. Students may not receive credit for both 211 and 220. Not suitable for those planning to major in mathematics, the natural sciences, or economics. Does not prepare for 230. 202 is not a prerequisite.

**MATH 212-0 Single-Variable Calculus I** Review of trigonometric, exponential, logarithmic, and inverse functions and transformation of graphs. Limits, continuity, derivative of a function, product, quotient and chain rule, mean value theorems, Newton's method, linear approximation and differentials, optimization problems. Students may not receive credit for both 212 and 211 or 220. For students with little or no previous exposure to calculus. Prerequisite: consent of department.

**MATH 213-0: Single-Variable Calculus II** Logarithmic differentiation, implicit differentiation, inverse trigonometric functions, related rates. L'Hôpital's Rule, curve sketching. Fundamental theorem of calculus. Techniques of integration, including integration by substitution and by parts, partial fractions, trigonometric substitutions, numerical integration, areas, and volumes. Students may not receive credit for both 213 and 211 or 224. Prerequisite: 212 or consent of department.

**MATH 214-0: Single-Variable Calculus III** Review of trigonometric substitutions and partial fractions. Improper integrals. Applications of integration: computation of arc length and surface area, work, and probability. Sequences and series: the integral and comparison tests, alternating series, power series, ratio test. Taylor's formula and Taylor series. Series solutions of differential equations. Students may not receive credit for both 214 and 224. Prerequisite: 213 or consent of department.

**MATH 220-0 Differential Calculus of One-Variable Functions** Limits, differentiation, linear approximation, optimization, curve sketching, related rates, Newton's method, anti-derivatives. Students may not receive credit for both 220 and 211 or 212.

**MATH 224-0 Integral Calculus of One-Variable Functions** Integrals, techniques of integration, volumes, arc length, work, differential equations, sequences and series, Taylor

polynomials. Prerequisite: 220. Students may not receive credit for both 224 and 213 or 214.

**MATH 230-0 Differential Calculus of Multivariable Functions** Vector algebra, vector functions, partial derivatives, optimization, Lagrange multipliers. Prerequisite: 214 or 224. Students may not receive credit for both 230 and 281-1, 285-2, 290-2, or 291-2.

**MATH 234-0 Multiple Integration and Vector Calculus** Cylindrical and spherical coordinates, double and triple integrals, line and surface integrals. Change of variables in multiple integrals; gradient, divergence, and curl. Theorems of Green, Gauss, and Stokes. Prerequisite: 230. Students may not receive credit for both 234 and 281-1, 285-3, 290-3, or 291-3.

**MATH 240-0 Linear Algebra** Basic concepts of linear algebra. Solutions of systems of linear equations; vectors and matrices; subspaces, linear independence, and bases; determinants; eigenvalues and eigenvectors; other topics and applications as time permits. Prerequisite: 230 or 232. Students may not receive credit for both 240 and 281-3, 285-1, 290-1, or 291-1.

**MATH 250-0 Elementary Differential Equations** Applications of calculus and linear algebra to the solution of ordinary differential equations. Prerequisites: 230 or 232; 240 or concurrent registration in 240 or equivalent. Students may not receive credit for both 250 and 281-2.

**MATH 281-1,2,3 Accelerated Mathematics for ISP: First Year** 1. Multivariable differential calculus, multiple integration and vector calculus. 2. Vector integral calculus, differential equations, infinite series. 3. Linear algebra, differential equations. Open only to students in ISP.

**MATH 285-1,2,3 Accelerated Mathematics for MMSS: First Year** 1. Linear algebra. 2. Continuation of linear algebra; multidimensional calculus. 3. Multivariable calculus. Prerequisite: first-year standing in MMSS.

**MATH 290-1,2,3 MENU: Linear Algebra and Multivariable Calculus** 1. Linear algebra, similar to 240, but in greater depth. 2,3. Multivariable calculus. Similar to 230/234 but in greater depth. Prerequisites: 1 year of calculus (usually in high school) and consent of department. Students may not receive credit for both 240 and 290-1; both 230 and 290-2; or both 234 and 290-3.

**MATH 291-1,2,3 MENU: Accelerated Linear Algebra and Multivariable Calculus** Emphasis on theory and proofs. Designed to prepare students to take 300-level mathematics courses such as 321 and 331 as sophomores. 1. Linear algebra, similar to 240, but in greater depth. Topics include vector spaces, linear functions, linear independence, dimension, determinants. 2,3. Multivariable calculus. Similar to 230 and 234 but in greater depth. Topics include vector calculus, multiple integration, Stokes's theorem. Prerequisites: 1 year of calculus (usually in high school) and consent of department. Students may not receive credit for both 240 and 291-1; both 230 and 291-2; or both 234 and 291-3.

**MATH 300-0 Foundations of Higher Mathematics** Introduction to fundamental mathematical ideas — such as sets,

functions, equivalence relations, and cardinal numbers — and basic techniques of writing proofs. Prerequisite: 240. May not be taken for credit after 320-1, 321-1, 330-1, or 331-1 without prior departmental consent.

**MATH 306-0 Combinatorics and Discrete Mathematics**

Discrete mathematics, inductive reasoning, counting problems, binomial coefficients and Pascal's triangle, Fibonacci numbers, combinatorial probability, divisibility and primes, partitions, and generating functions. Prerequisite: 240 or instructor's consent.

**MATH 308-0 Graph Theory** Introduction to graph theory: graphs, trees, matchings, planar graphs, colorings.

Additional topics as time permits. Prerequisites: 291-1, 300, 306, or equivalent.

**MATH 310-1,2,3 Probability and Stochastic Processes**

**1.** Discrete probability spaces, random variables, expected value, combinatorial problems. Special distributions, independence, and conditional probability. Weak law and central limit theorem. **2.** Convolution, central limit theorem, Markov processes in discrete time, recurrence, and transience. **3.** Markov processes in continuous time, stationary process, second-order process, stochastic differential equations. Students may not receive credit for both 310-1 and 383 or 385. Prerequisites: 234, 240.

**MATH 320-1,2,3 Real Analysis** Rigorous analysis in Euclidean space, beginning with one and proceeding to several variables. Properties of the real numbers, limits and continuity, differentiation and integration, sequences and series, the inverse and implicit function theorems. Applications to Fourier series. Primarily for undergraduates; open to graduate students only with departmental consent. Students may not receive credit for both 320-1 and 321-1 or both 320-2 and 321-2. Prerequisite: 234, 240, 300, or 291-1,2,3 or instructor's consent.

**MATH 321-1,2,3 MENU: Real Analysis** Rigorous analysis in Euclidean space and on metric spaces. Metric space topology, properties of Euclidean spaces, limits and continuity, differentiation and integration, sequences and series, the inverse and implicit function theorems. Lebesgue integration with applications. Faster paced and more abstract than 320-1,2, this sequence covers more topics in more depth and aims at intensive development of students' ability to analyze and create mathematical proofs. Students may not receive credit for both 320-1 and 321-1 or both 320-2 and 321-2. Prerequisite: grade of A- or above in 291 or 334, A in 300, B or above in 331, or consent of department.

**MATH 325-0 Complex Variables for Applications** Complex numbers, functions of a complex variable, theory of analytic functions, series development, analytic continuation, contour integration, conformal mapping. Students may not receive credit for both 325 and 360-3 or ESAM 311-3. Prerequisite: 250.

**MATH 330-1,2,3 Abstract Algebra 1.** Groups and their structure; elementary ring theory; polynomial rings.

**2.** Continuation of ring theory. **3.** Field theory and Galois theory. Prerequisite: 291-1,2,3, 300, or instructor's consent. Students may not receive credit for corresponding quarters of both 330 and 331.

**MATH 331-1,2,3 MENU: Abstract Algebra 1.** Groups and their structure, including the Sylow theorems. **2.** Ring theory; polynomial rings. Module theory, including applications to canonical form theorems of linear algebra. **3.** Field theory; Galois theory. 331 differs from 330 in that it covers more topics in more depth and aims at intensive development of students' ability to analyze and create mathematical proofs. Prerequisite: consent of department. Students may not receive credit for corresponding quarters of both 330 and 331.

**MATH 334-0 Linear Algebra: Second Course** Abstract theory of vector spaces and linear transformations. Complex vector spaces, unitary and Hermitian matrices. Jordan canonical form. Selected applications as time permits. Students who took 330-1 (formerly 337-1) prior to 2004-05 may not also take 334 for credit toward the major without departmental consent.

**MATH 336-1,2 Introduction to the Theory of Numbers**

**1.** Divisibility and primes, congruences, quadratic reciprocity, Diophantine problems. **2.** Additional topics in analytic and algebraic number theory. Prerequisite: 230.

**MATH 340-0 Geometry** Axiomatics for Euclidean geometry. Non-Euclidean geometry. Projective geometry. Introduction of coordinate system from the axioms. Quadrics. Erlangen program. Introduction to plane algebraic curves. Prerequisite: 230, 232, or equivalent.

**MATH 342-0 Introduction to Differential Geometry** Curves and surfaces in three-dimensional space. Prerequisites: 234 and 240 or equivalent.

**MATH 344-0 Introduction to Topology** Point-set topology. Prerequisite: 320-1 or 321-1.

**MATH 351-0 Fourier Analysis and Boundary Value Problems**

Expansion in orthogonal functions with emphasis on Fourier series. Applications to solution of partial differential equations arising in physics and engineering. Students may not receive credit for both 351 and 381 or both 351 and ESAM 311-2. Prerequisite: 250.

**MATH 353-0 Qualitative Differential Equations** Qualitative theory of ordinary differential equations. Linear systems, phase portraits, periodic solutions, stability theory, Lyapunov functions, chaotic differential equations. Prerequisites: 240 and 250 or equivalent.

**MATH 354-1,2 Chaotic Dynamical Systems 1.** Chaotic phenomena in deterministic discrete dynamical systems, primarily through iteration of functions of one variable. **2.** Iteration of functions of two and more variables, including the study of the horseshoe map, attractors, and the Henon map. Complex analytic dynamics, including the study of the Julia set and Mandelbrot set. Prerequisite: 240.

**MATH 360-1,2,3 MENU: Applied Analysis 1.** Linear ordinary differential equations and their applications. **2.** Systems of

linear ordinary differential equations, qualitative analysis of ordinary differential equations, linear partial differential equations, Laplace transform, Fourier series, orthogonal functions, and applications. **3.** Complex analysis. Prerequisite: 290-1,2,3 or 291-1,2,3.

**MATH 364-0 Game Theory** Selected topics in game theory: noncooperative games, matrix games, optimal strategies, cooperative games. Prerequisite: 240.

**MATH 366-1,2 Mathematical Models in Finance** Analytic modeling of financial problems. Theory of Interests. Basic financial concepts (stocks, bonds, options, arbitrage, hedging). Introductory to ordinary and partial differential equations. Random walk and Brownian motion as a tool of modeling fluctuations. Option pricing. The Black-Scholes formula. Method of discrete approximation (finite difference and sampling). Prerequisites: 240 plus any 1 of 310-1, 383, 385, IEMS 202, or ECON 381-1. Some acquaintance with basic differential equations is desirable but not required.

**MATH 368-0 Introduction to Optimization** Mathematical methods and concepts on which continuous nonlinear optimization theory (determining the maxima and minima of a function on an allowable set of points) rests. Topics from unconstrained and constrained optimization, the Kuhn-Tucker theorem on inequality constraints, optimization under convexity, and nonlinear dynamic programming. Prerequisite: 300 or graduate standing. 320-1 or 321-1 is helpful but not required.

**MATH 370-0 Mathematical Logic** Mathematical formulation and rigorous discussion of logical systems, particularly the propositional calculus and the functional calculi of first and second order. Well-formed formulae, formal languages, proofs, tautologies, effective procedures, deduction theorems, axiom schemata. Prerequisite: consent of instructor.

**MATH 374-0 Theory of Computability and Turing Machines** Algorithms, computability, decidability, enumerability; formal replacements and Church's thesis. Turing machines, primitive recursive functions, mu-recursive functions, recursive functions. Undecidability predicates; the undecidability and incompleteness of arithmetics. Prerequisite: consent of instructor.

**MATH 381-0 Fourier Analysis and Boundary Value Problems for ISP** Fourier analysis and boundary value problems. Students may not receive credit for both 351 and 381. Ordinarily taken only by students in ISP; permission required otherwise. Prerequisites: 281-1,2,3; PHYSICS 125-1,2,3.

**MATH 382-0 Complex Analysis and Group Theory for ISP** Complex analysis, elements of group theory. Students may not receive credit for both 325 and 382. Ordinarily taken only by students in ISP; permission required otherwise. Prerequisites: 281-1,2,3; PHYSICS 125-1,2,3.

**MATH 383-0 Probability and Statistics for ISP** Probability and statistics. Ordinarily taken only by students in ISP; permission required otherwise. Students may not receive credit for both 310-1 and 383. Prerequisites: 281-1,2,3; PHYSICS 125-1,2,3.

**MATH 385-0 Probability and Statistics for MMSS** Probability theory and its social science applications. Students may not receive credit for both 310-1 and 385. Prerequisite: second-year standing in MMSS.

**MATH 386-1,2 Econometrics for MMSS** Econometric methods. Prerequisite: second-year standing in MMSS.

**MATH 395-0 Undergraduate Seminar** (1 unit) Topics of modern mathematics and relationships among different branches of mathematics. Open only to superior students by consent of department. May be repeated for credit with change of topic.

**MATH 399-0 Independent Study** Open on approval of department to undergraduates who are qualified to do independent work under the direction of a faculty adviser. Students must file a plan of study with the department before enrollment in 399.

## NEUROBIOLOGY AND PHYSIOLOGY

The Department of Neurobiology and Physiology does not offer an undergraduate degree. See Biological Sciences for a description of that major.

## PHILOSOPHY

Perhaps the most notable feature of the Department of Philosophy is its pluralism — its commitment to exposing students to a broad range of philosophical traditions and issues. With strengths in both Anglo-American and contemporary continental philosophy, the department provides courses in all systematic areas of philosophy as well as a strong array of courses in ancient, medieval, and modern philosophy. The research interests of members of the department show a similar breadth. This pluralism enables students to see philosophy's application to all areas of life and to appreciate the diversity of approaches possible in philosophy.

### Major in Philosophy

Because the study of philosophy involves the critical discussion of the most fundamental questions asked by human beings, it helps develop breadth of understanding and clarity of thought. This character of philosophical inquiry makes a double major attractive to many students. Moreover, with appropriate supporting courses, a philosophy major can be a sound preparation for many careers, whether or not they involve further study.

The core of the program is a firm grounding in the history of philosophy. Against this background, students may tailor a program that meets their particular interests. Full descriptions of the courses offered each quarter are available in the department office two weeks before advance registration.

### Departmental courses (12 units)

Students should complete these required courses, especially 210-1 and 210-3, as early as possible, since

material covered is a prerequisite to more advanced work.

- *Logic*: 150
- *History of philosophy*: 210-1,3; 1 chosen from 210-2, 263, 264; and 1 chosen from 310, 311, 312, 313-1,2
- *Remaining 7 courses*: at least 4 at the 300 level (not including 398), and none at the 100 level

Of the 12 courses required of majors, 1 may be a course offered outside the department that has substantial philosophical content. Course approval must be obtained from the director of undergraduate studies by submitting a petition that includes the course syllabus.

### Minor in Philosophy

The minor in philosophy requires students to be well-grounded in the history of philosophy, especially ancient and early modern, covering the major texts of ethical and political theory as well as the major texts of epistemology and metaphysics. The emphasis on argument and logical structure in philosophy requires familiarity with contemporary logic, at least up to the level of the first-order predicate calculus. Beyond this foundational requirement, students take 4 courses tailored to their individual interests and, typically, to complement work being done in their major. To provide the greatest latitude for this, only 3 of the 4 remaining courses need be at the 300 level.

### Minor course requirements (8 units)

- *4 foundation courses*: 150, 210-1, 210-3, and 263 or 264
- *4 philosophy electives*: no 100-level courses, at least 3 300-level courses (not including 398)

### Honors in Philosophy

To receive honors, a student must have a grade point average of 3.5 or above in the philosophy major and declare candidacy before the spring quarter of the junior year. Declaration of candidacy involves approval of an honors project by a faculty adviser. The candidate then takes 398 in the spring quarter of junior year and in the fall quarter of senior year submits a paper demonstrating an appropriate level of research or reflection. The adviser and another faculty member read the paper. Their comments are submitted to the Committee on Undergraduate Studies, which recommends approved nominations to the Weinberg College Committee on Superior Students and Honors. For more information, consult the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

### Courses Primarily for Freshmen and Sophomores

Students with an informed interest in philosophy, especially those intending to choose philosophy as a major, should begin with 210-1 and 210-3 in their first year.

#### PHIL 109-0 Introductory Seminar in Philosophy

Introduction to philosophy: special topics or a general survey. Offered in small discussion-oriented classes.

**PHIL 110-0 Introduction to Philosophy** Fundamental problems and methods of philosophy.

**PHIL 150-0 Elementary Logic I** Introduction to the formal study of logical implication. Paraphrase of English sentences into logical schemata. Truth-functional logic. Quantifiers, predicates, and relations. Implication and its general properties. Establishing implication. First quarter of 150/250/350 sequence.

**PHIL 210-1,2,3 The History of Philosophy 1.** Ancient philosophy. **2.** Medieval. **3.** Early modern.

**PHIL 216-0 Introduction to Pragmatism** Introduction to classical and contemporary literature in pragmatist philosophy: Peirce, James, Mead, Dewey, and 20th-century neopragmatist authors (Quine, Rorty, Putnam, et al.).

**PHIL 219-0 Introduction to Existentialism** Principal sources of existential philosophy: Kierkegaard, Jaspers, Marcel, Nietzsche, Sartre, Heidegger, Merleau-Ponty, and others.

**PHIL 250-0 Elementary Logic II** Formal systems of deductive inference and their metalogical properties. Formal semantics. Natural deduction. Completeness and compactness; decidable fragments of first-order logic. Lowenheim-Skolem theorems. Second quarter of 150/250/350 sequence. Prerequisite: 150.

#### PHIL 254-0 Scientific Method in the Natural Sciences

Philosophical and methodological issues in the natural sciences, such as the discovery and testing of hypotheses, explanation, theory selection, the nature of scientific laws, causality, space and time, determinism. Prerequisite: 1 course in the natural sciences.

**PHIL 255-0 Theory of Knowledge** Basic philosophical questions about human knowledge, focusing on skepticism and competing theories of knowledge.

**PHIL 260-0 Introduction to Moral Philosophy** Overview of some of the main ideas and most influential writings of moral philosophy.

**PHIL 261-0 Introduction to Political Philosophy** Overview of some of the main ideas and most influential writings of political philosophy.

**PHIL 262-0 Ethical Problems and Public Issues** Analysis of such controversial issues as the death penalty, abortion, euthanasia, sexual morality, economic justice and welfare, pornography and censorship, discrimination and preferential treatment, the environment, and world hunger.

**PHIL 263-0 Classics of Ethical Theory** Classical works of moral philosophy from the ancient through the modern periods. Intended primarily for students who are or may become philosophy majors or minors.

**PHIL 264-0 Classics of Political Theory** Classical works of political philosophy from the ancient through the modern periods. Intended primarily for students who are or may become philosophy majors or minors.

**PHIL 265-0 Introduction to the Philosophy of Law** Ethical and conceptual issues arising in connection with the law, such as the nature of law, the nature of liberty and of justice, and the theory of punishment.



**PHIL 266-0 Philosophy of Religion** Survey of the central issues in the philosophic analysis of religious experience: the existence of God, creation, miracles, the claims of faith versus the claims of reason, sin, free will, and immortality.

**PHIL 267-0 Philosophy, Race, and Racism** Introduction to philosophical discussions of race, race identity, and racism. Readings may be drawn from classical as well as contemporary sources.

**PHIL 268-0 Ethics and the Environment** Topics include our relationship to the environment, the obligation to future generations, pollution and population control, food and energy production and distribution, species diversity, and the preservation of wilderness.

**PHIL 269-0 Bioethics** Ethical analysis of a variety of issues such as the human genome project, genetic therapy, cloning and stem cell transplantation, human and animal research, reproductive technologies, and the allocation of resources.

### Courses Primarily for Juniors and Seniors

**PHIL 310-0 Studies in Ancient Philosophy** Works of one or more important philosophers or movements before A.D. 500. May be repeated for credit with change of topic.

**PHIL 311-0 Studies in Medieval Philosophy** Works of one or more important philosophers or philosophical movements between A.D. 500 and 1500. May be repeated for credit with change of topic.

**PHIL 312-0 Studies in Modern Philosophy** Works of one or more important philosophers or philosophical movements between 1500 and 1800. May be repeated for credit with change of topic.

**PHIL 313-1,2 Kant's *Critique of Pure Reason*** 1. Detailed analysis of Kant's claims to justify human knowledge in *The Critique of Pure Reason*. 2. Detailed analysis of Kant's criticism of traditional metaphysics.

**PHIL 314-0 Studies in German Philosophy** Study of one or more key themes, figures, or historical developments in German philosophy from the 18th century to the present. May be repeated for credit with change of topic.

**PHIL 315-0 Studies in French Philosophy** One or more figures of 20th-century or contemporary French philosophy. May be repeated for credit with change of topic.

**PHIL 316-0 Studies in American Philosophy** Examination of one or more classical texts or contemporary works in American philosophy. Representative authors are Peirce, James, Dewey, Mead, and Quine. May be repeated for credit with change of topic.

**PHIL 317-0 Studies in 19th- and 20th-Century Philosophy** Study of one or more key philosophical themes, figures, or developments of the 19th century, 20th century, or both. May be repeated for credit with change of topic.

**PHIL 318-0 Studies in Contemporary Philosophy** Selected philosophical works of the latter part of the 20th century or the 21st century. May be repeated for credit with change of topic.

**PHIL 319-0 Existentialism and Its Sources** Intensive study

of one or a small number of major contributions to the existentialist tradition.

**PHIL 324-0 Phenomenology** Major works contributing to the phenomenological movement: texts by Husserl, Heidegger, Sartre, and Merleau-Ponty. Questions of methodology, together with problems in theory of knowledge and ontology.

**PHIL 325-0 Philosophy of Mind** Selected topics in the philosophy of mind: mind-body problem, problem of other minds, self-knowledge, personal identity, philosophical psychology. May be repeated for credit with change of topic.

**PHIL 326-0 Philosophy of Medicine** Introduces premed students to ethical problems they are likely to encounter. For example: Is it ever ethical to withhold information from a patient? Should physicians help terminally ill patients commit suicide? Should health care for the elderly be more limited than for children?

**PHIL 327-0 Philosophy of Psychology** Problems such as the nature of psychological explanation, experimentation and the testing of psychological claims, the standing of psychology as a science, reductionism, the unconscious, and conceptualizing the psyche and its processes.

**PHIL 328-0 Classics of Analytic Philosophy** Examination of classic texts that shaped the analytic movement of 20th-century Anglo-American philosophy. Readings from Frege, Russell, Wittgenstein, Carnap, Quine, and others.

**PHIL 330-0 Practical Reasoning and Choice** Explanations for decisions, what it is to decide, possible constraints on decisions, how and why deliberation occurs, how to understand preference reversals and actions taken against one's better judgment.

**PHIL 350-0 Advanced Logic** Metalogical limitations of logical theories. Formal arithmetic. Recursive functions. Arithmetization of syntax. Incompleteness and undecidability. Truth-predicates in first- and second-order logic. The provability predicate. Third quarter of 150/250/350 sequence. Prerequisite: 250.

**PHIL 351-0 Advanced Topics in Philosophical Logic** Methods of modern formal logic applied to traditional philosophical questions, e.g., modal logic, deontic logic, epistemic logic, many-valued logic, tense logic. Prerequisite: 250.

**PHIL 352-0 Philosophy of Mathematics** Nature of mathematical entities and mathematical truth. Platonism, intuitionism, fictionalism, nominalism, the synthetic a priori, self-referential paradoxes, incompleteness and undecidability, consistency, alternative axiomatizations and uniqueness, the relation between mathematics and logic, and mathematical revolutions.

**PHIL 353-0 Philosophy of Language** The nature and uses of language as presenting philosophical problems, e.g., theory of reference, the modes of meaning, definition, metaphor, problems of syntax, and semantics.

**PHIL 354-0 Advanced Topics in the Philosophy of Natural Science** Discovery, conceptual change and the growth of scientific knowledge, explanation, relation of theory to

observation, confirmation theory, space and time, causality, and philosophical implications of relativistic and quantum mechanics. Prerequisite: 250 or consent of instructor.

**PHIL 355-0 Scientific Method in the Social Sciences** Analysis of the philosophical foundations of social inquiry with reference to selected problems, thinkers, and schools, both classical and modern.

**PHIL 358-0 Epistemology** Central problems in the theory of knowledge, emphasizing contemporary developments. A priori knowledge, perception memory, induction, and theories of meaning and truth.

**PHIL 359-0 Studies in Metaphysics** The most general features of reality and their relation to thought and language. Topics may include existence, time, identity, properties, truth, causality, and freedom.

**PHIL 360-0 Topics in Moral Philosophy** Philosophical analysis of recent or contemporary issues, theories, or figures in moral philosophy. May be repeated for credit with change of topic.

**PHIL 361-0 Topics in Social and Political Philosophy** Philosophical analysis of a recent or contemporary issue, individual philosopher, or school of thought in social and political philosophy. May be repeated for credit with change of topic.

**PHIL 362-0 Studies in the History of Ethical and Political Theory** Examination of one or more major figures or movements in the history of moral or political philosophy. May be repeated for credit with change of topic.

**PHIL 363-0 Philosophy of History** Theories of history and historiography, examining issues such as historical memory, the objectivity of interpretation, narrative structures, freedom and causal determinism, teleological purpose, and the social responsibility of the historian.

**PHIL 365-0 Advanced Studies in the Philosophy of Law** Normative and conceptual issues arising in legal contexts.

**PHIL 366-0 Advanced Studies in the Philosophy of Religion** Central problems in the philosophy of religion.

**PHIL 367-0 Studies in African American Philosophy** Study of the work of one or more important African American philosophers or philosophical movements of the 19th or 20th centuries. May be repeated for credit with change of topic.

**PHIL 369-0 Philosophy and Gender** Survey of approaches to sex and gender throughout the history of philosophy.

**PHIL 370-0 Philosophy and Literature** Issues involving the relationship between philosophy and literature.

**PHIL 372-0 Philosophy of Education** Educational theories of representative philosophers as related to their culture and the problems of their times.

**PHIL 380-0 Philosophy of Art** Nature and purpose of art, art and perception, the nature of creativity, and the social responsibility of the artist.

**PHIL 390-0 Special Topics in Philosophy** May be repeated for credit with change of topic.

**PHIL 398-1,2,3 Senior Tutorial** Undergraduate honors thesis. Grade of K given in 398-1 and 398-2. Prerequisite: consent of instructor.

**PHIL 399-0 Independent Study** Open to properly qualified students with consent of instructor.

## PHYSICS AND ASTRONOMY

The physics and astronomy major provides an excellent intellectual foundation for nearly any career. The emphasis on quantitative thinking and mathematical analysis that characterizes physics and astronomy can be applied to business and other nonscience areas. While there is no formal major in astronomy, students may select the astronomy concentration within the physics major.

Majors in physics and astronomy usually take PHYSICS 135-1,2,3 in freshman year. Exceptionally qualified students may take PHYSICS 125-1,2,3 with consent of the department. Depending on their high school preparation, majors normally study mathematics in their freshman and sophomore years, starting with MATH 220, 224, and 230 and continuing with 234, 240, 250, and 351. (See the prerequisites for PHYSICS 135-1,2,3; students taking PHYSICS 125-1,2,3 must be enrolled in either MATH 290-1,2,3 or 281-1,2,3.)

Students in Weinberg College may complete their science distribution requirement by taking any of the following courses: PHYSICS 103, 105, 130-1,2, 135-1,2; ASTRON 101, 102, 103, 111, 120, 130. PHYSICS 103, 105, and the 6 astronomy courses allow students who have taken only high school mathematics to explore important ideas in the physical sciences.

### Major in Physics

The physics major is designed to help students acquire a broad and varied background in physics and related fields. The three basic steps toward completing the physics major are fulfilling prerequisites in introductory physics and calculus; taking a core sequence of courses in classical physics, modern physics, and mathematics; and completing a course concentration.

#### Basic courses (6 units)

- MATH 220 and 224 *or* 212, 213, and 214; plus 230
- PHYSICS 125-1,2,3 or 135-1,2,3

#### Core sequence (9 units)

- MATH 234, 240, and 250 *or* 250 and 290-1,2,3 *or* 281-1,2,3; plus 351
- PHYSICS 330-1, 332, 333-1, 339-1, 359-3

#### Concentrations

Majors must choose one or more of the following areas:

##### *Advanced physics (6 units)*

- PHYSICS 330-2, 333-2, 339-2, 359-1
- 2 other 300-level physics or astronomy courses other than PHYSICS 335, 398, 399 and ASTRON 398, 399

##### *Astronomy (6 units)*

- PHYSICS 330-2, 333-2, 339-2
- ASTRON 220
- 2 other 300-level astronomy classes other than 398, 399

**Biomedical physics (8 units)**

- BME 301, 302, 320, and 2 courses selected from 321, 323, 327
- CHEM 101 and 102 or 171 and 172
- PHYSICS 359-1

**Computational physics (7 units)**

- Prerequisite: knowledge of Fortran, C, or C++
- ES APPM 311-1 or 346
- MATH 310-1
- PHYSICS 252, 359-1
- 3 electives chosen from the following:
  - at least 1 300-level physics or astronomy course other than 335, 398, 399
  - ES APPM 311-2,3, 322
  - EECS 310, 336
  - MATH 310-2,3, 354-1,2, 374
  - STAT 330-1,2

**Materials physics (8 units)**

- CHEM 101 and 102 or 171 and 172
- PHYSICS 337, 339-2
- MAT SCI 316-1,2 plus 2 courses chosen from 332, 355, 360, 361, 380

**Nanoscale physics (6 units)**

- PHYSICS 333-2, 337, 339-2, 358
- 2 electives chosen from the following:
  - PHYSICS 359-1
  - BME 320, 343
  - EECS 389
  - MAT SCI 360, 370, 376
  - MECH ENG 319, 381, 382, 385

Students intending to go to graduate school to continue their study of physics and/or astronomy should also consider taking some or all of the following:

- 2 or 3 units of PHYSICS 398 or 399 undertaken with the supervision of a faculty member and consisting of a research project in the student's area of concentration
- MATH 325, 334
- selected introductory graduate courses such as PHYSICS 412-1,2,3

Students should discuss specific options in this advanced program of study with the director of undergraduate studies before the end of the sophomore year.

**Minor in Physics**

The minor in physics gives students a basic understanding of the most essential concepts in the field. It carries the same prerequisites as the physics major, a somewhat lighter core, and 2 physics electives. Students choosing the minor in physics must also complete the following 6 prerequisites or their equivalent: MATH 220, 224 (or 212, 213, 214), 230 and PHYSICS 125-1,2,3 or 135-1,2,3.

**Minor sequence (8 units)**

- MATH 234, 240, and 250; or 250 and 290-1,2,3; or 281-1,2,3
- PHYSICS 330-1; 333-1; 335 or 339-1
- 2 other 300-level physics or astronomy courses other than 398 or 399

**Physics Second Major for ISP Students**

The Integrated Science Program (ISP) is a highly selective BA program in Weinberg College that includes PHYSICS 125-1,2,3 and 339-1,2 and ASTRON 331 as part of its curriculum. Application to this program is made directly to ISP. It is possible to complete a double major in both ISP and physics by taking 6 additional upper-level courses in physics and astronomy:

- PHYSICS 359-1 or 359-3
- PHYSICS 330-1,2 or physics 333-1,2 and 3 courses chosen from 300-level physics or astronomy courses other than PHYSICS 335, 398, 399 and ASTRON 399

Students pursuing an ISP/physics double major may not substitute ISP 398 for any physics or math course in the ISP curriculum.

**Honors in Physics or Astronomy**

The honors program in physics or astronomy provides outstanding physics or astronomy majors with the opportunity to participate in research under the supervision of a faculty adviser selected by the student. The program culminates in a written report that, in conjunction with the student's academic record, forms the basis for faculty decisions on the award of departmental honors. (Note: Students may participate in research without being in the honors program. Students are welcome to initiate research projects by enrolling in 399 at any point in their undergraduate studies.)

The honors program is administered by the department's Undergraduate Curriculum Committee. This committee consists of the director of undergraduate studies, the assistant chair, and three other faculty members appointed by the chair of the department. The director of undergraduate studies serves as the departmental honors coordinator.

Physics and astronomy majors are eligible to participate in the honors program when they maintain a grade point average of 3.3 or higher overall and in all physics, astronomy, and mathematics courses. These criteria also apply to all classes taken after the student has formally entered the honors program. Students who do not satisfy these requirements at graduation cannot be granted departmental honors.

Students who meet the above criteria and wish to participate in the honors program must notify the director of undergraduate studies. If students have not yet selected an honors research adviser, the director can assist them in finding an appropriate faculty mentor.

Further details on completing the honors program and writing the honors thesis may be obtained from the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

## The Teaching of Physics

Weinberg College students pursuing a major in physics who also wish to be certified for secondary teaching must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

## Advanced Placement

Freshmen who have taken a calculus-level physics course in high school may waive parts of the introductory physics sequence in the following ways:

- A score of 5 on the College Board Advanced Placement Physics C1 examination (Mechanics) and/or the C2 exam (Electricity and Magnetism) will give the student full credit for 135-1 and/or 135-2, respectively.
- A score of 5 on the College Board Advanced Placement Physics B exam (algebra-based physics) will give the student full credit for 130-1 and 130-2.
- A passing score on the departmental placement examinations, given during New Student Week, will allow a student to place out of any or all parts of the 130-1,2,3 or 135-1,2,3 sequences. (No college credit is given for placing out of the courses.)
- Students who have taken college-level physics on the campus of an accredited college while in high school may apply to have the credit transferred to Northwestern. A transcript from the college is needed. "College-level" classes taken at a high school are not eligible for transfer credit.

## Minor in the Study of Evolutionary Processes

The Department of Physics and Astronomy is a contributing department to the interdisciplinary minor in the study of evolutionary processes (MSEP). The minor combines essential components from anthropology, biological sciences, earth and planetary sciences, and physics and astronomy to develop graduates who understand the theoretical and practical aspects of evolution as they apply to modern society, medicine, and technology. More information about the minor can be found on page 67 and at [www.wcas.northwestern.edu/evolution](http://www.wcas.northwestern.edu/evolution).

## Physics Courses

**PHYSICS 103-0 Ideas of Physics** Topics in modern physics. Content varies — for example, relativity, the physics of music, and the progress of physics through history. Requires only high school mathematics and is designed for nonscience majors.

**PHYSICS 105-0 Music, Sound, Timbre** Introduction to the interface of art, technology, and science. MIDI; musical analysis and composition; physical acoustics and psychoacoustics; construction and acoustics of instruments; signal generation, recording, and analysis.

**PHYSICS 125-1,2,3 General Physics for ISP** General physics course relying extensively on calculus. Similar to 135-1,2,3 but more advanced and intended for ISP students. A concurrent advanced calculus course, MATH 281-1,2,3, is offered by the mathematics department. Prerequisite: first-year standing in ISP or consent of the department.

**PHYSICS 130-1,2,3 College Physics** Algebra-based physics primarily for premedical students who do not need to take calculus-based physics. Topics covered are similar to those of 135-1,2,3. Prerequisites: algebra and trigonometry.

**PHYSICS 135-1,2,3 General Physics** Classical physics for science and engineering majors and premedical students.

**1. Mechanics.** Prerequisites: MATH 220, 224; concurrent registration in MATH 230. **2. Electricity and magnetism.** Prerequisite: 135-1. **3. Introduction to modern physics; wave phenomena.** Prerequisite: 135-2.

**PHYSICS 252-0 Introduction to Computational Physics**

Application of computing to physics: Monte Carlo simulation, numerical integration of equations of motion, discrete element methods in electromagnetism. Prerequisite: 135-3.

**PHYSICS 301-0 Radiation in the Environment** In-depth look at radioactivity in the environment, including physical descriptions of radiation and the biological basis for radioactive standards. Nuclear power generation, nuclear waste, techniques for detecting radioactive contamination, and the effects of electromagnetic radiation.

**PHYSICS 330-1,2 Classical Mechanics 1.** Newtonian mechanics, oscillations, the Lagrangian and Hamiltonian formalisms, central-force motion. **2.** Motion in a non-inertial reference frame, kinematics of rigid modes, systems with many degrees of freedom. Prerequisites: 135-1 or equivalent; MATH 234, 240, 250, or equivalent.

**PHYSICS 331-0 Thermodynamics** Equations of state, the three laws of thermodynamics, entropy, phase changes, ideal gas, applications. Prerequisites: 135-1,2,3 or equivalent.

**PHYSICS 332-0 Statistical Mechanics** Ideal gas, Boltzmann distribution, transport phenomena, fluctuation theory, Bose-Einstein and Fermi-Dirac statistics. Prerequisites: 330-1, MATH 234, 240, 250, or equivalent.

**PHYSICS 333-1,2 Advanced Electricity and Magnetism**

**1.** Electrostatics and magnetostatics, multipole expansion, solutions of Laplace's equation, images, analytic functions. **2.** Maxwell's equations, electromagnetic equations, electromagnetic wave propagation and radiation, microwave cavities, diffraction. Prerequisites: 135-1,2,3; MATH 234, 240, 250, or equivalent.

**PHYSICS 335-0 Modern Physics for Nonmajors** Survey of modern physics for nonmajors with a technical

background. Relativity and quantum physics; nuclear, atomic, and molecular structure. Prerequisites: 135-1,2,3 or equivalent. Does not fulfill 300-level requirement for majors.

**PHYSICS 337-0 Introduction to Solid-State Physics**

Electrons in periodic lattices; phonons; electrical, optical, and magnetic properties of metals and semiconductors; superconductivity. Prerequisites: 339-1,2.

**PHYSICS 339-1,2 Quantum Mechanics** Introduction to quantum theory. Applications to atomic and molecular systems. The harmonic oscillator, the one-electron atom, the hydrogen molecule, barrier penetration. Prerequisites: second-year standing in ISP or 330-1, 333-1, MATH 351.

**PHYSICS 339-3 Particle and Nuclear Physics** Nuclei and their constituents; nuclear models; alpha and beta decay; nuclear fission and fusion; the strong, electromagnetic, and weak interactions; and the fundamental particles and particle schemes. Prerequisites: 339-1,2.

**PHYSICS 357-0 Biophotonics Laboratory** Optics/laser lab focusing on optical instruments widely used in medical/biological studies, including optical microscopy, fluorescence spectroscopy, tumor detection in optical scattering, and optical fibers in endoscopes. Prerequisite: consent of instructor.

**PHYSICS 358-0 Nanolithography** Advanced lab involving fabrication of metallic nanometer-scale structures by electron-beam lithography. Characterization of these structures by atomic force microscopy. Prerequisite: 135-1,2,3 or equivalent.

**PHYSICS 359-1,3 Physics Laboratory 1.** Introduction to modern electronics, construction of elementary analog and digital circuits. **3.** Classic experiments in atomic, nuclear, and solid-state physics using modern electronics and microcomputers. Independent work. Prerequisites: 333-1,2 or consent of instructor; 359-1 is not a prerequisite for 359-3.

**PHYSICS 361-0 Classical Optics and Special Relativity**

This course covers advanced topics following from electrodynamics, including advanced classical optics, Fraunhofer and Fresnel diffraction, radiation from accelerated charges, wave guides and/or antennae, and special relativity, including dynamics. Prerequisites: 333-1,2.

**PHYSICS 371-0 Nonlinear Dynamics and Chaos** This course covers advanced topics following from classical mechanics. The focus will be on nonlinear dynamics and chaos theory, though coupled oscillations and continuous systems will also be covered. Prerequisites: 330-1,2.

**PHYSICS 398-0 Honors Independent Study** Individual study under the direction of a faculty member. Open only to advanced students pursuing departmental honors.

**PHYSICS 399-0 Independent Study** Opportunity to study an advanced subject of interest under the individual direction of a faculty member. Open to all advanced students; consent of instructor required.

## Astronomy Courses

All 100-level astronomy courses are specifically designed for students without technical backgrounds and require a mathematics background of only high school algebra.

**ASTRON 101-0 Modern Cosmology** Modern views on the structure of the universe, its past, present, and future. For nonscience majors who seek to follow 120 with a more detailed course.

**ASTRON 102-0 Milky Way Galaxy** Structure of the galaxy, star formation, interstellar clouds and dust, star clusters, neutron stars and black holes, the galactic center. For nonscience majors who seek to follow 120 with a more detailed course.

**ASTRON 103-0 Solar System** The planets and their moons, the sun, comets, asteroids. For nonscience majors who seek to follow 120 with a more detailed course.

**ASTRON 111-0 Introduction to Astrobiology** The modern scientific perspective on the question of life elsewhere in the universe. The prospects for life on Mars. The discovery of extrasolar planets and the search for extrasolar biospheres.

**ASTRON 120-0 Highlights of Astronomy** Acquaints students with modern ideas about the solar system, stars, galaxies, and the universe. Emphasizes fundamental principles and underlying concepts.

**ASTRON 130-0 Imaging in Astronomy** Introduction to the wide range of telescopes used to gather astronomical data and the techniques used to reduce the data. Of relevance to any field that uses extensive data or image analysis. 3 lectures, 1 computer lab.

**ASTRON 220-0 Introduction to Astrophysics** Use of introductory physics (mechanics, electromagnetism, thermodynamics, and modern physics) to cover astrophysical topics starting with the solar system and ending with the large-scale structure of the universe and cosmology. Prerequisites: PHYSICS 135-1,2,3 or equivalent.

**ASTRON 321-0 Observational Astrophysics** Geometric optics applied to design of optical and X-ray telescopes; diffraction and the Airy disk; radio and optical interferometry and aperture synthesis; adaptive optics; recent developments in detector technology; quantum and thermal noise in astronomy. Independent research projects using the CCD camera and 18-inch refractor in Dearborn Observatory. Offered alternate years. Prerequisite: 220.

**ASTRON 325-0 Stellar Astrophysics** Physics of stellar interiors, stellar atmospheres, and star formation. Specific topics include simple stellar models, nuclear energy generation, overview of evolutionary phases, white dwarfs, neutron stars, interstellar gas and dust grains, gravitational collapse. Prerequisite: 220.

**ASTRON 329-0 Extragalactic Astrophysics and Cosmology** Big bang cosmology, thermal history of the universe, primordial nucleosynthesis, microwave background, dark matter, large-scale structure, galaxy formation, spiral and elliptical galaxies, groups and clusters of galaxies. Prerequisite: 220.



**ASTRON 331-0 Astrophysics** Stellar structure and evolution: nucleosynthesis, supernova phenomena, white dwarfs, neutron stars, and black holes. Prerequisite: PHYSICS 339-3. Limited to students enrolled in ISP or with consent of the physics department.

**ASTRON 399-0 Independent Study** Opportunity to study an advanced subject under the individual direction of a faculty member. Open to all advanced students. Consent of instructor required.

## POLITICAL SCIENCE

Political science is the study of political behavior, institutions, and processes at the domestic and international levels. Studying political science helps one understand human behavior, policy making, and the relationships between people, groups, and governments. A background in political science is valuable for future careers in the business sector, the media, public service, and politics in any location.

Northwestern's Department of Political Science is internationally recognized for excellence at both the undergraduate and graduate levels. The department is particularly strong in American politics and government; the politics of foreign countries, especially in Europe, Latin America, Asia, and Africa; law and politics; political economy; international relations; and political theory. Political science faculty are closely associated with the Institute for Policy Research, the Program of African Studies, the Roberta Buffett Center for International and Comparative Studies, and the Gender Studies Program, among others.

### Major in Political Science

The major in political science provides an opportunity for students to learn about politics in a variety of realms and settings. Students generally begin the major with 200-level courses, which provide a general introduction to subfields of political science as well as background for 300-level courses. Majors should choose 200-level courses from at least three of the following subfields of political science: American politics, comparative politics, international politics, and political theory.

When students declare a major in political science, they meet with an adviser in the department to discuss their programs of study. Students planning to major in political science are advised to complete the 200-level prerequisites and at least 1 300-level course in political science by the end of their sophomore year. Majors should complete their methodology requirement by the end of their junior year and before taking the 395 research seminar. Students should plan to take 395 in junior year (and those who plan to pursue honors must do so). Those studying abroad in junior year should take 395 as early as possible in senior year. Up to 3 political science courses and 2 related courses taken abroad may be counted toward the major.

### Major course requirements

#### *Departmental requirements (11 units)*

- *Introductory courses:* 3 courses chosen from 201, 220, 221, 230, 240, 250 (since the introductory courses expose students to a variety of subfields, students may take no more than 2 from the American politics courses 220, 221, and 230 to fulfill this requirement)
- *Methods requirement:* 1 methodology course in political science (introductory methods courses include 310, 311, and 315; students with methods training in other departments may also choose 312 or 316)
- *Advanced courses:* 7 300-level courses in political science, 1 of which must be 395

#### *Related courses (5 units)*

- 5 quarter-courses in African American studies, American studies, anthropology, Asian American studies, economics, gender studies, global health, history, international studies, Latin American and Caribbean studies, legal studies, philosophy, psychology, and sociology, of which at least 3 must be at the 300 level and no more than 1 may be at the 100 level

### Minor in Political Science

The minor in political science offers students the opportunity to acquire a foundation in the discipline as well as significant exposure to advanced courses. Students may choose courses that focus on American politics, comparative politics, international politics, law and politics, political theory, or research methodology, or they may take courses across a variety of areas.

Students may want to choose courses that complement and deepen their major area of study. For example, an economics major may want to focus on political economy courses. A history major might study contemporary politics in an area on which he or she is focusing. A philosophy major may study political theory. Alternatively, students can choose to broaden their knowledge of political science in areas unrelated to their majors. To develop an individual program of study for a minor, students should consult with a member of the departmental undergraduate advising team.

### Minor course requirements (6 units)

- at least 2 200-level courses chosen from 201, 220, 221, 230, 240, 250
- 4 additional political science courses, including at least 3 at the 300 level

### Honors in Political Science

Majors with outstanding overall and departmental records may apply for the political science honors program. Admission is competitive. A departmental and overall grade point average of at least 3.5 is required. Interested students should complete at least 7 of the 11 courses required for the major, including the methodology and research seminar

requirements, before senior year. The application includes a thesis proposal and a letter of recommendation from a Northwestern political science faculty member. It is due in early March of junior year, including from students studying abroad.

Accepted students enroll in the 2-quarter Honors Tutorial (398) in which they write a senior thesis; 398 does not count toward completion of the major. They must maintain a 3.5 GPA. Students interested in pursuing honors in more than one major are encouraged to pursue interdisciplinary honors.

For more information see the honors program link on the departmental web page and Honors under Academic Policies earlier in this section of the catalog.

### Certificate of Achievement in a Foreign Language

Mastery of a foreign language has become increasingly important to understanding politics at home and abroad. To encourage students to become proficient in a foreign language, the Department of Political Science offers a certificate of achievement in a foreign language that may be earned either through course work in political science conducted in a foreign language (2 or more courses, usually completed during study abroad) or through the substantial use of foreign language materials in a thesis or other independent study-type (399) work. Faculty advisers can discuss options with students. The certificate must be approved by the director of undergraduate studies.

### The Teaching of Political Science

Weinberg College students pursuing a major in political science who also wish to be certified for secondary teaching of political science with history must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

Several political science courses have been renumbered. The former numbers are in parentheses in the course listings.

### American Politics Courses

These courses examine the institutions of the U.S. government and their linkages with the public.

**POLI SCI 220-0 American Government and Politics** The structure and process of American politics from competing perspectives. Analysis of representation, voting, interest groups, parties, leadership, and policy-making institutions. The gateway course for the American politics subfield.

**POLI SCI 221-0 Urban Politics** Structure of local and regional political power and its relation to the social and economic structure of community.

**POLI SCI 320-0 The Presidency** Development and operations of the American presidency. Political and constitutional

evolution of the office, the modern executive establishment, and the politics of presidential leadership. Prerequisite: 220 or equivalent.

**POLI SCI 323-0 Public Opinion and Voting Behavior** Who votes and for whom. Social, psychological, economic, and political factors influencing election choices. Sources of opinions. Focus on American presidential elections with some comparative and nonpresidential material. Prerequisite: 220 or equivalent.

**POLI SCI 324-0 Political Parties and Elections** Role of political parties in a democratic society. Topics include nomination, national conventions, political funding, campaigns, party organization, and national, state, and local parties.

**POLI SCI 325-0 Congress and the Legislative Process** Organization of legislatures to make public policy; legislative-executive relations; impact of interest groups and other forms of citizen activity on legislative decision making. Emphasis on the U.S. Congress. Prerequisite: 220 or equivalent.

**POLI SCI 327-0 African American Politics** Survey of black politics in the United States, including antidiscrimination struggles, blacks' relations with government, whites, political parties, public policy, and electoral politics.

**POLI SCI 328-0 (370-0) Public Policy** The role of government in regulating economic and social behavior; theories of public-policy making; sources and effects of public policy.

**POLI SCI 329-0 (371-0) U.S. Environmental Politics** Political problems associated with human impact on natural environment; pollution, natural resources, public lands, land use, energy, and population.

### Comparative Politics Courses

This field analyzes political behavior and institutions in foreign countries and areas of the world. Some courses concentrate on understanding the politics of specific national systems, while others focus on certain types of political phenomena and make cross-national comparisons.

**POLI SCI 250-0 Introduction to Comparative Politics** Emphasis may be on industrialized and/or developing states. Major issues include regime-society relations, political change and conflict, and policy making.

**POLI SCI 352-0 Politics of East Asia** Examines East Asia as a site for studying various concepts in comparative politics: war, revolution, imperialism, modernization, dependency, development, authoritarianism, party politics, and democratization.

**POLI SCI 353-0 Politics in Latin America** Patterns of socioeconomic development and regime forms in Latin America. Interaction of internal and international economic and political structures and processes.

**POLI SCI 354-0 Southeast Asian Politics** Political economy of selected Southeast Asian countries, 1945 to present. Important themes include colonial influence, oligarchy, democratization, and human rights. Background in comparative politics or political economy is recommended.

**POLI SCI 355-0 Chinese Politics** The rise of the Communist Party; contemporary issues facing China, including economic reform, financial policies, and political reform.

**POLI SCI 356-0 United States and Latin America** Interactions between U.S. foreign policy and Latin American politics. The evolving importance of Latin America in U.S. geostrategic objectives since the beginning of the 20th century. How the projection of U.S. power and influence shapes the domestic politics of selected countries.

**POLI SCI 357-0 Politics of Postcolonial States** European colonialism and its political consequences in Latin America, Asia, and Africa. Colonial legacies on long-run development receive special attention.

**POLI SCI 358-0 Nationalism** Social, linguistic, religious, and political bases of the rise of modern nationalism in Europe, Asia, and Africa; wars of national liberation in relation to imperialism and colonialism.

**POLI SCI 359-0 Politics in Africa** Political structures and relation of cultural factors to political stability and change; development of modern political systems.

**POLI SCI 360-0 Comparative Racial Politics** Theories and concepts of race and ethnicity and their relationship to issues of state power, national identity, and social policy. Methods of comparative analysis used to identify and distinguish patterns of racial politics between and within multiracial nation-states.

**POLI SCI 361-0 Democratic Transitions** Theories of the emergence and breakdown of democracy with a focus on cases from Europe, Latin America, Africa, and Asia.

**POLI SCI 362-0 Politics of Western Europe** Impact of historical development on contemporary institutions, political and political-economic institutions, interest groups and parties, policy making, and social and economic policy.

**POLI SCI 367-0 (204-0) Politics and Nature in a Comparative Perspective** The connectedness of people with natural systems. The relationships between processes of urbanization and globalization and struggles over protecting natural systems. Nature and cultural survival. The special role of national parks, biosphere reserves, and other protected areas in struggles over global biodiversity.

**POLI SCI 368-0 (373-0) Political Economy of Less-Developed Countries** Major analytical perspectives of modern political economy seen through concrete problems of development and underdevelopment in the least developed countries.

**POLI SCI 375-0 Comparative Politics of Business-Government Relations** Relations between business and government in a variety of economic, social, and political contexts. Patterns of influence in both business and government. Theories of business influence in politics, such as pluralism, corporatism, collective action, and instrumental and structural Marxism.

### International Politics Courses

This field includes the study of major actors and arenas in the world scene, global processes through which

cooperation and conflict are managed in the international system, and ways in which change occurs and resources become allocated in the global system.

### **POLI SCI 240-0 Introduction to International Relations**

Introduction to the major theories, concepts, and problems of contemporary international relations. Issues in international security, international political economy, and international cooperation.

**POLI SCI 340-0 International Relations Theory** Conceptual approaches to international relations, including “national interest,” sovereignty, international norms and law, and rationality. Prerequisite: 240 or consent of instructor.

**POLI SCI 341-0 International Political Economy** Introduction to the politics of international economic relations. Roots and evolution of the international political economy. Fundamental controversies about international trade, finance, and development Prerequisite: 240 or consent of instructor.

**POLI SCI 342-0 International Organizations** Examines the institutions that arise from and govern the interactions of states, including formal organizations such as the WTO, the UN, the ICJ, and the ICC, and informal regimes such as international intervention, international criminal law, and sovereignty. Prerequisite: 240 or consent of instructor.

**POLI SCI 343-0 International Law** Introduction to politics of international law. Influence of politics on formation and interpretation of international law; influence of international law on international politics. Prerequisite: 240 or equivalent.

**POLI SCI 344-0 (344-2) U.S. Foreign Policy** How U.S. foreign policy is formulated, executed, legitimated, and contested. Topics include 9/11 and its aftermath, covert action, interventionism, trade, U.S. respect for international norms, and U.S. engagement with the Middle East.

**POLI SCI 345-0 National Security** Basic issues in national security, focusing primarily on the United States. Topics include the nature of “national interest,” major actors in national security policy making and military strategy, and the influence and role of the defense establishment.

**POLI SCI 346-0 Politics of European Unification** Development of and prospects for the European Union in geopolitical and historical context.

**POLI SCI 347-0 Ethics in International Relations** Role of ethical considerations in international relations: where and when ethical questions are raised and by whom; causes and predictability of tensions between the ethics and self-interests of nations and political figures.

**POLI SCI 348-0 Globalization** Analysis of changes in the world economy and their implications for politics, economics, and society. Politics of multinational production, finance, and trade in the context of governance problems in a globalizing world. Prerequisite: 240 or equivalent.

### **POLI SCI 349-0 International Environmental Politics**

International cooperation and conflict resolution of global and transnational environmental problems such as climate

change. Role of political, economic, and normative considerations in the formation of politically feasible solutions to international environmental problems.

**POLI SCI 370-0 The Fate of the State in a Globalizing World**

Role states play in world politics and implications for world politics. Origins of the state system and contemporary challenges such as failed states, terrorism, transnational social movements, human rights norms, and humanitarian intervention.

**POLI SCI 372-0 The Middle East in International Politics**

International history and politics of the Arab states, Israel, Iran, and Turkey. Colonialism and nationalism, political Islam and secularism, the Iranian Revolution, the Gulf War of 1991, the U.S.-led occupation of Iraq, relations between Turkey and the European Union. Recommended but not required: 240.

**POLI SCI 374-0 The Politics of Religion in International Relations**

Politics of secularism and religion in global context. History and politics of different forms of secularism, challenges to them, and political consequences for international relations. Recommended but not required: 240.

**POLI SCI 376-0 Internal Wars and the State**

Focus on post-Cold War increase in civil wars, including causes and consequences of internal wars, and theories of conflict. Examines cases of civil wars around the world such as Yugoslavia, Congo, and Iraq.

**POLI SCI 377-0 The Politics of International Intervention**

Analysis of the internal and international politics of humanitarian interventions since the end of the Cold War. Examines evolving norms concerning interventions to protect human rights, including the increasing prevalence of postconflict prosecutions for human rights abuses and crimes of war.

## Law and Politics Courses

These courses study the role of the judiciary at the national, local, and emerging levels of government. They also investigate issues in jurisprudence and the administration of justice.

**POLI SCI 230-0 Introduction to Law in the Political Arena**

Roles of law in society and politics. How disputes are resolved, organization of the bar, why people litigate, the consequences of litigation. Compares common law, civil code, and other legal traditions.

**POLI SCI 330-0 The Politics of Local Justice** Local justice systems, with emphasis on crime and police, trial courts, criminal litigation, sentencing and corrections, and political involvement in these issues.

**POLI SCI 331-0 Politics of the Supreme Court** Operation of appellate courts, with emphasis on the United States Supreme Court. Decision making by appellate courts and the development of public policy. Prerequisite: 220 or 230.

**POLI SCI 332-0 Constitutional Law I** Introduction to interpretation of the United States Constitution by the Supreme Court. Judicial review, federalism, separation of powers, economic and religious liberty, and personal privacy. Prerequisite: 220 or 230.

**POLI SCI 333-0 Constitutional Law II: Civil and Political Rights**

Consideration of decisions of the United States Supreme Court dealing with civil and political rights, including equality, freedom of expression, and criminal procedures. Prerequisite: 220 or 230.

**POLI SCI 339-0 Special Topics in Law and Politics**

Specialized courses focused on specific aspects of law in the United States and elsewhere.

## Political Theory Courses

These courses examine the ideas that inform the thinking of today's citizens, representatives, and political scientists. They are organized by historical periods and conceptual similarity.

**POLI SCI 201-0 (201-1,2) Introduction to Political Theory**

Examination of texts in political theory. Topics vary but often include justice, the Greek polis, the modern state, individualism, representative democracy.

**POLI SCI 301-0 Ancient Political Thought** Political thought of Greece and Rome in historical context and with attention to contemporary theoretical interest.

**POLI SCI 302-0 Modern Political Thought** Consideration of major figures and topics from the Renaissance through the 20th century. Topics include the sources of political power (representation, social contract, revolution, state building), its impact (justice, nationalism, equality, conflict, community-individual relations), and mechanisms of accountability (popular protest, law). No prerequisites, but some knowledge of political theory is desirable.

**POLI SCI 303-0 (301-0) Moral Dilemmas and Political Theory**

Study of moral dilemmas and moral theory from the perspective of political theory. Specific attention to the politics of gender in dilemmas of citizenship, nationality, and abortion in ancient Greek theater, modern philosophy, and contemporary film. No prerequisites, but some knowledge of political theory is desirable.

**POLI SCI 304-0 (302-0) Critics of Modernity** Examination of late 19th- and early 20th-century social and political thought in the works of writers such as Marx, Weber, Mill, Kafka, Darwin, Nietzsche, Freud, and de Beauvoir. No prerequisites, but some knowledge of political theory is desirable.

**POLI SCI 309-0 (303-0) Advanced Topics in Political Theory**

Sustained reflection on one problem (e.g., freedom, republicanism, sexuality) or author (e.g., Plato, Machiavelli, Tocqueville, Arendt). Topics vary. May be repeated for credit with different topics. Prerequisite: 201 or equivalent.

## Research Methodology Courses

Courses in this field prepare students to conduct original research on the causes and consequences of political phenomena. The methodological techniques are often transferable to research problems in government and business.

**POLI SCI 310-0 (310-0 and 311-0) Methods of Political Inference** Methods for inferences based on data in political research. Research design and quantitative and qualitative

methods of inference. Focuses on descriptive, statistical, and causal inference and the application of different methods to substantive problems.

**POLI SCI 311-0 (312-0) Logics of Political Inquiry** Political science as “science.” Identity sources, construction, functions, and validation of social science theory and explanation from varied perspectives.

**POLI SCI 312-0 Statistical Research Methods** Intermediate coverage of statistical methods appropriate for data in political science research, such as multiple regression, logit and probit, estimation and inference with nonindependent or nonidentically distributed sampling, basic time series and panel data methods, and causal inference in statistical models. Prerequisite: 310 or introductory statistics background.

**POLI SCI 315-0 Introduction to Positive Political Theory** Introduction to the rational choice approach to politics focusing on individuals making goal-oriented, purposeful decisions that are aggregated by the institutions through which the individuals interact. Prerequisite: high school algebra.

**POLI SCI 316-0 Special Topics in Methods** In-depth focus on aspects of political methodology not covered in depth in other political science methods courses. A course may focus on applications of statistical modeling in political science, methods of laboratory experimentation, methods of historical research, survey research methods, or critical theory.

### Seminars, Independent Study, and Special Opportunities

**POLI SCI 390-0 Special Topics in Political Science** Designed for investigation of topics that are of current interest to students and faculty and are not covered by other course offerings. May be repeated for credit with consent of department. No prerequisites.

**CFS 393-1,2, CFS 394-1,2, CFS 395-1,2 Chicago Field Studies** See Chicago Field Studies on page 73.

**POLI SCI 395-0 Political Research Seminar** Required of all political science majors and is ordinarily taken during junior year or in the fall quarter of senior year. With consent of the department, students may receive full credit for more than 1 395 seminar provided that 399 and 395 courses together do not exceed a total of 4 course credits.

**POLI SCI 398-1,2 Honors Tutorial** Two consecutive quarters (fall and winter) during which students work on their honors theses. Prerequisite: 395 and admission to the honors program.

**POLI SCI 399-0 Independent Study** Study and research projects carried out under faculty supervision. A written proposal, signed by the professor with whom the student will study, should be submitted to the director of undergraduate studies. Consent of department required.

## PORTUGUESE

See Spanish and Portuguese.

## PSYCHOLOGY

The study of psychology covers a wide range of topics in the natural and social sciences. It provides students a unique opportunity to increase their understanding of themselves and other people as developing individuals, biological organisms, and participants in society. Because of the strong research orientation of the department, it also provides an understanding of how research is done and an opportunity to participate directly in research.

A major in psychology may lead in various directions after graduation. Graduate study may prepare a student for a career as an academic, clinical, industrial, or other kind of psychologist. With course offerings spanning the areas of cognitive science, psychobiology, psychopathology, and social psychology, psychology is also a useful major for students planning careers in medicine, law, or management. Whether or not students continue their education beyond the bachelor's degree, they will find that the psychology major provides knowledge about human behavior and about methods of research and data analysis that is valuable in business, the helping professions, and other occupations.

At the graduate level, the department recognizes several specialties with programs leading to the PhD. Though opportunities for study and research are available to undergraduates in all of these areas, there is only one undergraduate psychology major. Its requirements are designed to give every student a mastery of the basic methods and a balanced exposure to different aspects of psychology. Beyond that, students are encouraged to follow their interests in regular courses and in independent study. Extensive laboratory facilities and research experiences are available.

### Major in Psychology

#### Departmental courses

*Basic course:* 110

*Major courses:* 201, 205, and at least 7 additional psychology courses, including

- at least 1 upper-level research course from 316, 321, 326, 333, 334, 335, 351, 357, 358, 359, 362, 363, 371, 375, 386, 392, 397-2, 398 (any course listed both here and in one of the following two categories may be double-counted toward that category as well)
- at least 2 personality, clinical, and/or social psychology courses chosen from 204, 215, 303, 306, 316, 326, 357, 371, 375, 384, 385, 386
- at least 2 cognitive psychology and/or neuroscience courses chosen from 212, 228, 312-1,2, 321, 324, 333, 334, 335, 358, 361, 362, 363, 364, 365; COG SCI 210, 211
- at least 3 300-level courses

The following restrictions apply:

- Freshman seminars may not be counted toward the requirements.



- No more than 1 quarter of 397-1 and 399 may be counted toward the requirements; a student may not count both courses toward the major.
- No more than 1 quarter of 397-2 may be counted toward the requirements.
- No more than 2 total credits of 397 and 399 may be taken in any quarter.
- No more than 9 total credits of 397, 398, and 399 may be counted toward Weinberg College graduation requirements.

### Related courses

- 2 200-level mathematics courses are required
- 3 additional courses must be chosen from the following: any 200-level mathematics course; any 300-level statistics course; any biological sciences, chemistry, or physics course at any level; ANTHRO 213; COG SCI 207; CSD 202, 301, or 302; EECS 110, 111, 130 or 395 (with department consent, PSYCH 351 may also be counted toward this requirement)

### Minor in Psychology

The minor in psychology reflects the view that the undergraduate study of psychology should combine a methodological core with breadth of content. The minor therefore contains the basic course (110), the 2 central methods courses (201 and 205), and at least 1 course from each of the two main content areas defined for the major.

### Minor course requirements (7 units)

- 110, 201, and 205
- 4 additional psychology courses, including
  - at least 1 personality, clinical, and/or social psychology course from 204, 215, 303, 326
  - at least 1 cognitive psychology and/or neuroscience course from 212, 228, 312-1, 324, 361, 362, 365; COG SCI 210, 211
  - at least 2 300-level psychology department courses
 No more than 1 quarter of 397-1 and 399 may be counted toward the requirements; a student may not count both courses toward the minor.

### Psychology Second Major for ISP Students

The Integrated Science Program is a highly selective BA program within Weinberg College (see Integrated Science Program). Students in ISP who also wish to complete a major in psychology should consult with the program director and the director of undergraduate studies in psychology as early as possible to determine their specific additional major requirements.

### Honors in Psychology

Each spring quarter, juniors with outstanding academic records are encouraged to apply for the honors program for the next academic year. Those accepted enroll in 398

in the fall and carry out a yearlong research project. The honors thesis is a report of the findings of this project. Completion of the project and department approval of the final paper typically lead to departmental honors in psychology. For more information, consult the department web page, [www.wcas.northwestern.edu/psych](http://www.wcas.northwestern.edu/psych). See also Honors under Academic Policies earlier in this section of the catalog.

### Courses

**PSYCH 110-0 Introduction to Psychology** A survey course reviewing primary psychological research and theories of human behavior. Laboratory experience exposes students to psychology as a research science.

**PSYCH 150-0 Advanced Introductory Psychology** Principles of scientific psychology, taught at an advanced level. Topics include the biological foundations of psychology, perception, learning, cognition, emotion, social cognition and social influences, and clinical psychology. Prerequisites: For first-year students who have completed a university-level introductory psychology course or have earned a 4 or 5 on the AP Psychology examination.

**PSYCH 201-0 Statistical Methods in Psychology** Measurement; descriptive statistics; probability and sampling; T-test, ANOVA, correlation, and regression. Prerequisite: 110; some college mathematics recommended.

**PSYCH 204-0 Social Psychology** Psychological processes underlying social behavior; topics include social cognition, attraction, aggression, prejudice, and behavior in groups. Prerequisite: 110.

**PSYCH 205-0 Research Methods in Psychology** Methods of psychological research; experimental design; reliability and validity; review and application of statistics; execution and reporting of psychological research. Prerequisite: 201.

**COG SCI 207-0 Introduction to Cognitive Modeling** See Cognitive Science.

**COG SCI 210-0 Language and the Brain** See Cognitive Science.

**COG SCI 211-0 Learning, Representation, and Reasoning** See Cognitive Science.

**PSYCH 212-0 Introduction to Neuroscience** Brain processes related to memory, perception, and motivation. Dissection, histology, and surgery for brain stimulation. A prior course in biology is strongly recommended.

**PSYCH 215-0 Psychology of Personality** Nature of personality and its development. Modern theoretical interpretations. Biological and social bases of individual differences. Prerequisite: 110.

**PSYCH 218-0 Developmental Psychology** Development of cognitive, social, and other psychological functions. Prerequisite: 110.

**PSYCH 228-0 Cognitive Psychology** Introduction to research into mental processes such as memory, reasoning, problem solving, and decision making. Prerequisite: 110.

**PSYCH 303-0 Psychopathology** Understanding the nature

of psychological, emotional, and behavioral disorders. Emphasis on current evidence regarding causes and characteristics of these disorders. Prerequisite: 110.

**PSYCH 306-0 Introduction to Clinical Psychology** Definition and history of clinical psychology, personality theory in clinical psychology, diagnosis and classification of disorders, assessment, psychotherapy, and ethical issues. Prerequisite: 303.

**PSYCH 312-1,2 Physiological Psychology 1.** Neurophysiology, neuroanatomy, and electrophysiological substrates of behavior. Prerequisites: 110; 1 biological sciences course. **2.** Neuroanatomical, electrophysiological, and biochemical substrates of psychological processes. Prerequisite: 312-1 or equivalent; 205 recommended.

**PSYCH 314-0 Special Topics in Psychology** Topic to be announced. Prerequisites vary. May be repeated for credit with different topic.

**PSYCH 316-0 Experimental Social Psychology** Social psychological research techniques, including laboratory experiments, field experiments, and quasi-experiments. Students conduct original research. Prerequisites: 204, 205.

**PSYCH 321-0 Neuroscience and Behavior Laboratory** Classical exercises in the physiological psychology laboratory, including brain-wave recording and electrophysiology. Prerequisites: 205, 312-2.

**PSYCH 323-0 Deception: Processes and Detection** Multiple perspectives on truth and deception. Exposure to clinical and psychophysiological work on lying, malingering, and styles of deceit. Theories and methods in lie detection. Prerequisite: 110.

**PSYCH 324-0 Perception** Human perception, particularly vision but also hearing, taste, smell, and touch. Biological foundations, development, and disorders of perception. The senses in everyday life. Prerequisite: 110.

**PSYCH 326-0 Social and Personality Development** Research methods, theories, and facts relating to the development and modification of attitudes and behavior. Prerequisites: 205; 204, 215, or 218.

**PSYCH 333-0 Psychology of Thinking** Research methods and recent experimental findings for types of human thinking. Students conduct original research. Prerequisites: 205, 228.

**PSYCH 334-0 Language and Thought** Exposure to original research and theoretical perspectives on language and its relation to thought and behavior. Critical analysis of theories and methods. Topics may vary. Prerequisites: 205; 228 or COG SCI 211.

**PSYCH 335-0 Decision Making** Human decision making from both descriptive and prescriptive perspectives. Theories and models of decision making applied to a variety of contexts. Prerequisites: 205, 228.

**PSYCH 337-0 Human Sexuality** Sexual development and differentiation, deviations, dysfunctions, and controversies in sexuality. Prerequisite: 110.

**PSYCH 339-0 Psychology of Gender** Examination of sex differences and similarities. Evaluation of explanations for

differences. Review of how gender affects achievement, relationships, and mental health. Prerequisite: 110.

**PSYCH 340-0 Psychology and Law** Examines the application of psychology to law, including topics such as the insanity defense, criminal profiling, eyewitness testimony, and interrogation. Prerequisite: 110.

**PSYCH 344-0 Cultural Psychology** Introduction to concepts and empirical methods used to study how culture shapes mind, brain, and behavior over multiple time scales, including over generations and the lifespan and across situational contexts. Prerequisite: 110; at least 1 additional psychology course recommended.

**PSYCH 351-0 Advanced Statistics and Experimental Design** Advanced topics in research design and analysis of data. Focus on both theory and applications. Prerequisites: 205; 2 200-level mathematics courses.

**PSYCH 357-0 Advanced Seminar in Personality, Clinical, or Social Psychology** Discussion and critical analysis of research methods and findings in an area of personality, clinical, and/or social psychology. Topics vary. May be repeated for credit with different topic. Prerequisite: 205; additional prerequisites may apply.

**PSYCH 358-0 Advanced Seminar in Cognition or Neuroscience** Discussion and critical analysis of research methods and findings in an area of cognitive psychology and/or neuroscience. Topics vary. May be repeated for credit with different topic. Prerequisite: 205; additional prerequisites may apply.

**PSYCH 359-0 Advanced Seminar in Psychology** Discussion and critical analysis of research methods and findings in psychology. Interdisciplinary focus, often spanning natural and social science aspects of psychology. Topics vary. May be repeated for credit with different topic. Prerequisite: 205; additional prerequisites may apply.

**PSYCH 361-0 Brain Damage and the Mind** Survey of human cognition as studied via investigations of brain damage and brain-imaging techniques. Prerequisite: 110, 212, or COG SCI 210.

**PSYCH 362-0 Cognitive Development** Development of cognition and perception, including development of memory, concepts, language, and expertise. May focus on one or more age groups. Prerequisites: 205; 218 or 228.

**PSYCH 363-0 Images of Cognition** Study of brain processes underlying cognition. Analysis of brain structure and function. Introduction to imaging techniques including fMRI, PET, and ERP. Prerequisites: 205; a course in cognition and/or neuroscience (e.g., 212, 228, 312-1, 361; COG SCI 210) or consent of instructor.

**PSYCH 364-0 Topics in Cognitive Neuroscience** Topics spanning cognitive, computational, and systems-level neuroscience and cellular approaches to understanding the human mind/brain. Prerequisite: a course in cognition and/or neuroscience (e.g., 212, 228, 312-1, 361; BIOL SCI 306, 326; COG SCI 210; CSD 303) or consent of instructor.

**PSYCH 365-0 The Brain and Cognition** Examines the brain's role in cognitive processing, including perception, spatial

processing, attention, memory, language, reading, and executive functions. Particular attention is paid to learning and development. Prerequisite: 110.

**PSYCH 371-0 Personality Research** Research in personality, with emphasis on experimental approaches and methods. Basic concepts of test reliability and validity. Students conduct original research. Prerequisites: 205, 215.

**PSYCH 375-0 Psychological Tests and Measures** Explores the science of psychological assessment, including its history, test construction and evaluation, and common measures of personality, psychopathology, and ability. Students create and evaluate their own psychological measures. Prerequisites: 205; 204, 215, or 303.

**PSYCH 384-0 Close Relationships** Social-psychological analysis of close relationships, with an emphasis on romantic relationships. Interpersonal processes associated with relationship formation, development, and dissolution. Prerequisite: 204.

**PSYCH 385-0 Psychology of Attitudes** Survey of social psychological research on attitudes; focus on the formation of attitudes, the relationship between attitudes and behavior, and attitude change. Prerequisite: 204.

**PSYCH 386-0 Stereotyping and Prejudice** Analysis of the causes and consequences of stereotyping and prejudice, as well as methods used to study these issues. Students conduct original research. Prerequisites: 204, 205.

#### **PSYCH 392-0 Practicum in Child Development**

Direct contact with children and a site supervisor, under the direction of a faculty member. Weekly seminar. Integration of current developmental research with practicum experience. Prerequisites: 205, 218.

**PSYCH 397-1,2 Advanced Supervised Research** Design, implementation, and reporting of a psychology research project. Prerequisites: 205 and consent of instructor; 397-2 must be taken with the same professor as 397-1.

**PSYCH 398-1,2,3 Undergraduate Honors Seminar** (1-4 units) Senior honors research. Students must apply for admission in the spring quarter of their junior year.

**PSYCH 399-0 Independent Study** Consent of instructor required.

## **RELIGION**

Because religion is a multifaceted phenomenon, the academic study of religion and the religious is a multi-disciplinary field. The undergraduate major in religion is designed to foster an understanding of several major religions through study of their historical development, sacred literature, and social manifestations. The faculty's training and the course offerings concentrate on the traditions of Hinduism, Buddhism, Judaism, Christianity, and Islam, as well as on American and Chinese religions, though courses in other areas are presented occasionally. Study of the interaction of two or more traditions constitutes a regular part of the curriculum and the extracurricular seminars, lectures, and discussions.

The major and minor in religion provide a coherent and balanced set of departmental courses with work on general theories of religion and on Western and Eastern religious traditions. In consultation with the department adviser, students may organize highly individual major programs of study that include courses from this department and other departments in the University. To ensure coherence and balance within the individual programs, students submit their proposed programs for approval to the department's director of undergraduate studies. Majors and minors are permitted to preregister for up to 2 courses per quarter.

### **Major in Religion**

The major consists of 12 courses in the department:

- 170
- 395
- 10 other religion courses, including at least 9 beyond the 100 level and at least 5 at the 300 or 400 level; at least 2 must be in Eastern religions (Hinduism, Buddhism, Chinese religions) and at least 2 in Western or Abrahamic religions (Judaism, Christianity, Islam)

Students may substitute up to 2 courses on religion from outside the department. These must be chosen from ANTHRO 350, HISTORY 270, 371, or 374, PHIL 266, or SOCIOL 314 or approved in advance by the department's director of undergraduate studies.

### **Minor in Religion**

The minor consists of 6 courses in the department:

- 170 (395 may be substituted)
- 5 other religion courses beyond the 100 level, including at least 3 at the 300 or 400 level; of these 5, at least 1 must be in Western or Abrahamic religions (Judaism, Christianity, Islam) and at least 1 in Eastern religions (Hinduism, Buddhism, Chinese religions)

### **Honors in Religion**

Superior students in the department become eligible for departmental honors by writing a senior thesis in addition to completing the 12 courses required for the major. This is usually accomplished by enrolling in 2 quarters of 396 during the fall and winter quarters of their senior year. Students who intend to qualify for honors should notify the undergraduate adviser in writing by the end of the spring quarter of the junior year. For more information, consult the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

### **General Introductory Courses**

#### **RELIGION 170-0 Religion in Human Experience**

Religion as it has appeared in the past and as humans continue to express it in their personal and social lives.

#### **RELIGION 171-0 Varieties of Religious Tradition**

Introduction to a variety of the major religious traditions of the world.

**RELIGION 173-0 Religion, Medicine, and Suffering in the West** Examination of religious healing ceremonies and Christian perspectives on pain and suffering in light of the meaning of physical pain in the everyday lives of men and women.

### American Religion Courses

**RELIGION 260-0 Introduction to Native American Religions**

Diversity and common elements of Native American religious traditions; comparative study of myth, ritual, spiritual philosophy, and practice.

**RELIGION 261-0 American Religion, Ecology, and Culture**

The historical rise of environmentalism in American culture and its impact on religious thought and practice.

**RELIGION 360-0 African American Religions** Exploration of the historical diversity of African American religious experiences and identities.

**RELIGION 361-0 Mystics of the American Wilderness**

Intersections of mysticism, environmental literature, and art in American history.

**RELIGION 362-0 Women, Ecology, and the Sacred** The complex and often problematic relationships among religion, nature, culture, and gender.

**RELIGION 363-0 Women and Religion in America** Introduction to key figures, events, and dynamics in the history of American women and religion.

**RELIGION 369-0 Topics in American Religion** Content varies. May be repeated for credit with change of topic.

### Bible Courses

**RELIGION 220-0 Introduction to the Hebrew Bible** Major genres of Old Testament literature. Basic theological views and the social-political history of ancient Israel.

**RELIGION 221-0 Introduction to the New Testament**

Beginning, development, and content of the New Testament; its Jewish and Hellenistic environment.

**RELIGION 320-0 The Art of Biblical Narrative** Ways in which the religious imagination of ancient Israel expresses itself through literary artistry.

**RELIGION 321-0 Prophecy in Ancient Israel** Historical evolution of Israelite prophecy; ancient Near Eastern parallels; major themes of prophetic thought.

**RELIGION 329-0 Topics in the Bible** Content varies. May be repeated for credit with change of topic.

### Buddhism and East Asian Religions Courses

**RELIGION 210-0 Introduction to Buddhism** The Buddha's life and teachings, traditions that developed from these teachings, and systems of meditation, rituals, and ethics.

**RELIGION 310-1 Buddhist Scripture** Origins, development, and content of Buddhist sacred literature. Prerequisite: 170 or 210.

**RELIGION 311-1 Theravada Buddhism and Culture**

Theravada Buddhism in interaction with its culture.

**RELIGION 312-0 Zen Buddhism** Historical development of Zen Buddhist theory and practice.

**RELIGION 313-0 Tibetan Buddhism** Propagation of Buddhism in Tibet and formation of the major schools of Tibetan Buddhism.

**RELIGION 314-0 Buddhism in the Contemporary World** Buddhism's reinterpretation of its thought and practice in response to postcolonial modernizations.

**RELIGION 315-0 Contemporary Buddhist Philosophy**

Creative interaction of selected Buddhist thinkers with the Western philosophical tradition.

**RELIGION 316-0 Confucianism** Examination of the Confucian tradition as it developed in China between the 6th century B.C.E. and the 16th century C.E.

**RELIGION 318-0 Topics in East Asian Religions** Content varies. May be repeated for credit with change of topic.

**RELIGION 319-0 Topics in Buddhism** Content varies. May be repeated for credit with change of topic.

### Christianity Courses

**RELIGION 240-0 Introduction to Christianity** Doctrine, worship, and institutions in the various branches of Christianity.

**RELIGION 271-0 Theology of Love** The concept of love from theological, historical, philosophical, and biblical perspectives. True love of self, others, and God.

**RELIGION 340-1,2,3 Foundations of Christian Thought**

Survey of the development of Christian thought. **1.** Early or traditional Christianity. **2.** Christian thought from the Reformation to the 18th century. **3.** Christian thought from the 19th through the 21st centuries.

**RELIGION 341-0 Medieval Christianity** Christian thought, institutions, and figures of medieval Christianity, c. 500–1500.

**RELIGION 342-0 Christian Mystical Theology**

Writings of mystics — e.g., Meister Eckhart, Cloud of Unknowing, Julian of Norwich, Teresa of Avila — in their cultural context.

**RELIGION 343-0 Feminist Theology** Content varies — e.g., feminist ethics, feminist theology, and women's spirituality. May be repeated for credit with change of topic.

**RELIGION 344-0 Christian Ethics** Four contemporary moral issues viewed from a variety of Christian approaches. Prerequisite: 170, 221, 240, or 260.

**RELIGION 345-0 The Idea of Sainthood in Christianity**

Historical and contemporary conceptions of sanctity, especially in Roman Catholicism and Eastern Orthodoxy.

**RELIGION 346-0 Church Architecture** Survey of historical and recent churches: spatial dynamics, centering focus, aesthetic impact, and symbolic resonance.

**RELIGION 349-0 Topics in Christianity** Content varies. May be repeated for credit with change of topic.

### Hinduism Courses

**RELIGION 200-0 Introduction to Hinduism** Unity and diversity of Hindu mythology, beliefs, and practices from ancient times to the present.

**RELIGION 301-0 Indian Goddesses** Role and function of goddesses and feminine divinities in Brahmanical and popular Hindu traditions.

**RELIGION 302-0 Yoga and Tantra** Origin and development of ascetic disciplines in the Hindu and heterodox traditions of India.

**RELIGION 309-0 Topics in Hinduism** Content varies. May be repeated for credit with change of topic.

### Islam Courses

**RELIGION 250-0 Introduction to Islam** Principal beliefs and practices of Muslims set against the historic development of the faith.

**RELIGION 350-0 The Qur'an** Islam's sacred scripture and its origins; Muslim understandings of revelation and prophecy.

**RELIGION 351-0 Muhammad, the Jews, and the Origins of Islam** The rise of Islam, including a broad discussion of pre-Islamic Arabia.

**RELIGION 352-0 Biblical Themes in Muslim Tradition** Case studies in religious and cultural borrowing — e.g., the Queen of Sheba's visit to the court of King Solomon.

**RELIGION 353-0 Trends in Islamic Thought** Qur'anic, medieval, and modern approaches to problems in faith and social action.

**RELIGION 354-0 Sufism** The Islamic mystical tradition. Content varies — e.g., Sufism and philosophy, Sufism in Africa. May be repeated for credit with change of topic.

**HISTORY 355-0 Islam in Africa** See History.

**RELIGION 359-0 Topics in Islam** Selected topics in Islamic history and thought. May be repeated for credit with different topic.

### Judaism Courses

**RELIGION 230-0 Introduction to Judaism** Main concepts in the theology of Judaism, main rituals and customs, and main institutions.

**RELIGION 330-0 Varieties in Ancient Judaism** Introduction to the Judaisms that flourished from the fifth century B.C.E. to the third century C.E. Prerequisite: 220, 221, or 230.

**RELIGION 331-0 Classical Jewish Thought** Examination of the forms of expression of Rabbinic Judaism: legal, mystical, philosophical, and poetic.

**RELIGION 332-0 Modern Jewish Thought** How Judaism dealt with modernity and the problems it posed: Spinoza, Mendelssohn, Cohen, Buber, Rosenzweig, and Levinas.

**RELIGION 333-0 Judaism in the Modern World** Radical changes that emancipation and modernity have brought to the religious expression of Judaism.

**RELIGION 334-0 Jewish Ethics** Survey of arguments and interpretations of ethics and morality from rabbinic, medieval, and contemporary sources in Jewish texts and history.

**RELIGION 339-0 Topics in Judaism** Content varies. May be repeated for credit with change of topic.

### Theory and Comparative Studies Courses

**RELIGION 370-0 Religion and Mythology of the Ancient**

**Near East** Myths, religious ideologies, and cultic practices of Sumer, Babylonia, Assyria, and Canaan, including Phoenicia; relation to ancient Greece and Israel, women, and literature.

**RELIGION 371-0 Religion and Film** Content varies — e.g., films of Robert Bresson; Kieslowski's Decalogue; Dreyer and Tarkovsky. May be repeated for credit with change of topic.

**RELIGION 372-0 Asian Religions in Literature and Film** Representations of Hinduism and Buddhism in Indian classical texts, Western literature, and recent Western and Asian films.

**RELIGION 373-0 Religion and Bioethics** Analysis of contemporary dilemmas in medicine and the life sciences; responses to these dilemmas from religious perspectives.

**RELIGION 374-0 Contemporary Religious Thought** Content varies — e.g., convergence between religious paths, science and religion, politics and religion. May be repeated for credit with change of topic.

**RELIGION 375-0 Women in Contemporary World Religions** Women's religious roles, activities, and issues in contemporary Judaism, Christianity, Islam, and Neopaganism.

**RELIGION 379-0 Topics in Comparative Religion** Content varies. May be repeated for credit with change of topic.

**RELIGION 395-0 Theories of Religion** Ways of critically analyzing religious experience and its meaning. Phenomenology of religion, history of religions, comparative religions.

**RELIGION 396-1,2 Senior Seminar** For honors students writing the senior thesis.

**RELIGION 399-0 Independent Study** Reading and conferences on special subjects for advanced students. Consent of instructor required.

### RUSSIAN

See Slavic Languages and Literatures.

### SCIENCE IN HUMAN CULTURE

#### Adjunct Major and Minor in Science in Human Culture

The adjunct major and minor in science in human culture prepare students to confront the impact of science, medicine, and technology on society and on their own lives. The program welcomes science majors and premedical students interested in thinking beyond the problem sets assigned in their specialized courses, as well as students in the humanities who wish to surmount the compartmentalization of knowledge that accompanied the rise of modern science. The adjunct major and minor seek to foster critical thinking about the limits, authority, and impact of science, a mode of understanding that is often said to be the defining feature of modern culture.



For an up-to-date listing of courses and more information about the minor, consult the program web page at [www.shc.northwestern.edu](http://www.shc.northwestern.edu). Questions may be directed to the program director at [shc-program@northwestern.edu](mailto:shc-program@northwestern.edu).

### **Adjunct major course requirements (10 units)**

The science in human culture major is an adjunct major, meaning that students must also fulfill the requirements of another major. In consultation with the program director, students in the adjunct major develop a theme based on their particular interests. They then take 10 courses that match their interests from the partial list below. Students must take at least 2 core courses chosen from HISTORY 275-1,2, 325, 376-1,2, and 377. At least 6 of the 10 courses for the adjunct major must be at the 300 level. Course substitutions may be allowed with the consent of the program director. Up to 2 of the 10 courses may be double-counted toward another major.

### **Adjunct major honors**

To graduate with honors, students must take 9 courses and write a senior thesis of high quality during the 3-quarter sequence 398-1,2,3.

### **Minor course requirements (7 units)**

In consultation with a faculty adviser, students develop a coherent theme that ties together their choice of 7 courses selected from the (partial) list below. Students must take at least 1 300-level seminar. Students applying for the minor in science in human culture must show a minimum of 5 courses not double-counted in any other major(s).

### **Themes and eligible courses**

Some of the themes adopted by students have included medicine and society, technology and social change, science and gender, religion and scientific knowledge, and philosophy of science. For example, students interested in medicine and society might explore the interaction of medical knowledge and practice, medical ethics, and the boundaries between sickness and health. Topics addressed might include the authority of the physician, the role of the hospital, the social dimensions of racial and gender differences, and the changing conception of disease and healing.

Eligible courses include (partial list)

ANTHRO 255, 315, 370

CLASSICS 342

COMM ST 229

ECON 307

GNDP ST 250

HISTORY 275-1,2, 325, 375-1,2, 376-1,2, 377

PHIL 254, 269, 325, 326, 354

POLI SCI 367

RELIGION 373

SOCIOL 312, 319, 355

Other eligible courses are offered periodically and appear in the online quarterly class schedule available from the Office of the Registrar.

### **Course**

#### **SHC 398-1,2,3 Science in Human Culture Senior Seminar**

For students who wish to qualify for honors by writing a senior thesis.

## **SLAVIC LANGUAGES AND LITERATURES**

The Department of Slavic Languages and Literatures offers a full program of study in Russian language and literature and a range of other courses on the languages, culture, and history of Eastern Europe. Russian study encompasses a broad discipline that touches on many others. The rich heritage of Russia includes much that is fundamental to Western culture. For example, Turgenev, Dostoevsky, Tolstoy, and Chekhov probe philosophical, social, political, and psychological issues that are central to the 20th-century experience. Courses in Russian literature open up the artistry and ideas of this intellectual tradition. Russian language study may also serve as an entrée into other Slavic languages; with a foundation in Russian, one can branch off into related Slavic traditions.

Nonmajors as well as prospective specialists are served by the department's courses. Many courses offering a general acquaintance with some facet of Slavic studies have no prerequisite. All periods of Russian literature are represented, with emphasis on the 19th and 20th centuries. Russian language at all levels is taught by Americans and native speakers. Courses on Slavic linguistics are also offered. Northwestern's library is an excellent resource for undergraduate and graduate study in Russian literature.

Students major in Russian language and literature for a variety of reasons. Some want the rigorous intellectual training and the breadth of cultural exposure. Some students are primarily interested in acquiring language skills for use in government service, international law or trade, journalism, or scientific research. Others use the major as a foundation for graduate work in comparative literature, linguistics, history, or political science; a number of students combine the major in Russian with a second major in one of these fields.

Qualified advanced students may spend a fall quarter in Russia through a Northwestern study abroad program. Students should consult the undergraduate adviser in the department or an adviser in the Study Abroad Office to learn more about study abroad options.

## **Major in Slavic Languages and Literatures**

### **Departmental courses**

*Basic courses:* 102-1,2,3 or equivalent

*Electives:* 14 additional courses in Slavic languages and literatures and related fields

*Honors:* 2 additional courses

**Option A: No study abroad**

*Basic electives (7):* 203-1,2,3 and 4 courses chosen from 210-1,2,3; 211-1,2; 255

*Advanced electives (7):* 360 or 361 and 5 other 300- or 400-level Slavic languages and literatures courses; 1 course in a related field chosen with the undergraduate adviser

**Option B: Study in Russia**

*Basic electives (4):* chosen from 210-1,2,3; 211-1,2; 255

*Study abroad:* 4 or more units toward the major

*Advanced electives (6):* 360 or 361 and 5 other 300- or 400-level Slavic languages and literatures courses

**Minor Concentrations in Slavic Languages and Literatures**

The department offers minor concentrations in Central and Southeast European studies, Russian, and Slavic studies.

*Central and Southeast European Studies*

The minor concentration in Central and Southeast European studies prepares students to comprehend and confront the fascinating historical, cultural, linguistic, political, and sociological specificity of Europe's most misunderstood regions. Fostering a comparative and interdisciplinary approach to Central and Southeast Europe, the minor encompasses a wide variety of courses that deal with the lands stretching from Western Europe to Russia, from the Baltic Sea to the Mediterranean.

In consultation with the director of undergraduate studies, students develop a coherent theme that ties together their choice of 7 courses selected from an approved list of courses in history, Slavic languages and literatures, linguistics, political science, sociology, Jewish studies, and comparative literary studies.

**Minor course requirements (7 units)**

- 1 course each in three basic areas: history, culture, and contemporary society and linguistics
- 3 of the 7 courses at the 300 level
- up to 1 course on Russia and up to 3 relevant language courses (e.g., Czech, Polish, Bosnian, Croatian, Serbian)
- approval of course selections by the director of undergraduate studies

*Russian*

The minor concentration in Russian is particularly suitable for students who wish to study the Russian language intensively (possibly for use in such fields as political science, international relations, law, or business) or for the increasing number of students of Russian background at Northwestern who major in other fields but wish to broaden their knowledge of their native language.

*Prerequisites:* completion of two years of college-level language or equivalent as demonstrated by course work such as 102-3 or equivalent

**Minor course requirements (7 units)**

- 203-1,2,3
- 4 courses chosen from 303-1,2,3, 359-1,2, 360, 361

*Slavic Studies*

The minor concentration in Slavic studies offers a broad survey of literature and culture but does not include a sequence of language courses. The 200-level offerings provide a background in literature and culture, and the 300-level courses offer the opportunity to deal with more specific issues.

**Minor course requirements (8 units)**

- 4 200-level courses in Slavic languages and literatures
- 4 300-level courses, at least 2 of them in Slavic languages and literatures; up to 2 may be courses in a related field chosen with consent of the undergraduate adviser (HISTORY 345 is strongly recommended)

**Honors in Slavic Languages and Literatures**

The honors program in Slavic languages and literatures gives outstanding senior majors an opportunity to undertake a research project under the supervision of a faculty adviser. This honors thesis, together with the student's record in Slavic courses, forms the basis for faculty decisions on the award of departmental honors. Most honors candidates research and write the thesis in 2 quarters of 399. Another option is to take a 400-level seminar followed by 399, in which the student pursues a topic arising out of the 400-level course. Students interested in pursuing honors should consult the honors adviser by the end of their junior year. See also Honors under Academic Policies earlier in this section of the catalog.

**Courses in Language and Linguistics**

**SLAVIC 101-1,2,3 Elementary Russian** Russian language and culture. Basic reading, writing, listening, and speaking. Must be taken in sequence. Prerequisite: consent of language director.

**SLAVIC 102-1,2,3 Intermediate Russian** Russian language and culture. Reading, writing, listening, and speaking. Prerequisite: 101-3 or consent of language director.

**SLAVIC 106-1,2,3 Elementary Czech** Czech language and culture. Basic reading, writing, listening, and speaking. Must be taken in sequence. Prerequisite: consent of language director.

**SLAVIC 107-1,2,3 Introduction to Bosnian/Croatian/Montenegrin/Serbian** Basic reading, writing, listening, and speaking. Material presented in both Latin and Cyrillic alphabets. Students gain basic knowledge of similarities and differences among all linguistic varieties. Must be taken in sequence. Prerequisite: consent of language director.

**SLAVIC 108-1,2,3 Elementary Polish** Polish language and culture. Basic reading, writing, listening, and speaking. Prerequisite: consent of language director. Must be taken

in sequence. Prerequisite: consent of language director.

**SLAVIC 203-1,2,3 Russian Language and Culture**

Conversation, listening comprehension, reading, and composition. Contemporary readings on Russian culture and society. Third-year, multiskill course. Prerequisite: 102-3 or consent of language director.

**SLAVIC 206-1,2,3 Intermediate Czech: Language and Culture**

Continuation of 106; reading, writing, listening, and speaking on topics in Czech culture. Must be taken in sequence. Prerequisite: 106-3 or consent of language director.

**SLAVIC 207-1,2,3 Intermediate Bosnian/Croatian/Montenegrin/Serbian: Language and Culture**

Continuation of 107; readings on topics in Bosnian/Croatian/Montenegrin/Serbian culture and society. Reading, writing, listening, and speaking. Must be taken in sequence. Prerequisites: 107-3 or consent of language director.

**SLAVIC 208-1,2,3 Intermediate Polish: Language and Culture**

Continuation of 108; reading on topics in Polish culture and society. Must be taken in sequence. Prerequisite: 108-3 or consent of language director.

**SLAVIC 303-1,2,3 Advanced Russian Language and Culture**

Conversation, listening comprehension, reading, and composition. Topics in advanced grammar. Explore Russian culture and society through reading, video, and film. Third- and fourth-year multiskill course. Prerequisite: 203-3 or consent of language director.

**SLAVIC 304-1,2,3 Russian for Advanced and Native Speakers**

Russian for advanced speakers, including those who grew up in the United States. Stress on advanced levels of reading and writing as well as speaking. Taught entirely in Russian. Content varies; may be repeated for credit. Prerequisite: consent of language director.

**SLAVIC 320-0 Structure of Serbian and Croatian**

Phonological and syntactic structure of Serbian and Croatian. Historical background.

**SLAVIC 340-0 History of the Russian Language** Russian phonology and morphology from Proto-Indo-European to modern Russian. Effects of the changes on the contemporary language.

**SLAVIC 341-0 Structure of Modern Russian** Theories and methods of linguistics as applied to the description of modern Russian. Phonetics, morphology, and other topics.

**SLAVIC 358-1,2 Polish for Advanced and Native Speakers**

Polish for advanced speakers, including those who grew up in the United States. Stress on advanced levels of reading and writing as well as speaking. Taught entirely in Polish. Content varies; may be repeated for credit. Prerequisite: consent of language director.

**Courses with Reading and Discussion in English**

**SLAVIC 210-1,2,3 Introduction to Russian Literature**

Comprehensive overview of the central prose works and literary movements in 19th-century Russia.

**1.** Thematic and formal study of major works by Pushkin,

Gogol, Lermontov, Turgenev. **2.** Tolstoy, Dostoevsky.

**3.** Turgenev, the late Tolstoy, Chekhov, Bunin.

**SLAVIC 211-1,2 20th-Century Russian Literature** Major works in cultural-historical context, from the revolutions of 1917 through the present. Variable content depending on instructor. **1.** Focus on one of the following: Russian modernism in literature, music, film, and visual art; non-conformism in Soviet literature and visual arts (1940s to 1986); and contemporary Russian culture. **2.** Russian literature, film, and visual art in the transition from communism to postcommunism. Writers examined may include Pasternak, Bulgakov, Solzhenitsyn, and Sinyavsky/Tertz.

**SLAVIC 255-0 Early Slavic Civilization** History, literature, and culture of the Slavs (Bulgarians, Macedonians, Serbs, Croats, Russians, Ukrainians, Byelorussians, Poles, Czechs, Slovaks) from antiquity through the 13th century.

**SLAVIC 261-0 Polish Culture in the 20th Century** Study of key developments in Polish history, literature, and thought by way of texts drawn from literature, history, politics, journalism, memoirs, essays, and film. Poland as a microcosm for recent European history and culture.

**SLAVIC 267-0 Czech Culture: Film, Visual Arts, Music**

Cultural legacy of the Czech nation as represented in various media.

**SLAVIC 310-0 Tolstoy** Tolstoy's artistic and intellectual development through his major fiction.

**SLAVIC 311-0 Dostoevsky** Introduction to Dostoevsky's life and works: *Notes from the Underground*, *Crime and Punishment*, *Brothers Karamazov*.

**SLAVIC 313-0 Nabokov** Vladimir Nabokov's major Russian and American prose, from his émigré years (*The Defense*, *The Gift*, and *Invitation to a Beheading*) to his celebrated English-language works (*Lolita*, *Speak Memory*, and *Pale Fire*).

**SLAVIC 314-0 Chekhov** Introduction to the fiction and plays of Anton Chekhov. Examination of Chekhov's writing in its Russian cultural context and his influence on English-language drama, fiction, and film.

**SLAVIC 318-0 19th-Century Russian Comedy and Satire**

The nature of comedy, the types of satire, and the functions of laughter in the works of Gogol and Chekhov.

**SLAVIC 319-0 The Philosophical Story** Examines a key form of Russian and East European fiction, the story about abstract philosophical issues; its role in general philosophical debates, how it works as literature, philosophical issues it raises.

**SLAVIC 350-0 Folklore, Music, Poetry** Traditional folk and religious folklore and poetry: from Biblical and Greek origins through East Slavic, Russian, and Western European works. Forms, literary and political implications, Russian and Western European poetic and rhythmic interrelations.

**SLAVIC 367-1,2 Russian Film** Development of Russian film and film theory from the silent era to the 1980s.

**1.** Golden Age of Russian cinema (Eisenstein, Pudovkin, Vertov, Protazanov, Vasiliev brothers, Dovzhenko,

socialist realism). **2.** Russian film since World War II (more socialist realism, neorealism, Tarkovsky, Mikhalkov, Paradjanov, Abuladze; criticism and semiotic theory).

**SLAVIC 368-0 Andrei Tarkovsky's Aesthetics and World**

**Cinema** Major films of Tarkovsky and of Russian and non-Russian directors whose work is related to his (Eisenstein, Wenders, Bergman, Kurosawa).

**SLAVIC 369-0 20th-Century Russian Drama and Theater**

Modernist dramatic and theatrical traditions of Russia from the rise of the Moscow Art Theater to the advent of Socialist Realism. Dramas by Chekhov, Blok, Khlebnikov, Mayakovsky; productions of Stanislavsky, Diaghilev, Meierkhold; design innovations of Tatlin, Malevich, Exter.

**SLAVIC 372-0 Introduction to Eastern European Jewish**

**Culture** Cultural heritage of Russian and Eastern European Jewish communities from the 18th to 20th centuries. Works of Sholom Aleichem and Isaac Bashevis Singer; relations of Jewish culture to surrounding European cultures.

**SLAVIC 375-0 Eastern European Literature of the Holocaust**

Novels, short stories, and memoirs by Eastern Europeans who experienced the Nazi occupation or were marked by its aftermath; problems of identity, memory, genre.

**SLAVIC 377-0 Theory and Practice of Literary Translation**

Theoretical and practical problems of literary and cultural translation. Prerequisites: 300-level proficiency in a Romance, Germanic, or Slavic language; consent of instructor.

**SLAVIC 378-1,2 Visual Art in the Context of Russian Culture**

Introduction to the history of Russian art: survey of major trends in Russian visual art in the dual contexts of Russian culture and European visual art. Focus on interconnections among visual arts, literature, and political history.

**1.** Russian art from the medieval period to the beginning of the 20th century. **2.** Russian art of the 20th century.

**SLAVIC 390-0 Literature and Politics in Russia** More than in any other European tradition, Russian literature has played a central role in defining the nation's political agenda. The interaction of literature with Russian cultural and political history.

**SLAVIC 391-0 The Rise and Fall of Yugoslavia**

Yugoslavia from origins as a dream to existence as a multinational state and collapse in the late 1980s; nationalism, inter-relationship of politics and culture; readings from historians, cultural critics, and literary works.

**SLAVIC 392-0 Contemporary East European Literature** Post-World War II literature of the Czech Republic, Hungary, Poland, Romania, and the former Yugoslavia; national identity, dissidence, and literary postmodernism.

**Courses in Literature with Prerequisite in Russian**

Unless otherwise indicated, the prerequisite for 300-level courses is 203-3, 303-3, or equivalent.

**SLAVIC 359-1,2 Russian Prose** Selected works of Russian masters. **1.** 19th century. **2.** 20th century. Content varies;

may be repeated for credit. Prerequisite: consent of instructor.

**SLAVIC 360-0 Survey of 19th-Century Russian Poetry**

Introduction to the wealth of Russian 19th-century lyric poetry and basic techniques for its study: Pushkin, Baratynsky, Lermontov, Tyutchev, Fet. Prerequisite: consent of instructor.

**SLAVIC 361-0 Survey of 20th-Century Russian Poetry**

Introduction to the major currents of Russian 20th-century lyric poetry and basic techniques for its study: Tsvetaeva, Mayakovsky, Khlebnikov, Blok, Akhmatova, Mandelshtam, Pasternak, Brodsky. Prerequisite: consent of instructor.

**SLAVIC 398-0 Senior Honors Seminar** Topics vary yearly.

**SLAVIC 399-0 Independent Study** For majors selected as candidates for departmental honors; for other advanced students with consent of instructor.

## SOCIOLOGY

The Department of Sociology offers preparation for students who want to pursue careers in social research, social policy applications, and teaching. It provides an excellent background for all professions involved in the major structures of modern society, such as business, public administration, law, medicine, journalism, and planning. The department also emphasizes the sociological perspective as a fundamental part of a liberal education and a discipline for developing a humane understanding of the world.

The department is particularly strong in the areas of urban studies, comparative historical sociology, the sociology of art and culture, deviance and social control, organizations, economic sociology, and the sociology of law, education, and science. The department offers a wide variety of approaches to fundamental issues of social inequality, its origins and consequences, including class and economic domination, race, ethnicity, and gender. Unusually good opportunities are available for independent study, field internships, and the use of qualitative historical and comparative methods of research. In addition to the courses listed below, the department offers quarterly seminars on special topics of interest.

### Major in Sociology

**Departmental courses:** 1 sociology course at the 100 or 200 level (except 226) and 9 additional courses, distributed as follows:

- 3 courses in methods of social research: 226, 303, 329 (226 should be taken by the sophomore year; 303 and 329 in the junior year)
- 306 (junior or senior year)
- 398-1,2 (fall and winter quarters of the senior year)
- 4 additional 300-level sociology courses; only 1 unit each of 376 and 399

One Chicago Field Studies internship course (CFS 393-1,2) may be substituted for 329 and another for 1 of the 4 additional 300-level courses.

In certain cases, students who are combining a major in sociology with a major in another field that also requires a senior research seminar may arrange to fulfill their seminar requirement in a combined project.

**Related courses:** 4 300-level courses in African American studies, anthropology, economics, history, linguistics, philosophy, political science, psychology, or gender studies selected with the approval of the adviser

### Minor Concentrations in Sociology

The Department of Sociology offers minor concentrations in sociological research and in sociological studies. Students seeking a minor in sociology must consult with the director of undergraduate studies.

#### *Sociological Research*

The minor concentration in sociological research prepares students to carry out their own research by offering an introduction to the discipline, followed by an array of courses in quantitative and qualitative methods. Students learn about the gathering and preparation of data for analysis as well as a variety of techniques and methods for presenting information, arguments, and conclusions; 2 300-level courses allow students to see how these methods are used in practice.

#### Minor course requirements (6 units)

- 110 or a 200-level sociology course
- 226
- 303 or equivalent
- 329
- 2 300-level sociology courses approved by the director of undergraduate studies

Although they may be taken more than once, only 1 credit may be counted toward the minor for 376 and 399.

One Chicago Field Studies internship course (CFS 393-1,2) may be substituted for 329 and another for 1 of the 2 additional 300-level courses.

#### *Sociological Studies*

The minor in sociological studies introduces basic information about the social world and provides the rudimentary tools to understand it. It prepares students to compare, evaluate, and critically analyze information about various institutions, processes of stratification, and social change.

#### Minor course requirements (7 units)

- 110 or a 200-level sociology course
- 226
- 5 300-level sociology courses approved by the director of undergraduate studies

Although they may be taken more than once, only 1 credit may be counted toward the minor for 376 and 399.

One Chicago Field Studies internship course (CFS 393-1,2) may be substituted for 329 and another for 1 of the 5 additional 300-level courses.

### Four-Year BA/MA

In rare instances, superior students may petition the department to complete BA and MA degrees in the normal four-year period required for the BA. Only unusually gifted and motivated students are accepted into this rigorous program. Interested students should consult with the undergraduate advisers early in their academic careers. See Accelerated Master's Programs in the Undergraduate Education section of this catalog.

### Honors in Sociology

Students who complete all requirements for the major; maintain an overall grade point average of 3.3 or above and an average of 3.3 or above in their major courses; and complete an outstanding senior research project in 398-1,2 or its equivalent will be nominated for honors in sociology to the College Committee on Superior Students and Honors, which has final authority to grant the honors degree. For more information, consult the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

### The Teaching of Sociology

Weinberg College students pursuing a major in sociology who also wish to be certified for secondary teaching of sociology with history must be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP at the earliest opportunity.

### Courses

**SOCIOL 110-0 Introduction to Sociology** Essential characteristics of group life. Interrelations of society, culture, and personality. Basic institutions and processes.

**SOCIOL 201-0 Social Inequality: Race, Class, and Power** Origins and functions of stratification. Class, prestige, and esteem. Interaction of racial and cultural groups in various settings. Black-white relationships in the United States.

**SOCIOL 202-0 Social Problems: Norms and Deviance**

How issues emerge. Rules, rule enforcers, rule breakers; advocates, opponents, and victims of problems. Blame, help, and entitlement. Current problems and systemic contradictions.

**SOCIOL 203-0 Revolutions and Social Change** Causes and outcomes of large-scale social change. Role of violence and revolution in the development of the modern world.

**SOCIOL 204-0 Social Interaction: The Individual and**

**Society** Development of individual attitudes and behavior patterns through social interaction. Relation to students' everyday lives and problems.

**SOCIOL 205-0 American Society** How American society works as a whole. How major institutions relate and affect each other and how the different segments and strata of society experience such institutional processes. Tensions



associated with differential experience of common and shared institutions.

**SOCIOL 206-0 Law and Society** Introduction to the role of law in American society. Relationship of law, inequality, and social change. Patterns of change in major legal institutions: the courts, the legal profession, and legal services for the poor.

**SOCIOL 207-0 Problems of Cities** Problems of American urban communities and possible solutions. Spatial, economic, and political trends; private and public decision making; class, race, and family needs. Consequences for adequate public services.

**SOCIOL 215-0 Economy and Society** Introduction to sociological approaches to economic life. Topics include property rights, illegal markets, money, economic inequalities, direct sales, and boycotts.

**SOCIOL 216-0 Gender and Society** Social determination of gender-appropriate behavior. Origins, values, and effects of sex-role stereotypes. How stereotypes fit social reality. Socialization (childhood and adult), values, economic opportunities in the United States, now and in the past.

**SOCIOL 226-0 Sociological Analysis** Logic and methods of social research, qualitative and quantitative analysis of social data, and ethical, political, and policy issues in social research. Foundation for further work in social research.

**SOCIOL 276-0 Sport in American Society** Interrelationships between sport and social institutions; the nature of American society; capitalism and inequality in sports.

**SOCIOL 301-0 The City: Urbanization and Urbanism** Theories of urbanization, housing, jobs, race and class, segregation, social networks, politics, and reform policies. Research projects. Prerequisite: 110 or 207.

**SOCIOL 302-0 Sociology of Organizations** Structure and function of formal organizations, especially in business and government. Stratification, social control, and conflict. Discretion, rules, and information in achieving goals. Modes of participation. Development of informal norms. Prerequisite: 100- or 200-level course.

**SOCIOL 303-0 Analysis and Interpretation of Social Data** Introduction to quantitative methods: the interpretation of descriptive statistics, relationships between variables, and the logic of inferential statistics. Prerequisite: 226 or consent of instructor.

**SOCIOL 305-0 Demography and Population Problems** Social causes and consequences of population dynamics (fertility, mortality, marriage, divorce, migration) and population structures (age, sex, size, density). Possible roles of population changes in environmental and economic development problems. Prerequisite: 100- or 200-level course.

**SOCIOL 306-0 Sociological Theory** Sociological perspective as developed by classic theorists. Elucidation and testing of sociological principles in contemporary research. Primarily for sociology majors. Open to others with consent of instructor. Prerequisite: 226.

**SOCIOL 307-0 School and Society** Reciprocal influences

between formal institutions of education and the broader society from different theoretical perspectives. Internal organization of schools. Relationship of inequality to problems of contemporary urban education. Prerequisite: 100- or 200-level course.

**SOCIOL 308-0 Sociology of Deviance and Crime** The social organization of crime and other misdeeds, explanations of crime and deviance, creating criminal law, policing, detection and investigation, prosecution, plea bargaining, the courts, sentencing, punishment, prisons, and alternatives to criminal law. Prerequisite: 110 or 202.

**SOCIOL 309-0 Political Sociology** Selected topics in political economy and sociology: revolutions, the development of the modern state, third world development, international conflict. Prerequisite: 100- or 200-level course.

**SOCIOL 310-0 The Family and Social Learning** Influence of socioeconomic and other structural and cultural resources and constraints on family structure and dynamics. Historical and comparative perspectives on the modern family. Prerequisite: 100- or 200-level course.

**SOCIOL 312-0 Social Basis of Environmental Change** The role of production structures and other social institutions on pollution and depletion. Social support for and resistance to environmental protection policies. Inequalities in use of resources and incidence of environmental hazards. Prerequisite: 100- or 200-level course.

**SOCIOL 314-0 Sociology of Religion and Ideology** Belief systems in society. Production of ideas. Religion, art, science, political ideology, and folk-knowledge as social products. Prerequisite: 100- or 200-level course.

**SOCIOL 315-0 Industrialism and Industrialization** Structure and culture of modern industry; consequences for status and class organization. Labor force, formal and informal organization of management and labor. Union-management interaction. Factors affecting industrial morale. Prerequisite: 100- or 200-level course.

**SOCIOL 316-0 Economic Sociology** Sociological approach to production, distribution, consumption, and markets. Classic and contemporary approaches to the economy compared across social science disciplines. Prerequisite: 215 or ECON 202 or equivalent.

**SOCIOL 318-0 Sociology of Law** Sociological analysis of legal institutions such as courts, the police, and lawyers. Law, inequality, and social change. Prerequisite: 110 or 206.

**SOCIOL 319-0 Sociology of Science** Science as a social system. Personality, social class, and cultural factors in scientific development, creativity, choice of role, simultaneous invention, and priority disputes. Social effects on objectivity and bias.

**SOCIOL 321-0 Armed Forces and Society** Contemporary military institutions and sociological theory. Dynamics of combat, peacekeeping, race relations, gender, and other social issues. Prerequisite: 100- or 200-level course.

**SOCIOL 323-0 American Subcultures and Ethnic Groups** Differentiation, organization, and stratification by

ethnicity, race, lifestyle, and other traits. Maintenance of subgroup boundaries and distinctiveness. Consequences of difference: identity, political and economic participation, group solidarity. Prerequisite: 100- or 200-level course.

**SOCIOL 325-0 Sociology of Inequality** Bases of social stratification. Effects on life conditions and social organization. Theoretical, methodological, and empirical dimensions. Emphasis on advanced industrial societies. Prerequisite: 226.

**SOCIOL 327-0 Youth and Society** How young people interact with families, schools, peers, neighborhoods, and workplaces, influencing them and being influenced by them. Prerequisite: 100- or 200-level course.

**SOCIOL 329-0 Field Research and Methods of Data Collection** Practicum in firsthand data collection using observation and structured and unstructured interviewing. Issues of reliability and validity and qualitative analysis. Prerequisite: 226.

**SOCIOL 331-0 Markets, Hierarchies, and Democracies** The forms and social structures for making economic decisions in modern societies. Prerequisite: 100- or 200-level course.

**SOCIOL 332-0 Work and Occupation in Modern Industrialized Societies** Sociological perspectives on work. Students view their own occupational futures in the context of the changing social relations of production. Prerequisite: 100- or 200-level course.

**SOCIOL 333-0 Law, Norms, and Power** How laws and informal social rules are related to the exercise of power by some people over others. Prerequisite: 100- or 200-level course.

**SOCIOL 335-0 Sociology of Rational Decision Making** Analysis of the role played by numerical and quantitative information in organizational decision making in the private and public sectors. Prerequisites: 215 and 302 or ECON 202 or consent of instructor.

**SOCIOL 345-0 Class and Culture** The role that culture plays in the formation and reproduction of social classes. Class socialization, culture and class boundaries, class identities and class consciousness, culture and class action. Prerequisite: 100- or 200-level course.

**SOCIOL 347-0 Sociology of Time and Space** Social construction of time and space. Standardization of time, maps as ideological documents, capitalist time and space, personal and social spaces and memories. Prerequisite: 100- or 200-level course.

**SOCIOL 350-0 Sociology of the Arts** Art as collective activity. Conventions in art and aesthetics. Professionals and audiences and other aspects of culture. Prerequisite: 100- or 200-level course.

**SOCIOL 355-0 Medical Sociology** Social construction of health and illness; inequalities in distribution of illness and health care; organization of health care work and occupations. Prerequisite: 100- or 200-level course.

**SOCIOL 356-0 Sociology of Gender** Gender and issues of social reproduction and social change with sexuality and reproduction emphasized. Prerequisite: 216 or 226.

**SOCIOL 376-0 Topics in Sociological Analysis** Advanced work on special topics in sociological study.

**SOCIOL 380-7 Junior Year Tutorial** Small seminar group in conjunction with various scheduled 300-level classes.

**CFS 393-1,2 Field Studies in the Modern Workplace** See Chicago Field Studies for a description.

**SOCIOL 398-1,2 Senior Research Seminar** Independent research projects carried out under faculty supervision. Prerequisite: 303, 329, or equivalent.

**SOCIOL 399-0 Independent Study** (1–2 units) Open with consent of department. Students may reenroll for consecutive quarters.

## SOUND DESIGN

Please see Sound Design in the Cross-School Programs section of this catalog.

## SPANISH AND PORTUGUESE

The Department of Spanish and Portuguese offers courses in language, literature, and culture that speak to a variety of interests, whether focused on Latin America, Spain, or some aspect of literature, language, or culture that cuts across geographic divides. Instruction in most courses is in Spanish, and the development of fluency in reading, speaking, and writing the language is an important goal of courses at all levels. The major and minor programs offered in Spanish and Portuguese are flexible and depend on students' initiative in pursuing particular interests within a framework of simple rules. Each student's major or minor program is subject to the approval of an adviser. Students who study Spanish are also encouraged to study Portuguese.

The Department of Spanish and Portuguese encourages all its students to study abroad, whether in the programs in Spain approved by Northwestern, the programs in Mexico, Argentina, or Chile sponsored by Cooperative Programs in the Americas (COPA), the summer programs at the Universidad de Guanajuato in Mexico, or other programs approved by the University's Study Abroad Office.

### *Spanish*

#### Major in Spanish

The major in Spanish requires 15 courses taught in Spanish (with exceptions noted below). Each student, in consultation with an adviser, designs a program built around a concentration and representing a coherent pattern of study. Students may choose to concentrate on the literatures and cultures of Latin America, the literatures and cultures of Spain, or an appropriate combination of both. Many students fulfill some of the requirements for the major through courses taken abroad.

*Prerequisite:* SPANISH 199, an AP score of 5, or a passing score on the oral section of the Spanish Language Placement Exam.

**Major course requirements (15)**

- 201 or 202 (heritage speakers of Spanish must take an appropriate substitute course)
- 203 (heritage speakers may take 207 as a substitute)
- 204
- 220
- 3 courses chosen from 250, 251, 260, 261
- 6 300-level courses in the department that form an area of concentration, including at least 1 course that deals with a period earlier than 1800
- 2 elective courses at the 200 or 300 level taken in the department, in another department at Northwestern, or in study abroad programs, on condition that these courses be related to the historical, literary, and/or cultural existence of Hispanic countries (courses taken outside the department must be preapproved by an adviser)

A 300-level COMP LIT course that includes an important component of Latin American and/or Spanish literature and is taught by a member of the Department of Spanish and Portuguese may be substituted for a 300-level course requirement (adviser approval is required to ensure nonduplication of courses).

A study abroad course taught in Spanish on any topic related to the historical and/or cultural existence of a Hispanic country may be substituted for 201, 202, or 301, if the course for which it is substituted has not already been taken.

**Minor in Spanish**

The minor in Spanish is primarily designed to enable students to achieve advanced competence in oral and written Spanish. It also offers the opportunity to explore the literatures and cultures of Latin America and Spain.

*Prerequisite:* SPANISH 199, an AP score of 5, or a passing score on the oral section of the Spanish Language Placement Exam.

*Minor course requirements (8):* 8 courses at or above the 200 level, including at least 2 at the 300 level. Heritage speakers of Spanish must substitute other courses for 201 or 202; 203 may be replaced by 207.

**Honors in Spanish**

The honors program in Spanish gives outstanding senior majors the opportunity to design and carry out a research project on the languages and literatures of Latin America and/or Spain under the close supervision of an adviser. The award of honors is made by a Weinberg College committee on the recommendation of the department. Students who desire more information about honors should check the department's web site and contact a faculty adviser.

**The Teaching of Spanish**

Weinberg College students pursuing a major in Spanish who also wish to be certified for secondary teaching must

be admitted to the Secondary Teaching Program in the School of Education and Social Policy and complete all requirements as outlined in the SESP section of this catalog. Students are urged to contact the Office of Student Affairs in SESP as early as possible in their academic careers.

**Spanish Language Courses**

**SPANISH 101-1,2,3 Elementary Spanish** For students who have studied Spanish less than one year. Communicative method. Development of speaking, listening, conversation, and grammar skills through context. Three class meetings a week. Outside online video lab twice a week.

**SPANISH 115-1,2 Accelerated Elementary Spanish** For students with some previous experience in Spanish. Communicative method. Development of speaking, listening, conversation, and grammar skills through context. Three class meetings a week. Outside online video lab twice a week. Offered winter and spring. Prerequisite: Spanish Language Placement Exam.

**SPANISH 121-1,2,3 Intermediate Spanish** Communicative method. Further development of grammar, vocabulary, speaking, and writing skills through readings in modern prose. Three class meetings a week. Outside online video lab twice a week. Prerequisite: 101-3, 115-2, or Spanish Language Placement Exam.

**SPANISH 125-0 Accelerated Intermediate Spanish** Communicative method. Further development of grammar, vocabulary, speaking, and writing skills through readings and short films. Three class meetings a week. Outside online video. Offered in fall only. Prerequisite: AP score of 3 or Spanish Language Placement Exam.

**SPANISH 199-0 Language in Context: Contemporary Spain** Intensive review and development of fluency and grammatical accuracy in speaking and writing through examination of contemporary Spanish culture. Prerequisite: 121-3, 125, AP score of 4, or Spanish Language Placement Exam.

**SPANISH 201-0 Conversation on Human Rights: Latin America** First course of a sequence designed to develop speaking strategies and structures through analysis of modern (20th- and 21st-century) Latin American culture. Emphasis on accurate informal conversation. Prerequisite: 199 or Spanish Language Placement Exam.

**SPANISH 202-0 Conversation on Current Topics** Second course of sequence designed to develop speaking strategies and structures through examination of culturally related topics in the Spanish-speaking world. Emphasis on formal conversation and specialized vocabulary. Prerequisite: 201, AP score of 5, or Spanish Language Placement Exam.

**SPANISH 203-0 Individual and Society through Written Expression** First course of a sequence designed to develop writing skills and structures through examination of the relationship between the individual and society. Emphasis on short texts and essays. Prerequisite: 201, AP score of 5, or Spanish Language Placement Exam.

**SPANISH 204-0 Reading and Writing the Art of Protest**

Second course of a sequence designed to develop writing skills and structures through analysis of socially committed art. Emphasis on cultural analysis and development of longer essays. Prerequisite: 203 or 207.

**SPANISH 207-0 Spanish for Heritage Speakers** For heritage speakers without prior formal training in Spanish. Emphasis on writing, syntax, and formal modes of the language. Prerequisite: consent of department.

**SPANISH 301-0 Topics in Language** Special topics in historical, grammatical, or other linguistic aspects of Spanish. Prerequisites: 201 or 202; 203 or 207; 204.

### **Courses in Literature and Culture with Prerequisites in Spanish**

**SPANISH 210-0 Icons, Legends, and Myths in Spain**

Diverse representations of historical, literary, and popular figures in Spain, such as the *caudillo*, the *obispo*, El Cid, and Don Juan. Prerequisites (may be taken concurrently): 201 or 202; 203 or 207; 204.

**SPANISH 211-0 Icons, Legends, and Myths in Latin America**

Diverse representations of historical, literary, and popular figures in Latin America, such as the *conquistador*, the dictator, the *gaucho*, Simón Bolívar, Che Guevara, Evita, La Malinche, and Carlos Gardel. Focus on forms of representation such as films, documentaries, musical theater, biography, narrative fiction, poetry, and commercial art. Prerequisites (may be taken concurrently): 201 or 202; 203 or 207; 204.

**SPANISH 220-0 Introduction to Literary Analysis**

Introduction to textual analysis and to topics such as genre, narratology, prosody, and figurative language, aiming to prepare the student to read, discuss, and write analytically in Spanish about literature and culture. Prerequisites (may be taken concurrently): 201 or 202; 203 or 207; 204.

**SPANISH 250-0 Literature in Spain before 1700** Survey of the origins of the Spanish language and the development of Spanish literature from the Middle Ages to the end of the Spanish Golden Age. Study of representative figures and major literary developments in conjunction with political and cultural history. Prerequisite (may be taken concurrently): 220.

**SPANISH 251-0 Literature in Spain since 1700** Survey of literature in Spain from the 18th to the 20th century. Study of representative figures and major literary developments in conjunction with political and cultural history. Prerequisite (may be taken concurrently): 220.

**SPANISH 260-0 Literature in Latin America before 1888**

Survey of pre-Hispanic, colonial, and Romantic traditions in Latin America. Focus on authors and texts such as Popul Vuh, Cristóbal Colón, Inca Garcilaso de la Vega, Sor Juana Inés de la Cruz, Domingo Faustino Sarmiento, and Martín Fierro. Prerequisite (may be taken concurrently): 220.

**SPANISH 261-0 Literature in Latin America since 1888**

Survey of the modern period, including modernismo, the historical avant-garde, the “Boom,” and recent literary

trends. Authors such as Delmira Agustini, Jorge Luis Borges, Julio Cortázar, Rubén Darío, Gabriel García Márquez, José Martí, Pablo Neruda, Cristina Peri Rossi, and Elena Poniatowska. Prerequisite (may be taken concurrently): 220.

**SPANISH 310-0 Origins of Spanish Civilization** Spanish literature from its beginnings to the end of the Middle Ages: epic poems, lyrics, and romances. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 320-0 Golden Age of Poetry and Prose** Major authors of the 17th century, including Garcilaso de la Vega, Fray Luis de León, and Santa Teresa de Jesús. Works by Cervantes other than *Don Quixote*. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 321-0 Golden Age Drama** Major dramatists of the 17th century, including Lope de Vega, Tirso de Molina, and Calderón de la Barca. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 323-0 Cervantes** Close reading of *Don Quixote*, with attention to its historical and cultural context. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 330-0 The Age of Romanticism in Spain** Analysis of the principal literary forms of the Romantics in relation to major themes and ideas of the age and to key historical events such as the end of the Spanish Empire and the establishment of the new liberal regime. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 331-0 Realism in Spain: The Problem of Representation** Theories and practices of realist authors in modern Spanish literature. Issues of literary representation and mimesis. Aesthetic and ideological foundations of realism in the 19th century and in 20th-century variants such as social realism, antirealism, and postmodern documentarism. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 332-0 Avant-Garde Writers and Experimental Fiction in Spain** Aesthetic principles, modes of writing, and uses of media of avant-garde writers and artists in 20th-century Spain. The use of experimental forms in the critique of the bourgeois order and late capitalist society. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 333-0 The Spanish Civil War: The Good Fight**

Analysis of the Spanish Civil War (1936–39) and its effects on 20th-century Spanish culture and society. Issues may include the relationship between utopic thought and artistic avant-gardes during this period; literary and filmic representations of the war; and the war's connections to Nazi Germany and World War II. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 334-0 Memory, History, and Fiction in Spain since 1930** The uses of memory and history in fiction and film produced after the proclamation of the Second Republic. Approaches to rewriting myth and history in autobiography, historiography, and historical fiction. Prerequisite: 1 course from 250, 251, 260, or 261.



**SPANISH 335-0 Modern Fiction in Spain: Studies in Genre**

Study of literary genres (narrative, poetry, drama) or subgenres (detective fiction, autobiography, the fantastic). May be repeated for credit with different topic. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 340-0 Colonial Latin American Literature** Major texts and writers of the early colonial period, including chronicles of discovery and conquest from both indigenous and Hispanic sources. Works by authors such as Alvar Núñez Cabeza de Vaca, Hernán Cortés, Bernal Díaz del Castillo, Inca Garcilaso de la Vega, Felipe Guaman Poma de Ayala, Bartolomé de las Casas, Sor Juana Inés de la Cruz, and Carlos de Sigüenza y Góngora. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 341-0 Latin American Modernismo** Significant poetry, narrative, and criticism from the late 19th and early 20th centuries. Topics such as decadence, aestheticism, the *flâneur* and the *rastaciero*, cosmopolitanism, the modern city, and exoticism. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 342-0 Region and Rootedness in Latin America**

Literary traditions evolving from Latin American conceptions of regional and indigenous cultures in the 19th and 20th centuries. Authors such as José María Arguedas, Miguel Ángel Asturias, Rosario Castellanos, Rómulo Gallegos, José Hernández, José Carlos Mariátegui, Clorinda Matto de Turner, and José Eustasio Rivera. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 343-0 Latin American Avant-Gardes** Poetry, prose, and visual art by major figures and groups in 20th-century vanguard movements. Works by authors such as Roberto Arlt, Jorge Luis Borges, Alejo Carpentier, Nicolás Guillén, Felisberto Hernández, Vicente Huidobro, Manuel Maples Arce, and César Vallejo. Prerequisite: 250, 251, 260, or 261.

**SPANISH 344-0 Borges** The poetry, essays, and short fiction of Jorge Luis Borges. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 345-0 Reading the “Boom”** Historical, literary, and cultural characteristics of the “Boom” in the 1960s and 1970s and the development of the “new” narrative in Latin America. Readings include novels, short fiction, and essays by authors such as Guillermo Cabrera Infante, Julio Cortázar, José Donoso, Carlos Fuentes, Gabriel García Márquez, Manuel Puig, Juan Rulfo, and Mario Vargas Llosa. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 346-0 Testimonial Narrative in Latin America** Study of the tradition of testimonial writing in Latin America with attention to cultural, political, and historical contexts and questions of truth, memory, and subjectivity. Works by authors such as Miguel Barnet, Gabriel García Márquez, Rigoberta Menchú, Alicia Partnoy, Elena Poniatowska, Jacobo Timerman, and Rodolfo Walsh. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 347-0 Literature and Revolution in Latin America**

Revolutionary practices in Latin American literatures

as well as literary representations of revolution. Authors such as Mariano Azuela, Nellie Campobello, Alejo Carpentier, Roque Dalton, Carlos Fuentes, Pablo Neruda, and Rodolfo Usigli. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 360-0 Spain: Studies in Culture and Society**

Significant issues in the social, political, and cultural development of Spain. Prerequisites: 201-1 or 201-2; 202-1 or 207; 202-2; and 1 other 200-level literature or culture course.

**SPANISH 361-0 Latin America: Studies in Culture and Society**

Analysis of the history of culture in Latin America with an emphasis on the intersection of politics, society, and literature and on the relationship between literary and visual culture. Prerequisite: 201 or 202; 203 or 207; 204; and 1 other 200-level literature or culture course.

**SPANISH 380-0 Topics in Film: The Silver Screen in Latin**

**America and/or Spain** Introduction to film in Latin America and/or Spain during the 20th century. Topics vary and may include a historical survey of film, a study of films of a specific period, a comparative analysis of literary works and cinematic adaptations, or the work of specific filmmakers. May be repeated for credit with different topic. Prerequisite: 201 or 202; 203 or 207; 204; and 1 other 200-level literature or culture course.

**SPANISH 390-0 Undergraduate Seminar** Advanced course on topics in literature and culture oriented toward the development of an individual research project. Open to qualified seniors with consent of an adviser. Prerequisite: consent of adviser.

**SPANISH 395-0 Special Topics in the Literatures of Latin**

**America and/or Spain** Advanced study of topics in the literary traditions of either Latin America or Spain. Possible topics include intellectual history, transatlantic exchanges, the short story, literature of the fantastic, feminist traditions, hybrid cultures, and history and fiction. May be repeated for credit with different topic. Prerequisite: 1 course from 250, 251, 260, or 261.

**SPANISH 399-0 Independent Study** Independent reading under supervision. Consultation with director of undergraduate studies required.

**Courses with Reading and Discussion in English**

These courses may not be taken for major or minor credit.

**SPANISH 223-0 Cervantes** Study of *Don Quixote* and other selected works with attention to the historical and cultural context of the 17th century.

**SPANISH 225-0 Nationalism, Borders, and Immigration in**

**Spain** Interdisciplinary approach to national identity and nationalism in Spain with attention to political and cultural struggles for regional autonomy and to social conflicts arising from immigration.

**SPANISH 230-0 Margins and Centers in Latin American**

**Literature and Culture** Interdisciplinary analyses of the complex dynamic between social, political, and cultural peripheries and centers as represented in literary and



cultural production. Topics include city and country, cosmopolitanism and localism, graphic and oral cultures, and the original and its derivatives.

**SPANISH 231-0 The “New” Latin American Narrative**

Emphasis on novels and short fiction from the Latin American “Boom” of the 1960s and 1970s, with attention also to important precursors and recent trends. Focus on works by writers such as Isabel Allende, Jorge Luis Borges, Julio Cortázar, Carlos Fuentes, Gabriel García Márquez, Manuel Puig, Severo Sarduy, and Luisa Valenzuela.

**SPANISH 397-0 Topics in Hispanic Literatures and Cultures**

Aspects of the literatures and cultures of Latin America and Spain. Possible topics include postcolonial criticism and its reception in Hispanic cultures, notions of translation, theories of poetics, orality and oral culture, literature and film, the memoir, and travel writing. May be repeated for credit with different topic.

## Portuguese

### Portuguese Language Courses

**PORT 111-1,2,3/112-1,2,3 Intensive Portuguese** This three-quarter, rapid-study course sequence emphasizes spoken Brazilian Portuguese. With six hours in class and two hours of independent laboratory work per week, it covers the content of a traditional first- and second-year language acquisition sequence in one academic year. Each quarter students must register for both 111 and 112, for which they earn two credits. Prerequisites for 111-1 and 112-1: None. For 111-2 and 112-2: 111-1 and 112-1 or placement examination. For 111-3 and 112-3: 111-2 and 112-2 or placement examination.

**PORT 201-0 Reading and Speaking Portuguese** This intermediate course is designed to expand mastery in reading and speaking Brazilian Portuguese through select cultural videos, readings of literary *crônicas*, periodicals, and the Internet. Prerequisite: 111-3/112-3 or placement examination.

**PORT 202-0 Reading and Writing Portuguese** Instruction in reading and writing expository and narrative prose. Emphasis on vocabulary, linguistic skills, and syntax appropriate to formal written Portuguese. Prerequisite: 111-3/112-3 or placement examination.

**PORT 210-0 Icons, Legends, and Myths in Brazil** Representations of historical, literary, and popular figures who live in the national imagination. The course focuses on graphic materials, documentaries, film, theater, folklore, narrative fiction, and popular music. Prerequisites: 201, 202, or placement examination.

**PORT 303-0 Topics in Advanced Portuguese** Advanced review of grammar concepts and idiomatic use of spoken and written Portuguese. Deals with a variety of topics in the context of Brazilian culture, history, literature, and current events. May be taken more than once for credit with change of topic. Prerequisite: 202 or equivalent.

**PORT 399-0 Independent Study** Independent study under supervision. Consultation with the director of undergraduate studies required.

## STATISTICS

Statistics is the scientific discipline that deals with the organization, analysis, collection, and interpretation of numerical data. Statistical methods are widely used to design and analyze experiments, sample surveys, censuses, and other observational programs. Such analysis involves both description of the properties of groups of observations and problems of drawing inferences from such data. Applications to the biological, social, and physical sciences are widespread, and statistical analyses are increasingly required in actuarial work, accounting, finance, engineering, medicine, and law.

### Major in Statistics

*Introductory course:* 202, 210, or equivalent

*Basic courses:* 320-1,2, 325, 350

*Advanced courses:* 4 additional 300-level courses offered by the department. MATH 310-2 (or EMS 315) and IEMS 305 may each substitute for 1 of these 4 courses.

*Related courses:* MATH 220 and 224 (or 212, 213, and 214); MATH 230, 234, and 240 (or 281-1,2,3 or 285-1,2,3 or 290-1,2,3 or 291-1,2,3).

### Minor in Statistics

Students who complete the minor in statistics receive serious exposure to probability theory, statistical estimation theory, statistical analysis, and the design of statistical data collection. Students choosing to minor in statistics are required to complete MATH 220 and 224 (or 212, 213, and 214) and 230, 234, and 240 (or 281-1,2,3 or 285-1,2,3 or 290-1,2,3 or 291-1,2,3).

### Minor course requirements (6 units)

- 202, 210, or equivalent
- 320-1,2
- 325
- 350 or ECON 381-2
- 1 other 300-level statistics course

### Four-Year BA/MS

The department offers a four-year BA/MS program in statistics for outstanding undergraduate majors. Interested students should contact their adviser or department chair and should see Accelerated Master's Programs in the Undergraduate Education section of this catalog.

### Honors in Statistics

Departmental majors with outstanding records both overall and within the department may apply for graduation with departmental honors. A departmental recommendation for honors requires that students take 2 quarters of 398, during which a research paper is developed. For more

information, consult the director of undergraduate studies. See also Honors under Academic Policies earlier in this section of the catalog.

## Courses

**STAT 201-0 Statistics and Public Policy** Basic statistical concepts and techniques introduced via case studies of interesting public policy issues. The cases illustrate methods of data collection and analysis.

**STAT 202-0 Introduction to Statistics** Data collection, summarization, correlation, regression, probability, sampling, estimation, tests of significance. Does not require calculus and makes minimal use of mathematics. 202 and 210 cannot both be taken for credit.

**STAT 210-0 Introductory Statistics for the Social Sciences** A mathematical introduction to probability theory and statistical methods, including properties of probability distributions, sampling distributions, estimation, confidence intervals, and hypothesis testing. 210 is primarily intended for economics majors. 202 and 210 cannot both be taken for credit. Prerequisite: strong background in high school algebra (calculus is not required).

**STAT 232-0 Applied Statistics** Basic concepts of using statistical models to draw conclusions from experimental and survey data. Topics include simple linear regression, multiple regression, analysis of variance, and analysis of covariance. Practical application of the methods and the interpretation of the results will be emphasized. Prerequisites: 202, 210, or equivalent; MATH 220.

**STAT 320-1,2 Statistical Methods 1.** Distribution functions, densities, measurement of location and scale, random sampling, random variables, sampling statistics, hypothesis tests, confidence intervals, parameter estimation, and nonparametric methods. **2.** Correlation and regression, contingency tables, analysis of variance, design and analysis of experiments. Prerequisites: MATH 234 and 240.

**STAT 325-0 Survey Sampling** Probability sampling, simple random sampling, error estimation, sample size, stratification, systematic sampling, replication methods, ratio and regression estimation, cluster sampling. Prerequisites: 2 quarters of statistics or consent of instructor.

**STAT 338-0 History of Statistics** Historical survey of the development of modern statistics, from Bernoulli's law of large numbers to the contributions of R. A. Fisher. Prerequisite: 320-2 or equivalent.

**STAT 344-0 Statistical Computing** Theoretical and practical problems in the development and use of statistical computing systems for numerical and graphical analysis of data. Prerequisites: 2 quarter-courses chosen from 320-2, 350, 351, PSYCH 351, MATH 240, or equivalent.

**STAT 345-0 Statistical Demography** Introduction to statistical theory of demographic rates (births, deaths, migration) in multistate setting; statistical models underlying formal demography; analysis of error in demographic forecasting. Prerequisite: 350, MATH 240, or equivalent.

**STAT 350-0 Regression Analysis** Simple linear regression and correlation, multiple regression, residual analysis, selection of subsets of variables, multicollinearity and shrinkage estimation, nonlinear regression. Prerequisite: 320-2 or equivalent.

**STAT 351-0 Design and Analysis of Experiments** Methods of designing experiments and analyzing data obtained from them: one-way and two-way layouts, incomplete block designs, factorial designs, random effects, split-plot and nested designs. Prerequisite: 320-2 or equivalent.

**STAT 352-0 Nonparametric Statistical Methods** Survey of nonparametric methods, with emphasis on understanding their application. Prerequisite: 320-2 or equivalent.

**STAT 355-0 Analysis of Qualitative Data** Introduction to the analysis of qualitative data. Measures of association, log-linear models, logits, and probits. Prerequisite: 320-2 or equivalent.

**STAT 359-0 Topics in Statistics** Topics in theoretical and applied statistics to be chosen by instructor. Prerequisite: consent of instructor.

**STAT 365-0 Introduction to the Analysis of Financial Data** Use of time series and regression models in the analysis of financial data. Topics covered include models for returns, portfolio theory, capital asset pricing model, and options pricing. Prerequisites: MATH 240 and at least 2 courses in probability and statistics.

**STAT 398-0 Undergraduate Seminar**

**STAT 399-0 Independent Study** Independent work under the guidance of a faculty member. Permission of department required.

## Related Courses in Other Departments

- IEMS 202, 305, 315 (see McCormick School section)
- MATH 310-1,2,3

## TRANSPORTATION AND LOGISTICS

Please see Transportation and Logistics in the Cross-School Programs section of this catalog.

## UNDERGRADUATE LEADERSHIP

The Undergraduate Leadership Program, a certificate program open to all undergraduates, helps students understand the nature of leadership and prepares them to become leaders. (See Undergraduate Leadership Program in the Cross-School Programs section of this catalog.)

## URBAN STUDIES

The Program in Urban Studies enables students majoring in anthropology, economics, history, political science, or sociology to master their disciplinary major and to complement it with a second major in urban studies. With special consent of the director of the program, students with other majors in Weinberg College also may elect urban studies as a major. The purpose of the program is to introduce students to an interdisciplinary perspective on the city and its problems, bringing together faculty and students

who share common interests but have different academic backgrounds. In addition to the following requirements, it is recommended that students who major in urban studies complete a methods or statistics course in one of the social science departments and participate in an urban-related field studies program.

### Adjunct Major in Urban Studies

The following are required for a second major in urban studies:

- Fulfillment of the major requirements in another department of Weinberg College or another undergraduate school at Northwestern. Majors in urban studies must show a minimum of 7 courses not double-counted in any other major(s).
- Of the double-counted courses, 1 may be counted in the core requirement, and 1 may be counted as an elective.
- Completion of 4 courses chosen from an urban studies core: ANTHRO 372, 373; ECON 354; HISTORY 322-1,2; POLI SCI 221; SOCIOL 207, 301.
- Completion of 3 additional courses chosen from the following list, with no more than 2 from the same department and no more than 1 from urban field studies or internships: AF AM ST 236-2; , 365; ANTHRO 372, 373; ART HIST 379; CIV ENG 371; ECON 337, 354, 355; HISTORY 322-1,2; POLI SCI 221, 327, 330; SOCIOL 207, 301; or 1 unit from any approved urban field studies in any relevant department.
- Other courses may be substituted for the core and additional requirements with the approval of the director.
- Completion of the 2-unit 398 seminar during the fall and winter or winter and spring quarters of the student's senior year. Check the online class schedule for the quarters when this seminar is offered.

## WRITING PROGRAM

The Writing Program is an independent Weinberg College unit that seeks to help all Northwestern undergraduates learn to write clearly and persuasively. A core faculty of experienced writing instructors teach the program's main sequence of introductory, intermediate, and advanced expository writing courses. These are listed as ENGLISH 105, 105-6, 106, 205, and 305. Writing courses are limited to 15 students, allowing instructors to comment extensively on students' writing and to meet regularly with students in individual conferences. Courses at every level emphasize revision, with the goal of strengthening each student's ability to think clearly, analyze carefully, argue convincingly, and communicate effectively.

The Writing Program also operates the Writing Place, a center that provides free composition tutoring and consulting for all Northwestern students. The Writing Place, located in University Library, is open most mornings, afternoons, and evenings during the academic year.

Students may make appointments, use the schedule of drop-in hours, or interact with Writing Place tutors through the campus computer network.

In addition, the Writing Program helps to oversee writing requirements — and thus provides writing advising — for undergraduates in Weinberg College, the McCormick School, and the Henry and Leigh Bienen School of Music. Members of the Writing Program faculty teach specialized courses and workshops, as needed. In recent years the Writing Program has collaborated extensively with other University programs and departments, developing new ways to integrate writing instruction with instruction in other disciplines, such as engineering design. In all its courses and special offerings, the Writing Program concentrates on helping students develop skill, confidence, and insight as writers.

Students interested in a writing major should see the English Major in Writing in the English section.

### Courses

**ENGLISH 105-0 Expository Writing** See English.

**ENGLISH 106-1,2 Writing in Special Contexts** See English.

**ENGLISH 205-0 Intermediate Composition** See English.

**ENGLISH 304-0 Practical Rhetoric** See English.

**ENGLISH 305-0 Advanced Composition** See English.

## School of Communication

Communication is at the root of nearly everything we do, and mastering the art of communication can open doors in a wide range of careers, from law and medicine to acting, directing, writing, and producing.

The School of Communication's mission is based on a philosophy of performance. We seek to improve the practice of communication, whether on the stage or screen, at the podium, in the clinic, or in everyday life.

The school is committed to building the basic and applied sciences of communication; developing theoretical and critical perspectives on communicative performances; creating new technologies for communication and new modes of artistic expression; and helping students to be more effective in their work, at home, and in civic life by applying principles of communication. Undergraduates work in partnerships with world-class faculty to create new understandings and develop new approaches to human communication. The curriculum provides students with a solid liberal-arts education that broadens and enriches their studies of human expression and interaction.

Founded by Robert Cumnock in 1878, the School of Communication is now the third largest of Northwestern's six undergraduate divisions. It annually enrolls more than 1,200 undergraduate majors and 400 graduate students.

Originally, the curriculum and its related activities were concerned with public speaking and interpretative reading as performing arts. As the field grew, the school added instruction in theatre, speech pathology, audiology, radio, television, film, and other specialties in oral communication. Throughout its history the school has often been a pioneer in new fields of study, including film and audiology.

Today the five departments of instruction represent the diverse spectrum of study in the field of communication: communication sciences and disorders; communication studies; performance studies; radio/television/film; and theatre (including dance). In addition to the specialized program presented by each department, the five departments of the School of Communication combine to offer the undergraduate degree program in interdisciplinary studies. All departments offer graduate courses. The School of Communication sponsors dance, debate, media arts, and theatre arts divisions of Northwestern's National High School Institute.

This wide range of educational activities is housed in the Frances Searle Building — which includes administrative offices, a student resource center, two departmental

offices, and laboratory and research spaces — as well as in the school's original building, Annie May Swift Hall; two former residences on Chicago Avenue; the Theatre and Interpretation Center; and John J. Louis Hall, a state-of-the-art studio production facility.

In 2008 Northwestern opened a branch campus in Qatar, where programs in communication and journalism are offered. (See Campuses in The University section of this catalog.)

For more information, see the school's web site at [www.communication.northwestern.edu](http://www.communication.northwestern.edu).

## ACADEMIC POLICIES

### Requirements for the Degree of Bachelor of Science in Communication

The School of Communication grants the degree of bachelor of science in communication upon (1) the satisfactory completion of 45 course units; (2) the fulfillment of the distribution requirement of the student's major department; and (3) the completion of an approved program of study in communication and related fields suited to the student's special interests and needs. In the Departments of Communication Studies and Radio/Television/Film, the required program of study includes language requirements. Please see the major requirements for details. If students interrupt the program of study for an extended period of time and degree requirements are changed during this period, they are normally held to the new requirements.

In addition to and independent of the requirements set by the School of Communication, students must satisfy the Undergraduate Residence Requirement (see Undergraduate Education section).

### Requirements for the Degree of Bachelor of Arts in Communication

The Departments of Communication Studies, Performance Studies, Radio/Television/Film, and Theatre (including dance) offer the bachelor of arts in communication. The requirements for this degree are identical to the requirements for the bachelor of science in communication with the addition of a foreign language requirement. To earn the bachelor of arts in communication, students — in addition to completing the degree requirements for the bachelor of science — must demonstrate two-year proficiency in a classical or modern foreign language. Proficiency is established

in precisely the same manner as in the Weinberg College of Arts and Sciences; see the section on the foreign language requirement in the Weinberg section of this catalog.

### *General Requirements*

Of the 45 courses required for all major programs in the School of Communication, the last 23 courses must be taken while the student is enrolled as an undergraduate in Northwestern University, and the student must be enrolled in the School of Communication for the last 3 quarters preceding the granting of the degree. Credit for summer work taken at other colleges or universities as part of the last 23 courses requires approval by petition.

Of the required 45 units, 35 must be completed with grades of A, B, or C (grades of C- do not satisfy this requirement). A minimum of 18 courses must be taken outside the major department (see distribution requirements, below). All courses applied to a major, minor, and adjunct major and all distribution courses must be completed with a grade of C- or higher. Courses offered by the major department may not be taken for a P grade. D and P grades may apply only to the elective requirement.

A transfer student will be required to complete at least 11 courses in the School of Communication at Northwestern. A communication placement interview is required at the time of first registration for all transfer students.

### *Distribution Requirements*

All major programs in communication require 18 courses outside the major department in the following areas:

- Science, mathematics, and technology
- Individual and social behavior
- Humanities and fine arts

Students should consult the department concerned for the range of disciplines within each category and the number of courses required.

### *Major Programs in Communication and Related Requirements*

All students in the School of Communication must meet the requirements of one of the following major programs: interdisciplinary studies, human communication science, communication studies, performance studies, radio/television/film, or theatre (including dance). Basic communication courses are required in all programs, and provisions are made for study in other divisions of the University to complement the major program.

### **Student Conduct in Communication Courses**

All undergraduate students enrolled in School of Communication courses are held accountable to the University's standards of academic integrity (see Academic Regulations in the Undergraduate Education section of this catalog). They also are responsible for compliance with the following standards:

- Attendance is required in all courses, and excessive absence is cause for failure.
- Credit will not be given for 2 courses that meet at the same time.
- All assigned work must be completed to receive course credit.
- Assignments must be turned in on time, and examinations must be taken as scheduled; assignments cannot be made up or grades of incomplete given without prior approval from the instructor.

### **Teaching Certification**

The Department of Communication Sciences and Disorders offers a program leading to public school certification.

### **Advising**

Each student is assigned an adviser within the School of Communication. This adviser is available for consultation, especially for the purpose of planning for the next registration. Freshmen have a separate advising period before the fall registration. Ultimate responsibility for meeting degree requirements rests with the student.

## **ACADEMIC OPTIONS**

### **Minor Programs**

The School of Communication offers four minor programs. Students cannot earn both a major and a minor in the same area. Students wishing to pursue a minor should contact the appropriate department to be assigned a minor adviser. No course for the minor may be taken utilizing the P/N option, and all classes must be completed at a grade of C- or higher in order to be counted toward the minor.

#### *Dance (7 units)*

The minor in dance encourages students majoring in other fields to organize their dance studies in a coherent manner. The minor requires students to gain both depth and breadth in the study and practice of dance.

Of the 7 courses for the minor, 3 must be 300-level courses. At least 5 of the 7 courses for the minor must be offered by the dance program; the other 2 may be approved courses in departments or programs outside dance (e.g., performance studies, gender studies, comparative literature).

- DANCE 101-1 Introduction to the Dance Experience: Dance in Context
- Dance 101-2 Introduction to the Dance Experience: Movement Awareness
- 1 course in dance history, theory, or criticism
- 1 course from dance performance
- 1 unit of dance technique, including classes from 2 different dance genres (e.g., Modern and Jazz)
- 2 electives reflecting the student's special interests



### *Human Communication Science (7 units)*

A minor in human communication sciences requires at least 7 courses in the communication sciences and disorders department.

- CSD 202 Biological Foundations of Human Communication (or another 200- or 300-level course if granted a waiver based on course work in another department)
- At least 3 300- or 400-level basic science courses chosen from the following (students should consult with their adviser for other course options):
  - CSD 301 Anatomy and Physiology of the Vocal Mechanism
  - CSD 302 Anatomy and Physiology of the Peripheral Hearing Mechanism
  - CSD 303 Brain and Cognition
  - CSD 306 Psychoacoustics
  - CSD 307 Acoustic Phonetics
  - CSD 309 Culture, Language, and Learning
  - CSD 310 Biological Foundations of Speech and Music
  - CSD 314 Topics in Cognitive Neuroscience
  - CSD 350 Cognitive Development in Atypical Learners
  - CSD 392 Language Development and Usage
  - CSD 399 Independent Study
  - CSD 406 Functional Neuroanatomy
- At least 3 300- or 400-level clinical courses chosen from the following (students should consult with their advisers for other course options):
  - CSD 318 Introduction to Audiology
  - CSD 336 The Field of Special Education
  - CSD 373 Introduction to Learning Disabilities
  - CSD 375 Diagnostic Procedures for Exceptional Children
  - CSD 376 Remedial Education for Children with Learning Disabilities
  - CSD 396 Diagnostic Procedures in Speech and Language Pathology
  - CSD 419 Pediatric Audiology
  - CSD 434 Neuropsychology and Learning Disabilities
  - CSD 435 Neuromotor Speech Disorders in Adults
  - CSD 438 Dysphagia
  - CSD 475 Aphasia
  - CSD 491 Fluency, Disfluency, and Stuttering
  - CSD 492 Language Disorders in Preschool Children
  - CSD 493 Vocal Physiology and Pathology
  - CSD 494 Advanced Study in Disorders of Fluency

### *Sound Design (6 units)*

The minor in sound design allows students to study and create work in sound as it relates to film/video, new media, theatre, radio, and installation/exhibition projects. The minor draws on courses offered through the School of Communication, Bienen School of Music, and Weinberg College of Arts and Sciences. The minor is open to all Northwestern undergraduate students.

Students take 6 of the following courses:

- RTVF 379 Topics in Film/Video/Audio Production (sound design topics may include Advanced Audio Post-production, Sound Design for Horror, Sound Design for Comedy, Advanced Foley, Sound Design for the Web)
- RTVF 383 Audio Production
- RTVF 384 Foundations of Sound Design
- RTVF 398 Symposium: Issues in Radio/Television/Film (History/Aesthetics of Sound Design)
- RTVF 399 Independent Study
- THEATRE 263 Theatre Sound
- THEATRE 363 Theatre Sound
- MUS TECH 321 Producing in the Virtual Studio
- MUS TECH 335 Selected Topics in Music Technology (sound design topics may include Recording and Basic Audio, Studio Techniques for Electroacoustic Media)
- MUS TECH 337 Multimedia for the Web
- MUS TECH 338 Programming
- MUS TECH 340 Composing with Computers
- MUS TECH 342-1,2 Computer Sound Synthesis
- MUS TECH 348 3-D Sound and Spatial Audio
- MUS TECH 441 Advanced Computer Composition
- MUS TECH 450 Advanced Audio Processing

### *Theatre (7 units)*

The minor in theatre encourages students majoring in other fields to organize their theatre studies in a coherent manner. The minor requires students to gain both depth and breadth in the study and practice of theatre.

Of the 7 courses for the minor, 3 must be 300-level courses. At least 5 of the 7 courses for the minor must be offered by the theatre department; the other 2 may be approved courses in departments or programs outside theatre (e.g., performance studies, gender studies, comparative literature).

- 2 courses in theatre history, literature, criticism, or theory
- 1 course in theatre performance
- 1 course in theatre design
- 2 additional courses in one of the above areas to form a required concentration
- 1 elective

### **Interschool Options**

For information about the interschool programs listed below, see the Cross-School Programs section.

#### *Animate Arts Adjunct Major*

Any Northwestern undergraduate is eligible to declare an adjunct major in animate arts. This course of study provides an interdisciplinary approach to studying and creating new digital media. Its curriculum tightly integrates education in the arts and in technology, particularly computer programming.

The program is structured as an adjunct, interdepartmental major. A limited number of specific introductory courses will be offered in the curriculum as well as a senior-level project sequence. Students' electives will be chosen from the existing course offerings of the relevant departments.

### *Music Theatre Program*

The Certificate in Music Theatre provides the opportunity for Bienen School of Music students majoring in voice and School of Communication students majoring in theatre to create a second area of specialization.

### *Undergraduate Leadership Program*

The Undergraduate Leadership Program, an interschool certificate program open to all undergraduates, helps students understand the nature of leadership and prepares them to become leaders.

## **Graduate Study**

The School of Communication has been a national center for graduate study and research in the fields of communication arts and sciences for many years. Programs for the master of arts, master of fine arts, and doctor of philosophy degrees with majors in communication are administered by the Graduate School of Northwestern University. All candidates for these degrees must satisfy the Graduate School requirements. The school itself offers the doctor of audiology and master of science in communication degrees.

The School of Communication offers departmental and thesis sequences leading to the master's degree as well as a program leading to the degree of master of science in communication with emphasis in communication management or communication systems. Requirements for the departmental and thesis master's degrees, the master of fine arts, and the doctor of philosophy degrees in any division of the School of Communication are described in the Graduate School catalog. Requirements for the master of science in communication degree are available from the School of Communication.

All departments of the School of Communication participate in graduate studies and research. Graduate programs may be relatively specialized in the offerings of one department or arranged to represent the offerings of two or more departments.

## **INTRODUCTORY AND RELATED COURSES IN GENERAL COMMUNICATION**

**GEN CMN 101-0 Interpersonal Communication** Laboratory experience in human interaction. Analysis of communication within groups.

**GEN CMN 102-0 Public Speaking** Theory, composition, delivery, and criticism of public speeches.

### **GEN CMN 103-0 Analysis and Performance of Literature**

Critical reading, written analysis, and performance of literary texts; general introduction to performance studies.

**GEN CMN 104-0 Argumentation and Debate** Theories of argumentation and debate, with many opportunities for practice. Analysis and evaluation of the discourse related to public controversies.

### **GEN CMN 108-0 Processes and Pathologies of Human**

**Communication** Basic facts and principles of human communication and its disorders. Laboratory experience provides an introduction to research in human communication science.

**GEN CMN 110-0 Voice for Performance** Intensive individual development and use of voice for performance.

**GEN CMN 115-0 Freshman Seminar** Small courses that feature investigations of complex contemporary social issues explored in pedagogically innovative ways.

**GEN CMN 204-0 Paradigms and Strategies of Leadership** Theoretical models of leadership. Group vision, change, and decision making. Weekly student-led small groups discuss case studies.

**GEN CMN 206-1,2 Leadership Education Seminar** Open to students in the Undergraduate Leadership Program.

## **COMMUNICATION SCIENCES AND DISORDERS**

The Roxelyn and Richard Pepper Department of Communication Sciences and Disorders is the locus at Northwestern of basic science and research in human communication and its disorders, offering clinical training in audiology and hearing sciences, learning disabilities, and speech and language pathology. Undergraduate and graduate curricula provide a foundation for the study of normal and disordered human communication based on hearing, speech, language, and learning processes. Classroom, clinical, and research facilities of the department are located in the Frances Searle Building on the Evanston campus, with the opportunity to do further clinical work at the Feinberg School of Medicine on the Chicago campus.

### **Areas of Study for Departmental Majors**

The undergraduate program in communication sciences and disorders is designed to provide a thorough foundation in human communication and its disorders. The departmental major, human communication science, emphasizes basic scientific principles that underlie all human communication and cognition. Students are also introduced to clinical issues and research findings that pertain to disorders of communication and learning. Upon completion of the undergraduate degree (bachelor of science in communication), many students pursue clinically based or research graduate degrees or go on to medical school. Others enter careers in health-related private industry or the public sector.

Undergraduate majors in human communication science may choose a general education in human communication sciences (premed; see next paragraph) or from among three areas of concentration: audiology and hearing sciences, learning disabilities, and speech and language pathology. Undergraduates are encouraged to identify their area of concentration as soon as possible so that they can formulate a course plan suited to their interests. However, selection of an area of concentration by registration for fall quarter of their junior year may still allow reasonable time to complete the recommended course work. Students should consult with their academic advisers on a regular basis to ensure their course work is appropriate. Students can change from an area of concentration to the general education track at any time. Undergraduates who do not complete the recommended course work for a concentration can still graduate with a major in human communication science but may be at a disadvantage when applying for advanced degree programs.

Undergraduate majors in human communication science who choose to pursue a premed track are encouraged to begin the recommended course work during their freshman year because of the importance of following the best sequence of courses in this track's curriculum. Undergraduates who do not complete the premed course work can still graduate with a major in human communication science but will need to fulfill any remaining medical school requirements in a postbaccalaureate program if applying to an advanced-degree program.

### *Premed*

The premed track is particularly well suited to students who plan to attend graduate or professional school in fields such as medicine, dentistry, or neuroscience. It also provides excellent preparation for students who plan to pursue graduate study in audiology and hearing sciences, learning disabilities, or speech and language pathology; to conduct research in these areas; or to engage in professional practice. In addition to taking courses in communication sciences and disorders, students in this track complete courses in general chemistry, organic chemistry, biology, physics, and mathematics. Students should consult with their adviser for additional requirements and recommendations.

Students admitted to the Honors Program in Medical Education (a seven- or eight-year program) with an emphasis in human communication sciences must meet the 300- and 400-level course requirements of the department (see following description). However, because they may spend only three years on the Evanston campus, they may take fewer 100- and 200-level courses in the department and the School of Communication than some four-year undergraduates. These requirements are being reviewed, and students should check with their academic adviser for updated information.

### *Audiology and Hearing Sciences*

The audiology and hearing sciences area of concentration encompasses the study of hearing, hearing disorders, and the treatment of hearing disorders. Undergraduate course work in this program provides the scientific foundation necessary for clinical practice and/or auditory research. Emphasis is on basic communication science, including study of the anatomical, physiological, and physical bases of hearing. Information on normal communication processes is presented. An introduction to audiologic assessment and hearing loss management is provided, with the opportunity for supervised clinical experience for advanced undergraduate students.

The doctor of audiology program (AuD) is a professional degree program in audiology and hearing sciences designed to prepare students for the clinical practice of audiology. Students interested in careers in auditory research may emphasize the development of research skills at the master's degree level to prepare for continued study at the doctoral level.

Students completing graduate study in audiology and hearing sciences may qualify for clinical certification by the American Speech-Language-Hearing Association, Illinois state licensure in audiology, and registration with the Illinois Department of Public Health in the area of hearing aid dispensing. Audiology professionals may be employed in hospitals, community and university clinics, schools, industry, rehabilitation centers, and research laboratories. Advanced professionals may be self-employed in private practice.

### *Learning Disabilities*

The undergraduate concentration in learning disabilities provides academic preparation for graduate study leading to the MA degree in learning disabilities and related fields. The field of learning disabilities is concerned with learning processes and their dysfunctions, including disorders of attention, perception, memory, language, conceptualization and reasoning, and processing speed. Such disorders lead to problems in the acquisition and use of oral language, reading, writing, and math skills that require specialized remediation. Undergraduate course work stresses theoretical, scientific, clinical, and educational issues as a foundation for advanced training. Students may also create an interdisciplinary program by combining learning disabilities with such ancillary fields as audiology, education, linguistics, neuroscience, psychology, or speech and language pathology.

The undergraduate curriculum emphasizes the psychological, linguistic, and biological bases of normal language and cognitive development. Courses incorporate clinical examples from and/or observations in area clinics and local schools. Advanced undergraduate courses are focused more directly on disorders in basic processes and on clinical applications of basic theory, including some supervised clinical teaching.

Graduates may enter MA and/or PhD programs to pursue advanced work and school certification as a learning behavior specialist or as a researcher. Graduates with advanced degrees may work in public or private schools, universities, hospitals, or private practice.

### *Speech and Language Pathology*

The undergraduate emphasis in speech and language pathology combines academic instruction with laboratory activities and supervised clinical experiences to give students a background for graduate study in the field. The undergraduate curriculum emphasizes the psychological, linguistic, neurological, acoustic, anatomical, and physiological bases of normal auditory and language behavior. As knowledge of normal speech, language, learning, and hearing processes increases, students are introduced to the communicative disorders that result from the disruption of these processes.

Advanced undergraduate courses are concerned with the nature, recognition, and management of common communicative disorders, such as problems of speech sound production, language development, fluency, and voice. This program also offers courses of study leading to the MA degree in speech and language pathology or a PhD degree. Graduate courses are concerned with the neurophysiologic and structural disorders affecting communication and swallowing and with a more detailed study of disorders of language, fluency, articulation, and voice. Students study the theory, evaluation, and management of aphasia, cerebral palsy, cleft palate, laryngeal pathologies, and other complex disorders.

Students completing graduate programs of study in speech and language pathology may qualify for teaching certification by the Illinois State Board of Education, Illinois state licensure, and certification by the American Speech-Language-Hearing Association. Professional speech and language pathologists work in schools, child development programs, specialized educational settings, universities, hospitals, clinics, rehabilitation centers, and private practice.

### **Honors Program**

An honors program is available for students in their senior year who have maintained an outstanding undergraduate record through their junior year. Upon successful completion of an honors project, they will graduate with honors in communication sciences and disorders. Also see Honors and Prizes in the Undergraduate Education section of this catalog.

### **Independent Study**

Upperclass students in the department may register for units of independent study, in which they work closely with a faculty member on a topic of mutual interest. Students

interested in independent study should select courses that may lead to more advanced library or laboratory research.

### **Requirements for a Major in Human Communication Science**

There is one set of requirements for a major in human communication science. However, well-designed course plans are recommended for each area of concentration. Students should consult their adviser for details.

- 2 GEN CMN courses: 108 and a choice of 101, 102, or 103; both must be passed with a grade of C (not C-) or higher
- A total of 13 CSD courses, all of which must be passed with a grade of C (not C-) or higher, and including the following:
  - 100-level course: 112
  - 200-level course: 202
  - 300- and 400-level courses in communicative disorders: 10 courses (excluding practicum courses), including 3 clinically oriented and 3 basic science courses
- Statistics: a choice of 304 (which fulfills both the statistics requirement and 1 of the 13 CSD course requirements) or 1 of 2 non-CSD statistics courses — PSYCH 201 or STAT 210 — neither of which fulfills 1 of the 13 CSD course requirements
- Writing proficiency: requirement for all students
- Distribution requirements: 18 courses outside the department, including 3 in the School of Communication's science, mathematics, and technology distribution area (1 in mathematics, 1 in biology, and 1 in physics or chemistry; either the biology or the physics/chemistry course must have a lab component); 3 in the school's individual and social behavior distribution area; 3 in the school's humanities and fine arts distribution area; and 9 additional courses outside the department, including 3 in any combination of science, mathematics, technology, and/or individual and social behavior
- Electives in communication and other areas to complete a minimum of 45 courses

Also see the description of requirements for students admitted to the Honors Program in Medical Education under Areas of Study for Departmental Majors, Premed Track, earlier in this section.

### **Courses for Undergraduates and Graduates**

**GEN CMN 108-0 Processes and Pathologies of Human Communication** See Introductory and Related Courses.

**CSD 112-0 The Scientific Exploration of Communication** Introduction course to the biology and physics of human communication. Basic properties of speech sounds and how they are produced and received by the listener; relation between human anatomical structures involved in sound production, modulation, and reception; brain mechanisms involved in processing the sounds of speech.

**CSD 201-0 Phonetics** Training in transcription of English speech sounds. Introduction to phonological analysis, dynamics of articulation, and dialect variations.

**CSD 202-0 Biological Foundations of Human Communication** Human anatomy, physiology, and neurology in relation to communicative behavior. Sensory, perceptual, cognitive, and motor processes.

**CSD 205-0 Study of Learning and Learning Problems in the Classroom** Study of children's learning in classroom settings. Field placement, using informal assessments of social, cognitive, and communication functioning, for children with and without exceptionalities.

**CSD 207-0 Seminar in Communication Sciences and Disorders** Major topics of research interest in communicative disorders. Principles of research in communicative disorders.

**CSD 301-0 Anatomy and Physiology of the Vocal Mechanism** Anatomical and physiological mechanisms of breathing, phonation, and articulation. Laboratories include dissection and participation in physiological research. Prerequisite: sophomore standing or above.

**CSD 302-0 Anatomy and Physiology of the Peripheral Hearing Mechanism** Gross and fine structure; function of the peripheral auditory system. Prerequisites: junior standing or above, 202, 307, or consent of instructor.

**CSD 303-0 Brain and Cognition** Neural bases of cognitive processing with emphases on neuroimaging approaches in the areas of encoding, perception, attention, memory, language, reading, motor control, and executive functioning.

**CSD 304-0 Statistics in Communication Sciences and Disorders** Introduction to research design and data analysis in communication sciences and disorders; statistical inference.

**CSD 306-0 Psychoacoustics** Principles underlying perception of pitch, loudness, auditory space, auditory patterns, and speech. Psychophysical procedures for studying psychoacoustics and the impact of hearing impairment are considered.

**CSD 307-0 Acoustic Phonetics** Acoustic theory of speech production and perception. Emphasis on acoustic cues underlying speech sound identification and their physiologic correlates. Laboratory and lecture.

**CSD 309-0 Culture, Language, and Learning** Language and culture; transmission of culture through language; effects of cultural variety on perception, cognition, and learning; implications of cultural and linguistic diversity in communicative disorders.

**CSD 310-0 Biological Foundations of Speech and Music** Anatomy and physiology of the central auditory pathway, experience-related neural plasticity, right/left brain specialization, audiovisual integration, auditory learning and perception, and neural encoding of speech and music.

**CSD 314-0 Topics in Cognitive Neurosciences** Introduction to the study of cognitive neuroscience, with emphasis on cross-disciplinary approaches to understanding the mechanisms of the mind.

**CSD 318-0 Introduction to Audiology** Introduction to the measurement of hearing in humans. Basic anatomy of the ear, measurement of hearing, potential disorders of hearing. Lecture/laboratory.

**CSD 334-0 Delivery Systems in Speech and Language Pathology** Organization and administration of speech-language pathology services in schools, health care agencies, and private practice. Prerequisites: 397 and senior standing.

**CSD 336-0 The Field of Special Education** Criteria for in-school evaluation, eligibility, and intervention for students with disabilities. Legal basis of policies and regulations.

**CSD 339-0 Early Communication Intervention with Infants and Toddlers** Models of service systems, current practices in early intervention, legislation, infant development processes, and risk factors. Emphasis on individual family service planning, assessment, and intervention.

**CSD 342-0 Typical and Atypical Development in Infants and Toddlers** Theories of normal and atypical child development — including cognition; language; gross and fine motor, social, and interpersonal functioning; and intrapsychic functioning — during the first three years of life. Prerequisite: advanced status in developmental disabilities or consent of instructor.

**CSD 343-0 Family Systems: Theory and Intervention Strategies in Early Intervention** Models of family-systems theory and application pertaining to the functioning of families with disabled infants or toddlers. Intervention strategies appropriate for early-intervention professionals. Prerequisite: advanced status in developmental disabilities or consent of instructor.

**CSD 350-0 Cognitive Development in Atypical Learners** Normal cognitive development in perception, attention, memory, language, conceptualization, and problem solving with application to atypical children with genetic and brain abnormalities.

**CSD 351-0 Development and Disorders of Memory** Scientific models and evidence for memory development. Memory disorders in relation to developmental and life-span issues.

**CSD 369-0 Special Topics in Speech and Language Pathology** Current scientific and professional problems in speech and language pathology. Topics vary by quarter.

**CSD 370-0 Special Topics in Learning Disabilities** Current scientific and professional problems in learning disabilities.

**CSD 373-0 Introduction to Learning Disabilities** Psychological, neurological, and linguistic theories of language and learning as related to learning disabilities.

**CSD 374-0 Behavior Assessment and Management in Children** Theories and application of behavior analysis and management principles. Emphasis on assessment techniques, classroom management approaches, and strategies for the facilitation of learning.

**CSD 375-0 Diagnostic Procedures for Exceptional Children** Introduces students to differential diagnostic procedures used in special education. Examination of cognitive and



emotional disorders, sensory impairment, physical handicaps, and legal aspects of diagnosis.

**CSD 376-0 Remedial Education for Children with Learning Disabilities** Theories and intervention principles for disorders of oral language, reading, written language, mathematics, and nonverbal learning.

**CSD 377-0 Learning Disabilities in Early Childhood** Theoretical issues, assessment, and educational principles for young children with learning disabilities. Emphasis on problems of language, cognition, and pre-academic learning. Instruction and home management.

**CSD 378-1,2 Student Teaching in Learning Disabilities and Related Disorders** Supervised teaching of exceptional children. Observation and participation in classes of normal-learning children as well as children with learning problems and related disorders.

**CSD 379-1,2 Student Teaching in Learning Disabilities and Related Disorders** Continuation of 378.

**CSD 380-0 Introduction to Clinical Procedures in Learning Disabilities** Practicum experience in clinical settings. Learning processes and application of instructional approaches. Field studies, reading, and weekly seminars. Prerequisites: 375 and 376.

**CSD 381-0 Social Development in Normal and Learning-Disabled Children** Current theories of and empirical research on social-emotional development from infancy through adolescence; identification and treatment of social deficits in learning-disabled children.

**CSD 388-0 Attention Deficit Disorder and Related Disorders** Identification and treatment of attention deficit disorders and related childhood behavior disorders. Emphasis on objective and subjective assessment, life-span issues, and medical and psychological interventions.

**CSD 392-0 Language Development and Usage** Development of spoken and written language as it relates to child development; includes phonological, morphological, syntactic, semantic, and pragmatic components. Cultural and individual linguistic diversity.

**CSD 396-0 Diagnostic Procedures in Speech and Language Pathology** Evaluation of speech and language disorders. Interviewing, report writing; use of standardized tests; examination of speech sensory and motor functions. Prerequisite: senior standing or above, 392, or consent of instructor.

**CSD 397-0 Introduction to Clinical Procedures in Speech and Language Pathology** Beginning practicum experience in a clinical setting. Emphasis on planning and executing a remedial program for individuals with problems of speech sound production and language usage. Prerequisite: consent of instructor.

**CSD 399-0 Independent Study** Prerequisite: consent of undergraduate dean after submission of petition.

*Undergraduates may take 400-level courses with permission of the instructor.*

## COMMUNICATION STUDIES

The Department of Communication Studies offers liberal arts-oriented course work focused on the most fundamental and pervasive of human activities. The study of human communication ranges from interpersonal processes such as persuasion and relationship formation to organizational processes such as group leadership and dispute resolution, as well as to the strategies and styles of public deliberation and debate and the political and cultural processes involving mass media, the Internet, and telecommunications systems. At the same time, the study of human communication encompasses the scholarly traditions of both the humanities and social sciences. The intellectual foundations for this study range from classical rhetoric to cognitive science, from the economics of computer-mediated communication networks to the ethics of public argument.

### Course Specializations for Departmental Majors

The department has organized the wealth of theory and research on human communication — as well as the real-world applications of that theory and research — into six course specializations. These are interrelated sets of courses that can help students coordinate their choice of classes with their intellectual interests, postgraduate educational plans, and career goals. Students who major in communication studies are encouraged, though not required, to organize their course work within one or two of these specializations as described below.

#### *Organizational Communication*

The success of all organizations — whether small neighborhood groups or giant multinational corporations — depends on effective communication. Organizations must have members who are skilled in the basic communication activities of persuasion, group leadership and decision making, bargaining and negotiation, and team problem solving. And in the contemporary world, organizations also demand the knowledge necessary to analyze and act on information gathered from surveys and other research methods, to harness the resources of communication technology, and to thrive in an environment of diverse individuals. This specialization includes courses that develop basic communication skills as well as courses that examine communication processes in such contexts as task-oriented groups and professional-client relationships. It also includes courses that focus on the organizational challenges associated with technology, information management, cultural diversity, and image building. This specialization will be of interest to students who wish to work — and who will seek to lead — in either business or not-for-profit organizations. To complete this specialization, students must take 201, 250, and 360 and choose a minimum of 3 courses from the following: 205, 229, 270, 275, 329, 340, 341, 343, 350, 361, 362, 363, 364, 365, 366,

371, 391, 393, and appropriate sections of 395 chosen in consultation with an adviser.

### *Communication Industries and Technologies*

Mass communication and telecommunications are reshaping the culture, commerce, and politics of the United States and the world. Media firms are merging into ever-larger organizations that produce film, television, music, books, magazines, newspapers, and software for audiences worldwide. At the same time, technology is breaking down the old distinctions among computers, telephones, video, and print to create new networks that integrate video, voice, and data. These changes present new and sometimes unanticipated challenges to managers in business as well as to leaders in government, education, the arts, and the professions. This course specialization is intended for students who wish to prepare for these challenges by developing an understanding of the social, economic, legal, and technical aspects of mass communication and telecommunications. It will be of interest to students who seek careers in such communication fields as advertising and public relations, management of entertainment and information industries, and public policy making. To complete this specialization, students must take 205 and 270 and select a minimum of 4 courses from the following: 201, 229, 275, 330-1,2, 350, 355, 370, 374, 376, 377, 378, 383, 384, 385, 388, 393, and appropriate sections of 395 chosen in consultation with an adviser.

### *Rhetoric, Media, and Public Culture*

Citizens of the 21st century must understand the communication opportunities, obligations, and risks that emerge in an era of cultural diversification and conflict. This course specialization examines the relationship between communication and culture from a rhetorical and critical perspective — that is, from a point of view emphasizing the use of language and image to characterize social reality, create forums for deliberation and debate, and confront controversial issues and cultural differences. The specialization includes courses that engage the issues raised by differences of race, class, gender, nationality, and political conviction. It also includes courses that examine such cultural processes as the legitimization of social authority, the construction of personal as well as national identity, and the articulation of national purpose and international obligation. The role of the mass media in these issues and processes is of particular concern. This course specialization is intended for students interested in positions of civic leadership, such as in community-based organizations, social reform movements, and cultural, political, and educational institutions. To complete this specialization, students must take 210 and 220 and select a minimum of 4 courses from the following: 275, 310, 315, 322, 324-1,2, 325-1,2,3, 326, 327, 328, 329, 330-1,2, 332, 340, 370, 371,

373, 374, 376, 377, 384, 392, and appropriate sections of 395 chosen in consultation with an adviser.

### *Relational Communication*

Our lives are spent in relationships with others. Most people are born into a family, form friendships, join work groups, and begin romantic attachments that sometimes turn into new family units. Interpersonal communication is the means by which we develop, maintain, and terminate these relationships. The relational communication specialization focuses on these processes. It has four components: courses examining the psychological variables that affect how people create and interpret the communication behaviors that occur during social interaction; courses examining the contexts in which relational communication occurs, such as the family and the work group; courses focusing on strategies and processes of interpersonal influence; and courses focusing on the impact of gender, culture, and other factors on the processes of relational communication. This specialization is intended for students interested in the psychological foundations of human communication as well as students interested in the helping professions (e.g., therapy, counseling). To complete this specialization, students must take 201, 241, and 250 and select a minimum of 3 courses from the following: 205, 340, 341, 343, 344, 350, 360, 366, 378, 382, 390, and appropriate sections of 395 chosen in consultation with an adviser.

### *Media and Politics*

Communication is essential to both effective leadership and citizen participation. Leaders must employ the arts and sciences of communication to negotiate policy, move public opinion, maintain relations with other nations, and of course, win votes. Citizens must understand these arts and sciences if they are to maintain self-government. This course specialization focuses on the role of communication in the political processes of modern democracies, especially on how government officials, candidates, and citizens interact with the mass media in the realm of public affairs. The specialization is intended for students interested in political organizing and consulting, opinion polling, policy analysis, and research work in public interest groups and other not-for-profit organizations. To complete this specialization, students must take 270 and a minimum of 3 courses from the political leadership group, focusing on the rhetoric and strategies of political persuasion, consisting of 315, 322, 325-1,2,3, 328, 330-1,2, 332, 380, and 391; and a minimum of 2 courses from the citizen participation group, concerning Americans' beliefs and the ways they respond to political information, consisting of 201, 205, 331, 355, 370, 371, 372, 373, 380, 383, 384, 388, 392, 393, and appropriate sections of 395 chosen in consultation with an adviser.

### *Argumentation and Advocacy*

Lawyers, policy makers, and indeed all citizens must be able to put forward and defend their views when matters of common concern are debated. This course specialization is based on the conviction that the skills of advocacy can best be cultivated in the liberal arts tradition by uniting intensive practice in the arts of argumentation with theory-based understanding of advocacy and deliberation. In this specialization, courses emphasizing practice require students to think critically about their positions, plan their communicative strategies effectively, and argue their cases forcefully. Courses emphasizing understanding enlarge students' views of the traditions and institutions — especially the law — that shape the processes of advocacy and deliberation on vital issues. Thus prepared, students can take their places as articulate citizens in the various communities to which they belong. The perspectives and skills offered in this specialization are particularly appropriate for students interested in law careers. To complete this specialization, students must take 220 and select 2 practice-oriented courses from 215, 221, and GEN CMN 104 as well as 3 theory-oriented courses from 205, 210, 310, 315, 322, 324-1,2, 325-1,2,3, 326, 327, 330-1,2, 331, 363, 391, and appropriate sections of 393 and 395 chosen in consultation with an adviser.

### **Requirements for a Major in Communication Studies**

14 School of Communication courses:

- GEN CMN 102
- 205, 250, and 270; students should complete these courses and 220 (see below) before the end of the sophomore year because the material covered is prerequisite to more advanced courses
- A 2-course writing sequence consisting of 220, for which students will complete shorter essay assignments, and 394, for which students will complete a longer (25-page) research paper on a topic related to the seminar theme; 394 is taken during the junior year
- An additional 8 200- or 300-level School of Communication courses, at least 5 of which must be in the department; of those 5, at least 4 must be at the 300 level (the following courses may be combined to fulfill no more than 2 of the required units: 1 unit of 290 Forensics, 1 unit of 393 Field Study, 1 or 2 units of 389 Practicum in Communication Research, 1 or 2 units of 399 Independent Study)

Additional requirements:

- A field of concentration outside the School of Communication (normally one of the disciplines of the Weinberg College of Arts and Sciences), consisting of at least 6 courses; of these 6, at least 3 must be 300- or 400-level courses (courses taken to satisfy the School of Communication distribution requirement may be applied to the field of concentration if they fall within the discipline in

which the student chooses to concentrate; a non-School of Communication minor, dual major, or adjunct major satisfies this requirement)

- Language requirement: proficiency in a classical or modern foreign language equivalent to the work covered in a second-year college-level course (proficiency is established in precisely the same manner as in the Weinberg College of Arts and Sciences; see the section on the foreign language requirement in the Weinberg section of this catalog)
- Distribution requirements: 18 courses outside the department, including 3 courses from each of the three School of Communication distribution areas: science, mathematics, and technology; individual and social behavior; and humanities and fine arts
- Electives in communication and other areas to complete a minimum of 45 courses

Courses used to satisfy the major and distribution requirements must receive a grade of C- or higher and cannot be taken P/N.

### **Departmental Honors Program**

The Undergraduate Honors Program in Communication Studies offers an opportunity for highly motivated students to conduct original scholarly research. Through the senior year, each student works closely with faculty to produce an original research project in an interest area determined by the student. Seniors who successfully complete the program will be eligible to graduate with departmental honors. Also see Honors and Prizes in the Undergraduate Education section of this catalog.

### **Courses Primarily for Freshmen and Sophomores**

**GEN CMN 101-0 Interpersonal Communication** See Introductory and Related Courses.

**GEN CMN 102-0 Public Speaking** See Introductory and Related Courses.

**GEN CMN 104-0 Argumentation and Debate** See Introductory and Related Courses.

#### **COMM ST 201-0 Research Methods in Communication**

Foundations of knowledge in many areas of the field, including the nature of interpersonal interaction and the impact of mass media. How communication researchers do their work; how to judge the quality of research products. Prerequisite for many other courses in the department.

**COMM ST 205-0 Theories of Persuasion** Survey of major theories that explain how to change another person's attitudes and behaviors. Applications to persuasion within a variety of contexts, including relationships, organizations, legal campaigns, and the mass culture.

**COMM ST 210-0 The Arts of Controversy: An Introduction to Rhetorical Thinking** Controversy as a rhetorical practice essential to healthy political culture. Use of rhetoric to appreciate different (and frequently conflicting) approaches to issues.

**COMM ST 215-0 Principles of Rhetorical Criticism** Introduction to the critical study of political, legal, and ceremonial rhetoric. Development of skills in analyzing and assessing such rhetoric and appreciating how it reflects and shapes basic social and cultural values.

**PERF ST 216-0 Performance and Culture** See Performance Studies.

**COMM ST 220-0 Theories of Argumentation** Fundamental principles and practice of critical reasoning and public argument. For students interested in legal, academic, or political realms of communication and advocacy.

**COMM ST 221-0 Speech Writing** Theory and practice in the principles of composition and in the preparation and delivery of manuscript speeches.

**COMM ST 229-0 Communication Technology, Community, and Personal Identity** Philosophical, critical, and scientific analysis of how the intensification of technology in cultural, professional, and recreational domains is affecting our social relations and personal identities.

**COMM ST 241-0 Theories of Relational Communication** An overview of communication theories and research dealing with developing, sustaining, and terminating interpersonal relationships. Direct application to friendship, work, and romantic relationships.

**COMM ST 250-0 Team Leadership and Decision Making** Theories and research relating to communication in small groups and group decision making.

**COMM ST 270-0 Theories of Mediated Communication** Introductory survey of current issues in research on the mass media, the Internet, and computer-mediated communication.

**COMM ST 275-0 Persuasive Images: Rhetoric of Contemporary Culture** Analysis of image-making in all forms of popular culture — in film and television but also shopping malls, supermarkets, car dealers, and doctors' offices.

**COMM ST 290-0 Forensics** Independent research and analysis in conjunction with participation in intercollegiate forensics. Credit may not be earned for 290 more than once.

**COMM ST 298-0 Undergraduate Seminar** Student- or faculty-initiated seminars to consider special topics. Credit for 298 may be earned more than once. No more than 2 units of such credit may be applied toward fulfillment of the major requirements.

### **Courses Primarily for Juniors, Seniors, and Graduate Students**

**COMM ST 310-0 Development of Rhetorical Theory** Study of classical and contemporary texts to understand foundational problems, concepts, and claims regarding the political, social, and cultural functions of public discourse.

**PERF ST 311-0 Performance in Everyday Life** See Performance Studies.

**COMM ST 315-0 Rhetoric of Social Movements** Study of traditional theories of opposition derived from sociological and rhetorical analyses of mass movements. Examines

new social movements such as advocacy groups related to abortion, animal rights, feminism, and other local and national issues.

**PERF ST 316-0 Folklore and Oral Traditions** See Performance Studies.

**COMM ST 322-0 Rhetoric of the American Presidency** Offers students the opportunity to conduct an in-depth, quarter-long study of the rhetoric of particular presidents. May only be taken twice for major credit; additional credits count as electives.

**COMM ST 324-1,2 Rhetoric of U.S. Women's Rights** Today women cause no sensation when they address public gatherings, but in the 1820s, when American social reformers broke the taboo, such behavior was scandalous. **1.** Development of the new women's oratorical tradition from its origins through the early 20th century. **2.** Continued development from 1920 to the present.

**COMM ST 325-1,2,3 Rhetorical History of the United States** History of the United States, as studied through key rhetorical texts. Focus on moments of political crisis and cultural change. **1.** Colonial period to the outbreak of the Civil War. **2.** Civil War to World War I. **3.** World War I to the 1960s.

**COMM ST 326-0 African American Rhetoric** Survey of key texts of 20th-century African American public discourse as well as a forum to discuss those texts and engage them analytically and critically.

**COMM ST 327-0 Contemporary Rhetorical Practice** Contemporary history from a rhetorical perspective. Analysis of public communications and rhetorical study of non-oratorical events; emphasis on social movements and political controversy in the United States since 1960.

**COMM ST 328-0 The Rhetoric of War** The genre of war rhetoric; American experience in the 20th century as drawn from speeches, diaries, newspaper reports, government documents, films, and poetry.

**COMM ST 329-0 Rhetoric, Science, and Technology** Contemporary debates on the standing and production of scientific argument. Current controversies over the social constitution and consequences of science and technology.

**COMM ST 330-1,2 Contemporary Problems in Freedom of Speech** Personal freedom and public communication under the U.S. Constitution. **1.** Principles, forms of reasoning, and court decisions governing conflicts between freedom of speech and public order, property rights, personal security, morality, and racial and gender equality in traditional, mass, and new electronic media. **2.** Analysis of selected issues introduced in 330-1. Prerequisite: 330-1.

**COMM ST 331-0 Deliberative Democracy** Examination of the idea that legitimate democracy issues shape the public deliberation of citizens. Topics include questions of pluralism, equality, reason, and rhetoric in public deliberation.

**COMM ST 332-0 The Rhetoric of Multiculturalism** Examination of debates about the meaning and significance of cultural pluralism in American and global politics and about

the rhetorical, communicative, and political challenges this condition raises.

**COMM ST 335-0 Philosophy of Language and Communication**

Relationship between language and human communication behavior. How language structures individual world views; the process of meaning formation; therapeutic communication; the experience of creativity.

**COMM ST 340-0 Community Integration of Labeled People**

Examination of local integration initiatives, the role of professionals, the language used to describe the initiatives, the social service system's responses, and the agents and communities that have constructed inclusive environments for people labeled with disabilities.

**COMM ST 341-0 Communication and Aging** Relationship between adult developmental processes and changes in communication behavior. Prerequisites: 201 and 250.

**RTVF 341-0 Technological Innovations** See Radio/Television/Film.

**COMM ST 343-0 Health Communication** Examination of how communication can enhance and maintain the well-being of citizens in intentional health care contexts.

**COMM ST 344-0 Interpersonal Conflict** In-depth analysis of theories and research examining conflict within relationships. Special emphasis on conflict within friendships, dating relationships, and family. Prerequisites: 201 and 205.

**COMM ST 350-0 Computer-Mediated Communication and Information Systems** Examination and analysis of the tools of and issues in computer-mediated communication and networked information systems; effects of new communication technologies at the interpersonal, group, organizational, and societal levels.

**COMM ST 355-0 Audience Analysis** Methods used to analyze electronic media audiences; emphasis on quantitative research techniques. Prerequisites: 201 (or equivalent) and 270.

**COMM ST 360-0 Theories of Organizational Communication** Theories and research dealing with communication in formal organizations and institutions. Prerequisites: 201 and 250.

**COMM ST 361-0 Intergroup Communication and Urban Change** The small group as an agent of social change in urban society; internal and external communication in such change. Prerequisites: 201 and 250.

**COMM ST 362-0 Professional-Client Communication** Communication between professionals and clients in medicine, law, education, psychotherapy, and social services. Alternatives to the professional-client model of problem solving. Prerequisites: 201 and 250.

**COMM ST 363-0 Bargaining and Negotiation** Communication in bargaining and negotiation in organizational settings. Cognitive and motivational theories emphasizing bargaining and negotiation strategies. Prerequisites: 201, 205, and 360.

**COMM ST 364-0 Collective Decision Making and Communication in Organizations** Research on how organizations make, communicate, and implement collective decisions.

Assessing decision effectiveness, group decision making, leadership in organizations, and organizational design.

Prerequisites: 201 and 360.

**COMM ST 365-0 Solving Problems in Applied Organizational Communication**

Advanced concepts and techniques for defining and analyzing organizational problems. Preparation for recognizing and working with problems in business organizations. Prerequisites: 201 and 360.

**COMM ST 366-0 Organizational Innovation** Organizations and communities depend on innovative ideas, products, or processes to help them solve their problems and to grow in new directions. This course looks at a number of interpersonal and organizational variables as they relate to the production, acceptance, and adoption of new ideas.

**COMM ST 370-0 Current Perspectives in Mass Communication Research** In-depth study of theories currently applied to the study of mass communication. Prerequisites: 201 and 270.

**COMM ST 371-0 Public Opinion** Nature of public opinion; history of techniques for expressing and assessing public opinion. Theories about the relationships among media, public opinion, and policy. Prerequisites: 201, 205, and 270.

**COMM ST 372-0 Mass Communication and Campaign Strategies** Communication components of political campaigns, including broadcast advertising, direct mail, candidate speeches, debates, and news coverage. Campaign professionals share their expertise; students critically examine the effectiveness and appropriateness of campaign strategies and tactics. Prerequisites: 201, 205, and 270.

**COMM ST 373-0 News Media and American Society**

Examination of the news form, content and meaning of the news, and the role of the news media in social continuity and change. Prerequisite: 270.

**COMM ST 374-0 Information and Communication Technology in American Society** Historical, sociological, and philosophical analysis of how developments in information and communication technologies have altered our understanding of ourselves and our world.

**COMM ST 376-0 The Rhetoric of Popular Criticism** How critics communicate their ideas and values to the public. Prerequisite: 275.

**COMM ST 377-0 Marketing Popular Culture** The invention and packaging of popular culture products, including film, music, television, and celebrities. Prerequisite: 275.

**COMM ST 378-0 Online Communities** Examination of the types of computer-mediated interactions and collaborations that occur among people who share common (or perhaps uncommon) interests and of the language they use to express themselves.

**COMM ST 380-0 Political Communication** Nature and functions of communication within established political institutions; decision-making strategies, deliberative discourse, and electoral campaigns; field study of advocacy



and interest groups. Prerequisites: 220 and either 205 or 210.

**COMM ST 382-0 Family Communication Behavior** An overview of the family as a communication system. Intergenerational interaction patterns, intimacy and conflict patterns, decision making, environmental and cultural factors, and enrichment efforts. A wide range of family types and research methods are considered. Prerequisite: 241.

**COMM ST 383-0 Satellites** Historical development and contemporary issues regarding satellites. Government, research, military, and corporate uses of satellites and the relationships between satellites and telecommunications, geostrategic issues, information society, cyberspace, and economic development.

**COMM ST 384-0 Global Media and International Affairs** Analysis of public diplomacy and comparative media systems across nations, exploring the relationships between sovereign states and private media systems.

**COMM ST 385-0 Technology and the American Cultural Landscape** Research seminar focusing on the history of technology in American culture and how it might affect our experience.

**COMM ST 386-0 Science, Technology, and Society** Examination of developments in information and communication technology in the larger context of American science and technology since 1900. Prerequisite: previous course work on the historical or social dimensions of information and communication technology.

**COMM ST 388-0 Internet and Society** The social, cultural, political, and economic implications of information technologies.

**COMM ST 389-0 Practicum in Communication Research** Collaboration with a faculty member on design and execution of a communication research project. Students learn how to complete a research project and write a report. Prerequisite: 201.

**COMM ST 390-0 Children's Culture** Examination of children's media technologies from psychological, sociological, historical, and other perspectives. Reflection on and engagement in the creation of new media for children are intrinsic parts of the course.

**COMM ST 391-0 Ethical Issues in Communication** Ethical problems in public, group, and interpersonal communication; criteria for their resolution.

**COMM ST 392-0 Global Culture and Communication** Examination of current topics and events to familiarize students with the cultural dimensions of globalization and the critical importance of culture and communication in understanding the globalized world.

**COMM ST 393-0 Field Study in Communication** Enrollment only by petition in advance. Arrangements for winter quarter must be made by November 1 and for spring quarter by February 1.

**COMM ST 394-0 Undergraduate Research Seminar** Small seminars in research topics led by different members of

the department faculty. Provides students an opportunity to conduct research. Prerequisite: 220.

**COMM ST 395-0 Topics in Communication Studies** Reading, research, and discussion in areas of significance. Topics vary.

**COMM ST 397-0 Senior Honors Thesis** Students work on a yearlong project, culminating in a senior thesis, with the guidance of a faculty adviser. Upon successful completion a student is eligible to graduate with departmental honors.

**COMM ST 398-0 Undergraduate Seminar** Student- or faculty-initiated seminars to consider special topics. Credit for 398 may be earned more than once. No more than 2 units of such credit may be applied toward fulfillment of the major requirements.

**COMM ST 399-0 Independent Study** Enrollment only by petition in advance.

## INTERDISCIPLINARY STUDIES

For students who would like to combine interests from more than one department, the school offers the interdisciplinary studies major. Majors in interdisciplinary studies may seek a general education with exposure to a broad range of disciplines or a professional preparation from two related areas of communication.

### Requirements for a Major in Interdisciplinary Studies

- A minimum of 3 courses distributed among at least three School of Communication departments and selected from the following: GEN CMN 101, 102, 103, 104, 108, 110; THEATRE 140-1, 140-2, 140-3; RTVF 180; CSD 112
- A minimum of 3 courses at the 200 level distributed among at least three School of Communication departments
- An additional 10 courses in communication at the 200 level or above, distributed among at least two departments, including at least 8 courses at the 300 or 400 level; it is the student's responsibility to take all courses prerequisite for 300- and 400-level courses (eligible students are urged to elect 399 during their senior year; this independent study should be arranged to correlate two of the communication areas the student has studied)
- 6 courses at the 200 level or above outside communication, including at least 3 300-level courses; if they apply, courses taken to meet the distribution requirement may be used to satisfy this requirement
- Distribution requirements: 18 courses outside the school, including 8 courses from the School of Communication distribution areas: 2 from science, mathematics, and technology; 3 from individual and social behavior; and 3 from humanities and fine arts
- Electives in communication and other areas to complete a minimum of 45 courses
- Approval of the dean for undergraduate affairs of major programs for undergraduate work

## PERFORMANCE STUDIES

The Department of Performance Studies integrates artistic and analytical approaches to a wide range of performance texts, events, and processes. The courses explore an interdisciplinary range of literary, cultural, and personal texts in performance. The department has particular strengths in the study of literature through solo performance; the ensemble adaptation and staging of poetic, narrative, and nonfictional texts; intercultural performance; performance art; cultural studies and the ethnography of performance; performance theory and criticism. Internships and field study for performance studies majors extend and deepen their classroom work with experiential learning. Extracurricular work provides students with a variety of opportunities to perform, adapt, and direct, enabling their creative work to reach an audience outside the classroom.

Performance studies majors have been successful in many professions that require intelligence and imagination as well as critical and creative skills. In addition to pursuing careers in professional theatre and arts development, many graduates teach literature, theatre, humanities, and performance studies. Majors have found performance studies an excellent preparation for law school and complementary to their interests in creative writing, communication, new media, anthropology, dance, literature, or social work. Performance studies can be thought of as a major that bridges artistic expression and conceptual analysis, theory and practice. Performance, in its manifold forms, is the subject and the method of study.

### Requirements for a Major in Performance Studies

- Introductory courses: GEN CMN 101 or 102; GEN CMN 103
- 200-level courses: a minimum of 4 courses in communication, including the following courses in the department: 216, 224, and 1 unit of 210-1, 210-2, or 210-3
- Production courses in theatre: 2 courses selected from THEATRE 140-3, 249-1,2, 355, 363; or 1 course selected from the preceding courses and 1 registration for 119; or 2 registrations for 119
- An additional 10 courses in communication, at least 6 of which must be in the department at the 300 or 400 level; not more than 1 unit of either 399 Independent Study or 331 Field Study may apply toward the required 6 300-level performance studies courses, and not more than 2 units of 399 Independent Study and 1 unit of 331 Field Study may apply toward the required total of 10 courses in communication
- 6 courses at the 200 level or above outside communication, including at least 3 300-level courses in literature; students are encouraged to have some experience with literature written in languages other than English (if they apply, courses taken to meet the distribution requirement may be used to satisfy this requirement)

- Distribution requirements: 18 courses outside the school, including 10 courses from the School of Communication distribution areas: 2 from science, mathematics, and technology; 3 from individual and social behavior; and 5 from humanities and fine arts
- Electives in communication and other areas to complete a minimum of 45 courses

### Courses Primarily for Freshmen and Sophomores

#### GEN CMN 103-0 Analysis and Performance of Literature

See Introductory and Related Courses.

**PERF ST 210-1 Performance of Poetry** Introduction to the analysis and performance of poetry. Prerequisite: GEN CMN 103 or equivalent.

**PERF ST 210-2 Performance of Narrative Fiction** Introduction to the study of narrative performance. Prerequisite: GEN CMN 103 or equivalent.

**PERF ST 210-3 Performance of Drama** Introduction to drama and theatricality from a performance studies perspective. Prerequisite: GEN CMN 103 or equivalent.

**PERF ST 216-0 Performance and Culture** Performative bases of culture; ritual, festival, and ceremony.

**PERF ST 224-0 Adapting Narrative for Group Performance** Introduction to theories and methods of adapting narrative for the stage, with special emphasis on chamber theatre. Prerequisite: GEN CMN 103 or equivalent.

### Courses Primarily for Juniors, Seniors, and Graduate Students

Unless otherwise indicated, 1 200-level course in the department is a prerequisite.

#### PERF ST 307-1,2 Studies in Gender and Performance

**1.** Introduction to theories on gender in relation to selected literary texts. How gender is prescribed, reinforced, and transgressed; how race, class, and sexuality disrupt and/or affirm these representations. **2.** Examination of theories of gender performance from a cultural studies perspective. Close attention to live performance, including drag, performance art, and film. A third course in this series (THEATRE 307) is offered by the Department of Theatre.

**PERF ST 308-0 Performing Modern and Contemporary Poetry** Use of performance in the analysis and criticism of modern and contemporary poetry.

**PERF ST 309-0 Performance of Black Literature** Exploration of black poetry, short fiction, and novels, as literary texts and cultural texts, through solo, duo, and group performance. The literary genre will vary from year to year.

**PERF ST 310-0 Literature and Performance of Women of Color** Literary expressions by native, Latina, African, and Asian American women reflecting intersections of gender, sexuality, ethnicity, class, and culture in the United States. Feminisms considered across race and culture. Includes poetry, fiction, autobiography, drama, and critical theory.

**PERF ST 311-0 Performance in Everyday Life** Conceptual view of human beings as actors. Dramatism and the perspective of life as theatre.

**PERF ST 315-0 Nonfiction Studies** Exploration of the dramatic impulse in nonfiction texts. Emphasis on autobiographical one-person shows.

**PERF ST 316-0 Folklore and Oral Traditions** Genres of oral literature and an introduction to the methods and aims of folklore research. The nature of verbal art as performance and the importance of cultural context.

**PERF ST 318-1 Shakespeare's English Histories** Use of performance in the analysis and criticism of Shakespeare's two tetralogies of English history plays.

**PERF ST 318-2 Shakespeare Adaptations** Use of performance in the analysis and criticism of selected Shakespeare plays and their adaptations by other writers.

**PERF ST 321-0 Performing the American '50s** Use of performance in the analysis and criticism of selected postwar American literature.

**PERF ST 322-0 Performing the Psychological Novel** Use of performance in the analysis and criticism of selected 19th- and 20th-century novels.

**PERF ST 324-1,2 Presentational Aesthetics** 1. Theatrical convention, presentational mode, and conscious artifice in the performance of dramatic literature, poetry, and nonfiction. 2. Theory and practice of chamber theatre, its conventions and presentational modes; adaptation, staging, and performance of prose fiction. Choice of performer's or director's perspective. Prerequisite: 224.

**PERF ST 326-1,2 Performance Art** 1. History, development, and theories of performance art as a live-art genre from the modernist avant-garde to contemporary cross-cultural forms. Media in all forms, with emphasis on performance process and audience relationship. 2. Further theoretical and laboratory exploration of compositional processes and political strategies of performance, media, and event/audience contexts.

**PERF ST 327-0 Field Methods in Performance Studies** Theory and practice of fieldwork on performance; practical fieldwork experience.

**PERF ST 328-0 Studies in James Joyce** Primary emphasis on extensive critical study and performance of Joyce's *Ulysses*, resulting in either a lecture-performance, a recital, or a research paper.

**PERF ST 329-0 Performing Individual Poetic Styles** Content varies. Major poems of a significant writer or writers, permitting in-depth encounter with the writer, cultural context, and performance-related issues.

**PERF ST 330-0 Topics in Performance Studies** Readings, discussion, and creative work in performance studies research and artistic practice. Topics vary. May be repeated for credit.

**PERF ST 331-0 Field Study/Internship in Performance Studies** Intensive participation in off-campus production

and/or field research experience. Departmental approval required.

**PERF ST 332-0 Urban Festivity** Ethnographic study of festivals, parades, exhibitions, civic celebrations, and other genres of urban cultural performance. Multiethnic expressions of Chicago identity. Field research methods.

**PERF ST 334-0 Human Rights and Radical Performance** How social movements, local communities, and individual activists from specific regions around the world use performance to seek political empowerment and social justice. Performance as theory, method, and event in the arts of resistance; human rights as ideology and praxis within indigenous histories, imaginaries, and contexts.

**PERF ST 335-0 Social Art Tactics** Exploration of historical and theoretical foundations of social art practice, including work focused on social change in such genres as performance, digital media, relational art, and photography. Performance/art workshops; development of performance-based interventions.

**PERF ST 336-0 Performance of Latina/o Literature** Exploration of U.S. Latina/o literature through narratives of migration, annexation, exile, and diaspora; focus on the arrival and development of Latina/o cultural enclaves in the United States. Use of performance to understand further such materials as autobiography, narrative fiction, drama, poetry, and radio commentary.

**PERF ST 338-0 Family Stories, Memoirs, and Diaries** Use of performance to explore family stories, memoirs, diaries, and other biographical and autobiographical sources.

**PERF ST 399-0 Independent Study** Prerequisite: consent of undergraduate dean after submission of petition.

## RADIO/TELEVISION/FILM

The Department of Radio/Television/Film offers education in the history, theory, and production of media. Broad-based and interdisciplinary in orientation, the department offers a range of perspectives on media forms from cinema to broadcast and cable television to alternative media to emerging technologies. Courses emphasize that media are social and cultural practices in dialogue with the broader context of the humanities. The department is dedicated to integrating theory and practice, creating intersections with other disciplines, and fostering cutting-edge media production. Originality, critical analysis, and vision are valued in both scholarly research and creative work. The department's goal is to educate students and citizens to critically interpret contemporary media, envision alternative structures in theory and practice, and reinvent the media of the future.

Production facilities include 16mm film and HD equipment, sound stage, and editing; field video and multiple-camera television studio facilities; linear and non-linear video editing; advanced audio postproduction; and state-of-the-art computer graphics. Students operate the

7,200-watt FM radio station WNUR, which serves the Chicago area and also broadcasts on the Internet. The School of Communication funds four active student-run cocurricular production groups and offers juniors and seniors numerous opportunities for internships at Chicago-area television and radio station and production companies. Frequent guest lectures are offered by alumni with careers in media and by other well-known professionals.

### Requirements for a Major in Radio/Television/Film

- Introductory courses: 190 (190 and sophomore standing are the prerequisites for all 300-level production courses); a minimum of 3 courses in communication at the 100 or 200 level outside the department
- 200-level courses: 220, 230, and 1 other 200-level course in the department or COMM ST 275
- An additional 8 courses in communication at the 300 and 400 levels, including at least 6 courses in the department at the 300 and 400 levels; not more than 1 unit of 349 Internship in Radio/Television/Film and 1 unit of 399 Independent Study may be applied toward the 6 courses required in the department; the remaining internship and 399 units count as elective credits
- 6 courses at the 200 level or above outside communication, including at least 3 courses at the 300 level or above; courses taken to meet the distribution requirement may be used to fulfill this requirement
- Language requirement: competency in a modern foreign language, which may be established by a placement exam; completion of the fourth quarter or a higher class; or an AP score of 3, 4, or 5
- Distribution requirements: 18 courses outside the school, including 8 courses from the School of Communication distribution areas: 2 from science, mathematics, and technology; 3 from individual and social behavior; and 3 from humanities and fine arts
- Electives in communication and other areas to complete a minimum of 45 courses

### Courses Primarily for Freshmen and Sophomores

**RTVF 190-0 Media Construction** Introduces the core components of media: idea, image, sound, and sequence, while teaching the technical fundamentals involved in shooting and editing video. Students work with SLR and digital video cameras, with Photoshop and Final Cut Pro editing software. Four projects in different genres must be completed over the course of the quarter. This course is a prerequisite for all upper-level production courses. Required for majors; typically taken in freshman year.

**RTVF 202-0 Freshman Topics Seminar** Beginning seminar focused around a special topic of media analysis, history, or theory. Freshmen will learn research, analytic, and writing skills while focusing on issues relevant to film, media and/or digital arts and culture.

**RTVF 220-0 Analyzing Media Texts** Introduction to the study of the moving image. Basic elements of style across media including film, television, and interactive media. Focus on close analysis of texts to find significance. Prerequisite for upper-level courses in the department. Required for majors; typically taken in freshman year.

**RTVF 230-0 Understanding Media Contexts** Media industries as social and cultural forces; economic and political dimensions of the global media. Required for majors; typically taken in freshman year.

**RTVF 260-0 Foundations of Screenwriting** Introduction to writing for the screen (film, television, and/or computer). Structure, character, dialogue, format, voice, scope, pace, context. Lecture/workshop. Prerequisite for upper-level writing courses in the department.

**COMM ST 275-0 Persuasive Images: Rhetoric of Contemporary Culture** See Communication Studies.

**RTVF 298-0 Studies in Media Topics** Theoretical or practical or both; emphasis on evolving trends.

### Courses Primarily for Juniors, Seniors, and Graduate Students

**RTVF 301-0 Race and Ethnicity in Film and TV** How race and ethnicity are depicted in film and media; audience response, activism, and/or alternative media production by groups of color.

**RTVF 310-0 Television History** Political, cultural, social, and industrial history of television, from the classic network era to the postnetwork contemporary period of media convergence. Exploration of programs as well as major events and shifts in television history.

**RTVF 312-1, 2 History of Film** International survey of motion pictures as a distinctive medium of expression from its prehistory to the present.

**RTVF 313-1 Documentary Film: History and Criticism** Survey of the schools, styles, and purposes of documentary film as a unique form of artistic expression and sociopolitical persuasion.

**RTVF 313-2 Documentary Film and Video** Contemporary work and issues in documentary film and video.

**RTVF 321-0 Radio/Television/Film Authorship** Idea of authorship in the media and an examination of different uses of author theory related to the work of particular artists.

**RTVF 322-0 Radio/Television/Film Genre** Concept of genre in the media, with reference to popular American forms.

**RTVF 323-1 Experimental Film: History and Criticism** Films and theories of experimentalists since the 1920s; contemporary underground movement.

**RTVF 323-2 Experimental Film and Video** Contemporary work in experimental film and video.

**RTVF 325-0 Film, Media, and Gender** Explores issues of gender in film and media. Introduces students to major debates and theories regarding gender and sexuality in the media.

**RTVF 326-0 Film and TV Criticism** Contemporary critical methods applied to film and/or television. Students read literature on critical methods and analysis and write critical analyses of films and television programs.

**RTVF 330-0 Culture Industries** Overview of business and social organization of film and television industry. Introduction to how media industries produce cultural products for local, national, and transnational audiences.

**RTVF 331-0 Regulation of Broadcasting** Government regulation and industry self-regulation; historical perspective and examination of current issues.

**RTVF 334-0 Media Arts and Visual Culture** An exploration of the way artists use electronic media as forms of visual expression and how artists have historically appropriated communication technologies such as radio, video/television, and computers.

**RTVF 341-0 Technological Innovations** How technology develops and is assimilated into mass media.

**RTVF 342-0 Program Planning and Programming** Programming broadcast stations, networks, and cable in relation to audiences, markets, coverage, policies, and facilities.

**RTVF 345-0 History of Hollywood Cinema** Overview of the development of the classical Hollywood cinema, with particular emphasis on the 1920s through the early 1960s. Explores the relationship between industry practices and aesthetic features of classical narrative film genres.

**RTVF 349-0 Internship in Radio/Television/Film** (1–4 units) Selected students work in production departments of radio and television stations and film studios. Guided research and reading.

**RTVF 351-0 National Cinema** Historical aspects of cinema in a culture outside the United States or a social/cultural/intellectual movement within the general evolution of cinema.

**RTVF 353-0 Film, Media, and Globalization** Explores theories of media's role in the globalization of cultures. Examines transnational production, marketing, and reception of film, television, and/or digital media.

**COMM ST 355-0 Audience Analysis** See Communication Studies.

**RTVF 360-0 Topics in Screenwriting** Various approaches to screenwriting, emphasizing different modes and genres, such as the short film, the feature film, screenplays based on preexisting material, the teen film, interactive computer scenarios. May be taken twice for credit, depending on the change in topic. Prerequisite: 260.

**RTVF 372-0 Editing** The technique and art of editing for film. Topics include editing for continuity, controlling pace and rhythm, and editing nonlinear narratives. Prerequisites: 190, 380, and sophomore standing.

**RTVF 375-0 Designing for the Internet** Design concepts as they relate to the web in an intensive studio/workshop environment. Prerequisites: 190 and sophomore standing.

**RTVF 376-0 Interactive Media** Exploration of the techniques and aesthetics of interactivity using various media.

Prerequisites: 190, sophomore standing, and consent of instructor.

**COMM ST 377-0 Marketing Popular Culture** See Communication Studies.

**RTVF 379-0 Topics in Film/Video/Audio Production** In-depth study and practice of one area of film, video, or television. May be taken more than once for credit, depending on changes in topic. Prerequisite: 380.

**RTVF 380-0 Lighting and Cinematography** Techniques, aesthetics, and technologies of lighting and camera skills, including film and video. Prerequisites: 190 and sophomore standing.

**RTVF 383-0 Sound Production** Techniques and technologies of audio production, emphasizing location recording. Survey of techniques used for film, video, experimental audio, and radio production. Postproduction includes work with a digital audio workstation. Lecture/laboratory.

**RTVF 384-0 Foundations of Sound Design** Aesthetics and techniques of the sound/image relationship in media.

**RTVF 385-0 Integrated Media Arts** Introduction to theory and practice of media using microcomputers. For nonmajors.

**RTVF 390-0 Directing** Single-camera dramatic directing, including visualization and breakdown of scripts, camera blocking, and working with actors. Prerequisites: 190 and sophomore standing.

**RTVF 391-0 TV Studio Directing** Directing, crewing, and technical skills for multiple camera live-on-tape television production in narrative and nonnarrative genres; preproduction, directorial communication, blocking, pacing, visualization. Prerequisite: 380.

**RTVF 392-0 Documentary Production** Students examine documentary practices and produce their own shorts. Prerequisites: 190 and sophomore standing.

**RTVF 393-0 2-D Computer Animation** Animation techniques in the 2-D sphere and incorporation of visual design principles.

**RTVF 394-0 Experimental Media Production** Creation of an experimental work as a linear film or video, an interactive web site, an installation, a game, or a multidisciplinary performance. Prerequisites: 190 and sophomore standing.

**RTVF 395-0 Computer Animation: 3-D** The fundamental concepts and techniques of 3-D computer modeling and animation. Use of concepts acquired in camera-based production techniques to create a rendered animation. Prerequisites: 190 and sophomore standing.

**RTVF 397-1,2 Advanced Production, Advanced Postproduction** Two-quarter sequence for students creating advanced artistic production, with critique of work throughout the production and postproduction process; conceptual resources offered as needed. Students may work in any genre (documentary, narrative, experimental) and any medium. Admission based on portfolio of previous media work and proposal for project, including script and budget.



**RTVF 398-0 Symposium: Issues in Radio/Television/Film**

Special issues and topics in the analysis of radio, television, film, and popular culture.

**RTVF 399-0 Independent Study** Prerequisite: consent of undergraduate dean after submission of petition.

**THEATRE**

Of all the performing arts, none draws on the rich variety of human experience more fully than theatre. Theatre communicates the drama of life — whether the past, present, or future, and whether real or imagined — with immediacy, excitement, and eloquence. The student of theatre, therefore, must be a student of human society and must understand how social forces impinge on human behavior. To paraphrase Boswell, students of the theatre take as their subject the entire system of human life.

For this reason students who major in theatre at Northwestern combine a liberal arts education with intensive training in the theories and arts of the theatre. At the heart of the theatre program lies the idea that the best theatre artist is the one who combines a broad knowledge of the literature and theory of the field with highly developed skills in its practice.

Students spend approximately one-third of their program studying in the Department of Theatre, including courses in history, literature, and criticism; acting, voice, and movement; directing; stage production; design; playwriting; dramaturgy; creative drama and children's theatre; and dance. Students develop the ability to approach problems and issues from a variety of perspectives while developing skills in research and writing, laboratory work, group discussion, oral presentation, performance, and production. Another third of the program comprises distribution requirements outside the department, and a final third is devoted to elective courses selected from a wide spectrum of University offerings.

A major in dance is also available within the Department of Theatre. The dance major prepares students for further advanced academic work or a wide range of positions in professional dance. The major's comprehensive curriculum emphasizes the study of dance as well as the act of dancing. Students are prepared for lifetime involvement in the field and for continued development intellectually, artistically, and professionally within the dance world. In addition to dance technique and choreography, the program provides students with opportunities for writing, research, and analysis in the field. The major presents a well-integrated view of dance while also providing sound technical training in a variety of forms, with modern dance and jazz as the foundation techniques. The department offers a number of dance organizations and performing opportunities.

**Requirements for a Major in Theatre**

- Introductory courses  
THEATRE 140-1 Theatre in Context, 140-2 Theatre in Context, 140-3 Production in Context (includes one build crew and one run crew)  
GEN CMN 110 Voice for Performance  
GEN CMN 103 Analysis and Performance of Literature or 1 performance studies or radio/television/film course
- Production: one registration for THEATRE 119, taken in the sophomore year (0 units)
- 10 200- and 300-level theatre courses, with a minimum of 5 courses at the 300 level or above, with courses from each of the following groups:

**Performance** (at least 2 courses)

THEATRE 210 Training the Actor's Voice  
THEATRE 243-1,2,3 Acting I: Principles of Characterization  
THEATRE 253-1,2 Mime  
THEATRE 260 Fundamentals of Stage Directing  
THEATRE 310 Advanced Voice/Styles  
THEATRE 311 Dialects for the Stage  
THEATRE 312-1 The Art of Storytelling  
THEATRE 330 Special Topics  
THEATRE 340-1,2 Stage Directing  
THEATRE 341-1,2,3 Acting II: Analysis and Performance  
THEATRE 346-1,2,3 Playwriting  
THEATRE 347 Children's Theatre  
THEATRE 348-1 Creative Drama  
THEATRE 348-2 Advanced Creative Drama  
THEATRE 349-1,2,3 Acting III: Problems in Style  
THEATRE 359 Directing for the Open Stage (see Graduate School catalog)  
THEATRE 442 Theatre Practice: Children's Theatre Tour (see Graduate School catalog)

**Design/technology** (at least 2 courses at the 200 level)

THEATRE 240-1,2,3 Stagecraft  
THEATRE 241-1,2,3 Design Process  
THEATRE 242 Stage Makeup  
THEATRE 249-1 Introduction to Stage Management  
THEATRE 249-2 Advanced Stage Management  
THEATRE 263 Theatre Sound  
THEATRE 330 Special Topics  
THEATRE 342 Lighting Design II  
THEATRE 343 Scene Design II  
THEATRE 344 Costume Design II  
THEATRE 350 Production Management  
THEATRE 353 Topics in Stagecraft  
THEATRE 354 History of Costume and Décor  
THEATRE 355 Scene Painting  
THEATRE 356-1,2,3 Graphic Arts for the Stage Designer  
THEATRE 357-1,2 Freehand Drawing for the Stage Designer

THEATRE 361 Textile Arts and Crafts for the Costume Designer  
 THEATRE 363 Theatre Sound  
 THEATRE 364-1,2,3 Period Pattern Drafting and Draping  
 THEATRE 379 Topics in Stage Management and Leadership

**History, literature, and criticism** (at least 3 courses)  
 2 of the 3 courses must come from the same area of study; for a copy of the current academic year's "Linked Sequences in History, Literature, and Criticism," see a theatre adviser in office 215 of the Theatre and Interpretation Center

- Courses outside communication: 6 courses at the 200 level or above, including at least 3 courses at the 300 level or above (may include courses taken to meet the distribution requirement)
- Distribution requirements: 18 courses outside the school, including 8 courses from the School of Communication distribution areas: 2 from science, mathematics, and technology; 3 from individual and social behavior; and 3 from humanities and fine arts
- Electives in communication and other areas to complete a minimum of 45 courses

### Theatre Courses Primarily for Freshmen and Sophomores

**THEATRE 119-0 Production Laboratory** (0 units) Registration for students fulfilling production crew requirements.

**THEATRE 140-1,2 Theatre in Context** 1. Combination of lecture, discussion, assignments, play viewing, and text analysis. 2. Seminar in three sections emphasizing theatre history, literature, and criticism; research; and writing skills. Prerequisite: consent of department.

**THEATRE 140-3 Production in Context** A combination of lecture, discussion, and production lab participation implementing the directing and design process of a theatrical production. Prerequisite: consent of department.

**THEATRE 143-0 Acting: Basic Techniques** For nonmajors. Introduction to the study of acting: sensory response, imagination, and characterization work leading to prepared scenes from selected plays.

**THEATRE 210-0 Training the Actor's Voice** Training and development of the actor's voice, integrating work in GEN CMN 110 with use of heightened text. Students work to develop optimal pitch and vocal range, improve articulation, and develop skills in intonation and stress through performance of scenes, monologues, and Shakespeare sonnets. Prerequisites: GEN CMN 110 and consent of instructor.

**THEATRE 240-1,2,3 Stagecraft** Craft and technology used in mounting a theatrical production. Crew participation in department productions. 1. Lighting: mechanics, physics, and practices of the stage lighting technician. 2. Scenery: construction, rigging, and handling. 3. Costumes: sewing

techniques, fitting, equipment, and fabrics. Prerequisite: sophomore standing or consent of instructor.

**THEATRE 241-1,2,3 Design Process** Development of stage design for the theatrical designer, from initial reading of the script to final design. Crew participation in department productions. 1. Scene design I. 2. Costume design I.

3. Lighting design I. Prerequisite: sophomore standing and consent of instructor.

**THEATRE 242-0 Stage Makeup** Theory and practice of stage makeup. Crew participation in department productions. Prerequisite: consent of instructor.

**THEATRE 243-1,2,3 Acting I: Principles of Characterization** 1. Basic concepts. 2. Dramatic imagination. 3. Dramatic characterization. Prerequisites: 140-1,2 (or equivalent) and consent of instructor.

**THEATRE 244-1,2 Development of Contemporary Theatre** Critical study of major dramatists, theories, and production styles. 1. 1870–1920. 2. 1920–present.

**THEATRE 249-1 Introduction to Stage Management** Preproduction, rehearsal, and technical rehearsal process of theatrical productions. Basic stage management tools taught in theory: assembling a production book, blocking, scheduling, communication, and cueing. Prerequisite: consent of instructor.

**THEATRE 249-2 Advanced Stage Management** Problem solving in the stage manager's leadership role; advanced study in production realization and communication. Students will be required to stage manage or assistant stage manage a department production and will prepare a production book based on the production. Prerequisite: consent of instructor.

**THEATRE 253-1,2 Mime** 1. Basic training in the arts of mime, including physical awareness, imagination, object techniques, illusion, sculpture, creation of environments, and the process of formulating performable mime pieces. 2. Creation of solo and group mime dramas, culminating in a recital performance at the end of the quarter. Prerequisite: consent of instructor.

**THEATRE 260-0 Fundamentals of Stage Directing** An introductory course focusing on defining the role of the director while discovering a variety of directorial strategies. Prerequisite: consent of instructor.

**THEATRE 263-0 Theatre Sound** An introductory class in sound design for the theatre. Crew participation in department productions. Prerequisite: consent of instructor.

**THEATRE 272-0 Special Topics: Music Theatre** (2 quarters, .5 units each) Recommended for sophomore theatre majors interested in music theatre.

### Theatre Courses Primarily for Juniors, Seniors, and Graduate Students

Unless otherwise noted, these courses are open only to students who have completed the departmental 200-level requirements or their equivalents.

**THEATRE 307-0 Studies in Gender and Performance**

Exploration of recent research on the social and political background of gender, particularly women's access to performative expressions. Historical aesthetics: changing debates on women's participation in the public theatre and the significance of the body in performance. PERF ST 307-1,2 are the first 2 courses in this series.

**THEATRE 310-0 Advanced Voice/Styles** Advanced vocal techniques of the stage actor. Vocal styles include Molière, Restoration comedy, Shaw, Coward, Stoppard. Prerequisites: GEN CMN 110 (or equivalent) and consent of instructor.

**THEATRE 311-0 Dialects for the Stage** Using the International Phonetic Alphabet, dialect recordings, and selected text, students learn dialects for stage and film performance. Principal dialects covered: standard British, Cockney, Irish, French, Russian, German. Prerequisites: GEN CMN 110 (or equivalent) and consent of instructor.

**THEATRE 312-1,2 The Art of Storytelling** Ancient traditions and current renaissance of storytelling. Strategies for selecting, preparing, and sharing stories in performance. Applications in theatre, communication, education, religion, law, healing professions, leadership, and business. **1.** Basic techniques. **2.** Advanced techniques of research, preparation, and performance, culminating in a public event. Students use storytelling in presentations and performance. Prerequisites for 312-2: 312-1 and consent of instructor.

**THEATRE 330 Special Topics** Content varies. May be repeated with change of topic. Prerequisite: consent of instructor.

**THEATRE 339 Advanced Acting** Scene-study course in advanced acting techniques emphasizing scene analysis and character development. Focus on creation of realistic characters from modern theatre. Primarily intended for graduate students and undergraduate transfer students. Prerequisite: consent of instructor.

**THEATRE 340-1,2 Stage Directing 1.** Staging fundamentals: blocking, movement, business, tempo, script selection and analysis, casting, and rehearsal planning. **2.** Special problems: exposition, suspense, surprise, marking of climaxes, and creation of mood. Prerequisite: consent of instructor.

**THEATRE 341-1,2,3 Acting II: Analysis and Performance** Theory, principles, and techniques of interpretation of drama from the point of view of the actor. **1.** Greek tragedy. **2.** Shakespeare. **3.** Modern drama. Prerequisite: consent of instructor.

**THEATRE 342-0 Lighting Design II** For advanced undergraduate lighting design students and graduate students studying lighting design as a secondary area. Lectures and design projects. Prerequisites: 241-3 and consent of instructor.

**THEATRE 343-0 Scene Design II** For advanced undergraduate set design students and graduate students studying scene design as a secondary area. Lectures and design projects. Prerequisites: 241-1 and consent of instructor.

**THEATRE 344-0 Costume Design II** For advanced undergraduates studying costume design and graduate students studying costume design as a secondary area. Lectures and design projects. Prerequisites: 241-2 and consent of instructor.

**THEATRE 345-1,2,3 History of Western Theatrical Practice** Comprehensive survey of the theory and history of theatre and drama. **1.** The classical period. **2.** The Middle Ages, Renaissance, and early 17th century. **3.** Late 17th century through the modern era.

**THEATRE 346-1,2,3 Playwriting** Fundamental techniques of playwriting. A yearlong sequence aimed at developing an original full-length play. Prerequisites: junior or senior standing and consent of instructor.

**THEATRE 347-0 Children's Theatre** Selection, evaluation, direction, and production of plays for children. Prerequisite: consent of instructor.

**THEATRE 348-1 Creative Drama** Process-centered improvisation and its applications to teaching, performance, therapy, writing, recreation, and other areas. Prerequisite: consent of instructor.

**THEATRE 348-2 Advanced Creative Drama** Explores improvised drama as a teaching method and a means of learning for the elementary school child. Theory and practice through reading, discussion, films, and observation. Course culminates in extended teaching projects with children from local schools. Prerequisites: 348-1 (or equivalent) and consent of instructor.

**THEATRE 349-1,2,3 Acting III: Problems in Style** Advanced problems in acting theories and styles. **1.** Comedy. **2.** Contemporary drama. **3.** Special topics. Prerequisite: consent of instructor.

**THEATRE 350-0 Production Management** Role and duties of a production manager. Experience in production management. Production management of modern shows in different venues. Prerequisite: consent of instructor.

**THEATRE 351-0 Staging of Contemporary Drama** Production problems peculiar to directing of plays for contemporary theatre. Prerequisite: 340-1,2 or equivalent.

**THEATRE 352-1,2 Music Theatre Techniques** Various performance styles of musical theatre. Current topic will be listed in the quarterly class schedule. May be repeated for credit with change of topic. Open to students in the Music Theatre Certificate Program or by consent of instructor. Prerequisites: junior standing and 243-1,2,3.

**THEATRE 353-0 Topics in Stagecraft** Seminars with guest or resident faculty on topics in stagecraft. Prerequisite: consent of instructor.

**THEATRE 354-0 History of Costume and Décor** Style and aesthetics of art, architecture, fashion, and decorative arts. Special emphasis on periods of theatrical production. Current topic will be listed in the quarterly class schedule. May be repeated for credit with change of topic. Prerequisite: consent of instructor.

**THEATRE 355-0 Scene Painting** Traditional and contemporary theory and practice of scene painting. Lecture and studio. Lab fee required. Prerequisite: consent of instructor.

**THEATRE 356-1,2,3 Graphic Arts for the Stage Designer** Techniques and materials of graphic communication for the stage designer. May be repeated for credit with change of topic. Crew participation in department productions may be required. **1.** Perspective, rendering, and color. **2.** Theatrical drafting and calligraphy. **3.** Theatrical model building and three-dimensional design development. Prerequisite: junior standing or consent of instructor.

**THEATRE 357-1,2 Freehand Drawing for the Stage Designer** Drawing for scenery, costume, and lighting designers; principles of drawing and composition using a variety of drawing materials. Lecture and studio. Prerequisite: consent of instructor.

**THEATRE 361-0 Textile Arts and Crafts for the Costume Designer** For advanced undergraduate and graduate students studying costume design. Topics may include fabric dying, fabric modification, wig ventilation, millinery construction, and yarn arts. May be repeated for credit with change of topic. Prerequisites: 344 and consent of instructor.

**THEATRE 362-0 20th-Century Stage Design** Major stylistic developments in 20th-century scenography and scene, costume, and lighting design. Emphasis on the American artist in context of the major influences that have shaped the craft. Prerequisite: consent of instructor.

**THEATRE 363-0 Theatre Sound** Planning and execution of sound for theatrical production; design of the actor's acoustical environment. Crew participation in department productions. Prerequisites: junior standing and consent of instructor.

**THEATRE 364-1,2,3 Period Pattern Drafting and Draping** Techniques of flat pattern drafting and advanced construction used to create historical garment patterns for the stage. **1.** Flat patterns. **2.** Draping. **3.** Period patterns. Prerequisites: junior standing and consent of instructor.

**THEATRE 365-1,2 American Theatre and Drama** Survey of American theatre and drama; examines relevance of plays, performances such as pageants and blackface minstrelsy, theatre companies, and their original contexts to their national identity. **1.** Beginnings through the 1930s. **2.** 1940s to present. Prerequisite: 140-1,2 or consent of instructor.

**THEATRE 366-0 Special Topics in History, Literature, or Criticism** Content varies. Studies of individual playwrights, national or regional theatres, historical periods, performance practices, or theoretical inquiries. Prerequisite: 140-1,2 or consent of instructor.

**THEATRE 367-0 History of the Lyric Theatre** Three-part course, covering the major movements in the histories of dance, opera, and musical comedy. Examination of artists and their works.

**THEATRE 368-0 African Theatre and Drama** Major practices in African theatre and drama. Topics may include festival

practices, traveling and popular theatres, Anglophone drama, nationalist dramas, reappropriation of the Western canon, or theatre for development. Prerequisite: 345-1, -2, or -3 or AF AM ST 259 or consent of instructor.

**THEATRE 369-0 Latin American Theatre** Explores the intersection of theatre and politics in modern and contemporary Latin American theatre by linking dramatic texts to readings in history, genre, and theory.

**THEATRE 373-0 Computer Graphics for the Theatre Artist** Computer graphics for the stage designer. Investigation of available software programs and strategies for use in theatre. Current topic will be listed in the quarterly class schedule. May be repeated for credit with change of topic. Lecture/laboratory. Crew participation in department productions may be required. Prerequisite: consent of instructor.

**THEATRE 374-0 Text Analysis for Theatrical Production** Seminar in analysis of dramatic and nondramatic texts as it relates to the problems of realized theatrical production. Prerequisite: consent of instructor.

**THEATRE 376-0 Participation Theatre for Young Audiences** Participation and story theatre, incorporating improvisation into the structure of a scripted play for the child audience. Prerequisite: consent of instructor.

**THEATRE 379-0 Topics in Stage Management and Leadership** Leadership versus management, delegating, team building, theatrical hierarchy, organizing the design process. Advanced study in leadership, management, communication, and actor-director-designer relationships. Course requires stage managing a mainstage production. Prerequisite: consent of instructor.

**THEATRE 380-0 Internship in Theatre Practice** (3 units for undergraduates; 2 units for graduates) Production and/or management activities in a theatre company. Prerequisite: consent of department.

**DANCE 387-0 Theatre/Dance Practicum** See Dance.

**THEATRE 399-0 Independent Study** Prerequisite: consent of undergraduate dean after submission of petition.

## Requirements for a Major in Dance

- Introductory courses: DANCE 101-1,2,3; THEATRE 119 (2 quarters, no credit); 1 course from the following: GEN CMN 101, 102, 103, 108, 110
- Upper division core requirements: DANCE 201, 202, and 395
- 200- or 300-level communication courses: 3 courses
- Dance techniques: at least 4 units (each dance technique class carries .33 units of credit), which must include DANCE 140 Cultural Forms as well as at least 1 unit of modern taken sequentially and 1 unit of jazz taken sequentially, each in consecutive quarters in a single academic year; selected from  
DANCE 110 Movement for the Stage  
DANCE 120 Topics in Preparation for Performance

DANCE 130 Music Theatre Dance  
 DANCE 150 Modern I  
 DANCE 160 Jazz I  
 DANCE 170 Ballet I  
 DANCE 180 Tap I  
 DANCE 250 Modern II  
 DANCE 260 Jazz II  
 DANCE 270 Ballet II  
 DANCE 280 Tap II  
 DANCE 350 Modern III  
 DANCE 360 Jazz III  
 DANCE 370 Ballet III  
 DANCE 380 Tap III

- At least 6 courses chosen from the following categories:

**Performance** (at least 2 credits)

DANCE 225 Dance Composition  
 DANCE 235 Choreography for Music Theatre  
 DANCE 325 Advanced Choreographic Study  
 DANCE 326 Advanced Improvisation  
 DANCE 345 Studies in Collaboration  
 DANCE 387 Theatre/Dance Practicum  
 DANCE 465 Studies in Dance (see Graduate School catalog)

**History, theory, and criticism** (at least 2 credits)

DANCE 215 Dance History  
 DANCE 315 Dance Criticism  
 DANCE 335 Special Topics in Dance Research (methods or history topics)  
 DANCE 365 American Rhythm Dancing and the African American Performance Aesthetic  
 THEATRE 367 History of the Lyric Theatre  
 DANCE 399 Independent Study

**Professional studies** (at least 2 credits)

DANCE 335 Special Topics in Dance Research  
 DANCE 355 Dance in Education  
 DANCE 356 Dance and Expressive Arts Therapies  
 DANCE 375 Summer Dance Institute  
 THEATRE 380 Internship in Theatre Practice  
 DANCE 399 Independent Study  
 DANCE 465 Studies in Dance (see Graduate School catalog)

- Courses outside communication: 6 courses at the 200 level or above, including at least 3 courses at the 300 level or above (may include courses taken to meet the distribution requirement)
- Distribution requirements: 18 courses outside the school, including 8 courses from the School of Communication distribution areas: 2 from science, mathematics, and technology; 3 from individual and social behavior; and 3 from humanities and fine arts
- Electives in communication and other areas to complete a minimum of 45 courses

## Dance Technique Courses Open to Undergraduates

**DANCE 110-0 Movement for the Stage** Movement and body awareness. Improvisational techniques using time, space, weight, and effort as the instrument of expression.

**DANCE 120-0 Topics in Preparation for Performance**

Different techniques each quarter to help prepare students for performance. Techniques include Pilates, yoga, Alexander technique, and the Feldenkrais method.

**DANCE 130-0 Music Theatre Dance** Choreography from Broadway shows. Explores various styles of original Broadway choreography through study of jazz, tap, modern, and ballet repertoire (not technique). Each class includes a short warm-up period.

**DANCE 140-0 Cultural Forms** Sections offer instruction in different ethnic dance forms; those offered in the past include flamenco, Indian, and African. Not offered every quarter; may not be offered every year.

**DANCE 150-0, 250-0, 350-0 Modern** Offered at levels I, II, and III each quarter to develop modern dance technique. Higher levels progress more rapidly with a greater level of complexity, as class work focuses on a wider range of qualities and aesthetics. Style of modern technique varies with each instructor.

**DANCE 160-0, 260-0, 360-0 Jazz** Offered at levels I, II, and III each quarter to develop jazz technique. As class advances, students learn more advanced rhythmic phrases, more complex body-part isolations, and quicker direction changes in space. Style of jazz technique varies with each instructor.

**DANCE 170-0, 270-0, 370-0 Ballet** Offered at levels I, II, and III each quarter to cover ballet from basic principles through advanced skills. Terminology and movements are based on class level. Dancers begin at the barre and continue in the center, across the floor, and from the corner with combinations of steps, including turns and jumps.

**DANCE 180-0, 280-0, 380-0 Tap** Tap technique. One level is offered each quarter, starting at beginning level. The fundamentals of tap are developed through each level, and rhythmic awareness is expanded.

## Dance Academic Courses Open to Undergraduates

**DANCE 101-1,2,3 Introduction to the Dance Experience**

Foundation for further studies in dance technique, science, history, and analysis. **1.** Introduction to body-mind approaches to movement study, including Laban movement analysis, yoga, tai chi, body-mind centering, and Feldenkrais. **2.** Dance in context: places dance in the context of other aspects of human behavior, exploring social dance, ritual, and theatrical performance. **3.** Introduction to improvisation: dance and movement improvisation as a tool for developing a personal movement vocabulary.



**DANCE 201 Cultural Studies of Dance** Dance as a force in culture and society amid ethnic, social, and theatrical traditions. Participation in labs, class lectures, and discussions. Required readings; independent video viewing and concert attendance.

**DANCE 202 Experiential Anatomy for Performances** The language and analysis of anatomy; heightening of bodily awareness using kinesthetic sensation and imagery. Combines theory and practice to achieve both intellectual and experiential awareness of the kinesthetics of anatomy.

**DANCE 215-0 Dance History** Choreographic accomplishments in the major developmental periods of American dance. Readings, discussion, video screenings, movement workshops, and research.

**DANCE 225-0 Dance Composition** Fundamental choreographic elements: time, space, shape, form, dynamics, and design. Choreographic exploration of the basic principles of dance composition.

**DANCE 235-0 Choreography for Music Theatre** How to manipulate space, time, and energy in short movement studies; creating a movement study in dramatic action that relies on those manipulations; choreographing a short dance to music for other dancers using the previous movement studies as guideposts.

**DANCE 315-0 Dance Criticism** Critical and theoretical thought of writers on Western theatrical dance.

**DANCE 325-0 Advanced Choreographic Study** Manipulation of space, time, and energy according to the principles of organic compositional development to produce personal, poetically charged choreographic statements. Lecture-laboratory investigation of advanced choreographic concepts; abstraction, style, use of music, group work, humor in dance. Prerequisite: 225 or consent of instructor.

**DANCE 326-0 Advanced Improvisation** Improvisation as a source for composition and performance. Recommended for musicians and actors wishing to expand knowledge and/or command of dance vocabulary and for dancers wishing to investigate the musical and theatrical dimensions of their art. Emphasis on interrelationships between people moving and between the performing arts that students bring to the course.

**DANCE 335-0 Special Topics in Dance Research** Research methodologies, dance scholarship, criticism, and historical reconstruction. Critical issues and contemporary problems. Content varies.

**DANCE 345-0 Studies in Collaboration** Workshop exploration of collaboration as well as historical and theoretical perspectives. Seminar, practicum. Through studio work, reading, and discussion, dancers and musicians will explore our shared language.

**DANCE 355-0 Dance in Education** Organizing and teaching dance technique and creative movement for children and adolescents. Creative play, movement exploration,

acquisition of basic motor skills, links to the classroom. Lecture, laboratory, and field experiences.

**DANCE 356-0 Dance and Expressive Arts Therapies** Overview of dance, drama, and art therapies as currently practiced in treating disabled, mentally ill, or other special populations. Introduces diverse theoretical perspectives in the role and use of art forms as therapeutic modalities. Symbolic meaning, group dynamics, and the language of movement as it relates to personality, body image, and expression.

**DANCE 365-0 American Rhythm Dancing and the African American Performance Aesthetic** Viewing (via video) and evaluating the sources and contemporary influences of jazz, tap, Broadway, and other vernacular forms of theatre dance. Light movement exercises to convey the kinesthetic basis of American rhythm dancing.

**DANCE 375-0 Summer Dance Institute** One-week summer workshop exploring various forms of dance with guest artists.

**DANCE 387-0 Theatre/Dance Practicum** Offered during the summer to provide academic credit to students participating in a Northwestern performance.

**DANCE 395-0 Senior Seminar** A forum for addressing issues of transition, career planning, and support, providing a structure for analyzing opportunities in the professional dance world. The seminar is also responsible for creating and producing the Senior Concert, the culminating activity of the dance major. The course meets as a yearlong sequence with grade and 1 credit awarded in the spring.

**DANCE 399-0 Independent Study** Prerequisite: consent of undergraduate dean after submission of petition.

## School of Education and Social Policy

The mission of the School of Education and Social Policy (SESP) is to understand and improve learning communities, defined as groups of people working together in structured social and/or technical environments that influence human development. In this view, learning communities include not only schools and classrooms but also workplaces, families, neighborhoods, and other societal arrangements where learning takes place. Through their broad-based interdisciplinary research, teaching, and outreach activities, SESP faculty strive to better understand how social, psychological, and economic factors shape human development and learning and how innovations in pedagogy, technology, and social policies can benefit lives. Students integrate and apply this knowledge to the outside world and their own lives.

At the undergraduate level, the school provides an interdisciplinary curriculum, practical experience, and research activities that are closely linked to SESP's faculty and to the graduate programs in learning sciences and in human development and social policy. Students learn to understand human development and improve learning in its various social contexts by applying the social and behavioral sciences. The school offers four concentrations leading to the degree of bachelor of science in education and social policy: human development and psychological services, learning and organizational change, secondary teaching, and social policy. Students in other undergraduate schools within Northwestern also may complete the requirements of the secondary teaching concentration and qualify for secondary certification.

SESP offers advanced degrees in elementary and secondary teaching, higher education, learning and organizational change, learning sciences, and human development and social policy.

For more information about SESP, see the school's web site at [www.sesp.northwestern.edu](http://www.sesp.northwestern.edu).

### ACADEMIC POLICIES

#### Grade and Residency Requirements

The following requirements concerning residence and grade point average (GPA) apply to all students seeking the degree of bachelor of science in education and social policy:

- A minimum of 45 course units are required for graduation.
- Students are required to maintain a minimum GPA of 2.0 in all work presented for the degree. To qualify for teacher certification, students must earn a minimum grade of C- and an overall GPA of 2.5 in all professional core courses and teaching subject area requirements. Students in the human development and psychological services, learning and organizational change, and social policy concentrations must earn a minimum grade of C- in all their core courses, concentration courses, and distribution requirements.
- Full-time students may elect to enroll in some Northwestern courses with the understanding that they will not receive a regular letter grade but the notation P (pass) or N (no credit). They may elect 1 unit per quarter under the P/N option, which may not be used toward distribution requirements, SESP core courses, or concentration requirements.
- Not more than six of the grades in courses taken at Northwestern and presented for graduation may be P's and D's.
- Students may double-count up to 3 units from their concentration toward a second major and up to 2 units toward an adjunct major or a minor. Required related courses in Weinberg College are not subject to these limits.
- Course work taken at universities other than Northwestern that is to be counted toward fulfilling Northwestern requirements must be approved in advance by the student's adviser and the assistant dean. Students taking courses at a community college must earn a grade of B or higher to have the credit accepted by SESP.
- Every candidate for a degree must file an application for the degree, along with a Course Planning Form, in the SESP Office of Student Affairs one year in advance of the date of graduation (see Academic Calendar). That office will forward the application, when approved, to the Office of the Registrar.
- Students who wish to transfer into SESP's secondary teaching concentration may not be able to meet the requirements unless they plan carefully throughout their undergraduate program.
- Students who wish to transfer into SESP from another Northwestern school must
  - meet SESP concentration requirements

- possess a minimum cumulative GPA of 2.0 (students in the secondary teaching concentration must also have a GPA of 2.5 in professional core courses and teaching subject area requirements)
- be in good academic standing
- attend the appropriate information and orientation sessions
- Students transferring from another university must complete their final 23 units at Northwestern.
- Students in the human development and psychological services, learning and organizational change, and social policy concentrations must complete a 10-week practicum during the junior year (9 weeks during the Summer Session just before or after the junior year). The practicum includes 30 hours per week at a supervised practicum site (SESP 383) and a concurrent seminar (SESP 385) analyzing the practicum experiences. Students receive 4 units upon completion of these requirements. Secondary education students must complete a quarter-long student teaching internship and be enrolled in TEACH ED 388/389 Student Teaching Seminar.
- Additional requirements are stipulated in the *SESP Undergraduate Handbook*. All students are expected to be familiar with and observe these policies.

In addition to and independent of the requirements set by SESP, all students must satisfy the Undergraduate Residence Requirement (see Undergraduate Education section of this catalog).

### Probation

In addition to the University regulations regarding academic probation, an undergraduate student in SESP is ordinarily placed on academic probation when, in any one quarter, he or she does not receive at least three final grades of A, B, C, or P or has a cumulative GPA below 2.0. Students on probation must work with their advisers to meet the conditions set by the probation and address the deficiencies that resulted in probation. Failure to do so may result in dismissal from the University.

### Academic Advising

Each undergraduate student is assigned to an adviser in the SESP Office of Student Affairs. For the advising system to work effectively, the student must take all academic questions to the adviser. The adviser is responsible for helping to plan the academic program to meet the requirements for completion and graduation. Advisers also help students access academic, professional, and personal development resources. Students consult with faculty as well about research and professional interests.

Students are encouraged to meet with their advisers at least once per quarter to develop an individualized plan of study. Failure to do so may result in a hold being placed on a student's registration.

### Petitions for Exemptions

Students must petition if they wish to be exempted from any of the regular degree or specific course requirements of SESP. Petition forms may be obtained from the SESP Office of Student Affairs. No petition is considered unless it is signed by the student's adviser and the SESP assistant dean for student affairs. Petitions requesting that a course substitute for a degree requirement must be submitted before the completion of that course.

### ACADEMIC OPTIONS

The interdisciplinary and flexible nature of SESP concentrations allows many undergraduates to pursue a minor or a second major in addition to their SESP concentration or to enroll in University-wide certificate programs. Many students also elect to spend one or more quarters in a University-approved study abroad program.

#### *SESP Programs for All Students*

##### **Service Learning Certificate Program**

Open to freshmen, sophomores, and juniors in any school at Northwestern, the Service Learning Certificate Program increases students' understanding of community needs and fosters ongoing civic engagement by connecting community service experience with an academic component. Spanning five academic quarters, the two-year program requires a total of 5 units of course work, 100 hours of community service, concurrent participation in reflective seminars, and a capstone project.

Course work includes SESP 202 Introduction to Community Development, taken in winter quarter of the first year of the program; SESP 351 (cross-listed as COMM 395) Special Topics, taken in fall of the second year; an elective course relevant to the principles of the service learning certificate, chosen from offerings across the University; and 2 independent study units — SESP 299-1,2 Service Learning Capstone Research — taken in the winter and spring quarters of the second year and leading to a capstone project completed in collaboration with a sponsoring organization.

During each of the two years, students perform 50 hours of community service at approved sites. Throughout all 5 quarters, students also participate in biweekly staff-facilitated reflective seminars that serve as a forum for assessing service experiences and course work.

##### **Practicum/Field Studies Program**

The SESP Practicum/Field Studies Program gives students the opportunity to make solid professional contributions to an organization while benefiting from experiential learning. The 1-quarter program carries 4 units of credit. Students work at their sites for 30 hours a week and attend a Friday morning Practicum Analysis Seminar.

During Summer Session any Northwestern undergraduate student is able to complete the program in San Francisco or Washington, D.C., in addition to the Chicago area. Program sites expose students to the breadth and depth of issues and activities within a field. Students function as participants/observers who can contribute to the organization in meaningful ways. They experience new skills and responsibilities through the projects they carry out from start to finish. Their supervising mentors meet with them individually for at least one hour per week.

A prerequisite qualitative methods course — SESP 372 *Methods of Observing Human Behavior* — teaches students how to take and analyze notes for a field study. In the workplace students record and analyze events and processes, integrating concepts and theories from their social science courses. The field notes lead to a final paper that analyzes some component of the practicum/field study experience.

## Honors

Students who maintain records of academic distinction may qualify for the honors program. Any student who has attained an overall cumulative GPA of 3.5 or above after winter quarter of the junior year is eligible for provisional admission to the program beginning spring quarter of the junior year. Students considering both study abroad and the honors program must plan their study abroad programs accordingly.

Students who successfully complete SESP 391 *Advanced Research Methods* during the spring quarter of the junior year and are recommended for the honors program may formally enter the honors program by registering for SESP 398 *Honors Thesis* in the fall quarter of their senior year. In this three-quarter program students work with a faculty adviser on a research project. If progress is satisfactory, students are eligible to register for 398 during winter and spring quarters of the senior year. Grades are based on performance throughout the program and on readers' evaluations of the project report. All honors students present their projects to SESP faculty, students, and guests at a poster session at the end of the year. Students earn 3 units for successful completion of an honors thesis. They receive departmental honors only on the recommendation of the faculty adviser and the approval of the program director.

Additional information about the honors program is available from the honors program coordinator in the SESP Office of Student Affairs.

## Undergraduate Research

SESP provides a variety of innovative learning opportunities, including SESP 298 *Student-Organized Seminar*, 390 *Research Apprenticeship*, and 399 *Independent Study*. Students in the human development and psychological services, learning and organizational change, and social policy concentrations may use a maximum of 3 units of

SESP 390 or SESP 399 toward concentration requirements. Credit earned in SESP 298 may only be used as elective credit. Additional information about undergraduate research opportunities in SESP and faculty research projects may be obtained through the academic advisers in the SESP Office of Student Affairs.

## Other Programs

For information on the interschool programs listed below, see the Cross-School Programs or Weinberg College sections of this catalog, unless otherwise directed. The following is not a complete list; it contains examples of popular program choices among SESP students.

## Business Institutions

The Program in Business Institutions approaches the study of business through an investigation of the cultural, political, and social consequences of business institutions.

## Global Health Studies

This interdisciplinary minor is designed to provide skills for dealing with international health issues. Students learn about domestic and international approaches to international crisis management and review perspectives on specific health issues within the diverse U.S. population. The minor combines course work and international experience.

## International Studies

International studies is an undergraduate interschool adjunct major that is taken in conjunction with a departmental major. It explores our interconnected world system and how the contemporary world is politically structured and economically organized.

## Legal Studies

Legal studies is another undergraduate interschool major that is taken in conjunction with a departmental major. Not a "pre-law" program, it challenges students to use various academic perspectives and methodologies to study legal issues and to use the conceptual framework of the law to illuminate empirical and theoretical concerns in the social sciences and humanities.

## Study Abroad

Students are encouraged to explore the myriad options for study abroad. Credit may be applied toward concentration, distribution, and elective requirements with the consent of the student's adviser. See the Academic Options section at the beginning of this catalog for more information.

## Undergraduate Leadership

The Undergraduate Leadership Program, an interschool certificate program open to all undergraduates, helps students understand the nature of leadership and prepares them to become leaders.

## ACADEMIC PROGRAMS

### The Bachelor's Degree in Education and Social Policy

Students in SESP receive a bachelor of science degree in education and social policy; 45 units are required for the degree. The intellectual core of the human development and psychological services and social policy concentrations comes from SESP's human development and social policy graduate program. The intellectual core of the secondary teaching and learning and organizational change concentrations is grounded in the school's learning sciences graduate program.

The human development and psychological services, learning and organizational change, and social policy concentrations have similar distribution and core requirements, though each has different major courses. The secondary teaching concentration is markedly different from the other concentrations, due in large part to Illinois Board of Education requirements.

### Human Development and Psychological Services, Learning and Organizational Change, and Social Policy

#### *Preprofessional Preparation*

SESP concentrations offer opportunities to prepare for a number of career options. Students enroll with a wide variety of academic and career goals. Some intend to go immediately to graduate and professional schools, while others plan to enter a profession upon graduation. They are encouraged to design their concentrations with career objectives or graduate and professional school admission policies in mind.

Students interested in such fields as child development, social work, clinical psychology, medicine, and counseling normally enter the human development and psychological services concentration. The core course work in human development and psychological counseling, combined with other courses in psychology, sociology, and interpersonal communication, is particularly important for students considering such careers. Students with these interests are encouraged to include in their concentrations the pre-requisites in psychology and quantitative methods needed for graduate work in psychology and in the human services professions.

Students who are interested in such fields as management, consulting, change management, training, design of knowledge systems, and human resources in profit and not-for-profit organizations normally enter the learning and organizational change concentration. Students combine core course work in learning sciences, organization behavior, psychology, and human development with the necessary work in economics, quantitative methods,

communications, and computer science to prepare for careers as organizational leaders and change agents and for graduate study in education, the social sciences, and management.

Students interested in public service, public policy, and law typically choose to follow the requirements of the social policy concentration, where they can combine the policy-related course work with courses in political science, communication studies, economics, urban affairs, and sociology to prepare either for graduate work in law or public policy or for policy positions in public and private agencies. Students in this concentration are encouraged to use electives to build specialties in such areas as juvenile justice, advocacy programs, and policy analysis and to develop the oral and written communication skills important to success in law school and public policy positions.

In all three concentrations — human development and psychological services, learning and organizational change, and social policy — students focus on the interdisciplinary study of human behavior as it is influenced by social institutions, understanding the behaviors that people bring to various institutional contexts, identifying and analyzing how behaviors are shaped in these environments, and establishing criteria by which to evaluate the purposes and effectiveness of institutional activities.

To work toward these goals, students register for a 1-quarter practicum in off-campus settings — such as governmental entities, community agencies, hospitals, juvenile homes, learning and development departments of for-profit organizations, and legal organizations — where they can observe and participate in the activities of a socializing institution. Concurrent with this practicum — taken during the junior year (including the summer before or after) in the Chicago area or, during Summer Session, in San Francisco or Washington, D.C. — students meet in a weekly practicum analysis seminar. This seminar helps them integrate their past learning from course work with their observations of human behavior in an organizational setting.

#### *Distribution Requirements (10 units)*

Students in the human development and psychological services, learning and organizational change, and social policy concentrations complete at least 2 units in each of the following areas:

- Natural sciences
- Formal studies (mathematics, logic, etc.)
- Historical studies
- Ethics and values (religion, philosophy, etc.)
- Literature and fine arts

Selected courses from Weinberg College and professional schools throughout the University may be used to fulfill distribution requirements with the consent of the student's adviser and the assistant dean of SESP.



*SESP Core (8 units)***Basic courses** — 2 units

- SESP 201 Human Development: Childhood and Adolescence or 203 Human Development: Adulthood and Aging
- Another human development course chosen from SESP 201, 203
- LOC 212 Learning and Understanding
- SESP 316 Moral Values in Human Development: An Introduction
- SESP 317 Gender and the Life Course
- SESP 318 Adult Development and Work Careers
- SESP 319 Family Development in Changing Society

**Research methods** — 2 units

- SESP 210 Introduction to Statistics and Research Methodology
- SESP 372 Methods of Observing Human Behavior (students must complete 372 before enrolling in the practicum)

**Practicum** — 4 units

- SESP 383 Practicum (2 units)
- SESP 385 Practicum Analysis Seminar (2 units)

The practicum is a one-quarter unpaid experience in an off-campus setting related to the student's program. It is completed the summer before the junior year, during the junior year, or the summer after. While at the practicum site, students conduct social science research that serves as the basis for a final research paper.

Concurrent with the practicum, students attend a weekly seminar (SESP 385) taught by a faculty member that integrates their experiential knowledge with the theoretical training in their course work. Students may not take a 5th unit while completing their practicum.

Students must contact the practicum director in the school's Office of Student Affairs at least 2 quarters (3 for summer practicums) before the beginning of the quarter in which the practicum will be taken. The practicum director advises students about procedures and application materials for a practicum placement.

*Individual Program Requirements*

Students in the human development and psychological services, learning and organizational change, and social policy concentrations prepare a plan that includes a rationale for the configuration of courses chosen for their concentrations. Many students work with their advisers to develop an optional interdisciplinary specialization within their concentrations by selecting 5 or more courses around a particular theme. See concentration requirements for examples.

**Human Development and Psychological Services**

This concentration explores how human development is influenced by family, schools, community, and the

workplace. Courses focus on theories of individual development and on family, group, and organizational dynamics. The interdisciplinary concentration draws from current practice and research in counseling, personality psychology, and human development as well as on the disciplines of psychology, sociology, gender studies, communication studies, cognitive science, and anthropology to give students the opportunity to combine theory with practice and develop pragmatic skills grounded in a deep understanding of human psychology, growth, and adaptation throughout the life span. Examples of interdisciplinary specializations include child development, family development, premedical studies, and gender and human development.

**Total requirements** — 45 units**Distribution requirements** — 10 units**SESP core** — 8 units**Major program** — 18 units

- Basic courses — 5 units
  - HDPS 201 Introduction to Psychological Services
  - HDPS 301 Introduction to Counseling
  - 3 courses chosen from HDPS 302 The Human Personality, HDPS 311 Group Dynamics, SESP 303 Program Development and Implementation, and SOC POL 304 Social Policy and the Human Services
- Major courses — 13 units, at least 5 at the 300 level, selected from an approved list in human development and psychological services, other SESP concentrations, and other areas such as anthropology, communication studies, linguistics, psychology, and sociology. Up to 3 units of SESP 390 Research Apprenticeship or SESP 399 Independent Study and 3 units of SESP 398 Honors Thesis may be counted toward this requirement.

**Electives** — 9 units

Students are encouraged to discuss their elective plans with their advisers; they may be able to pursue a second major or a minor using elective credits.

**Learning and Organizational Change**

This concentration explores how organizations and the individuals in them use knowledge and learning to create and respond to change in the environment. It addresses the effects of such forces as technology, globalization, and changing demographics on theories and applications of learning, innovation, and knowledge sharing. Drawing on current research in learning sciences and organizational behavior, this interdisciplinary concentration also involves the disciplines of economics, anthropology, psychology, sociology, and computer science to give students the ability to understand and influence change in organizations. Examples of interdisciplinary specializations include economics, education reform, leadership, organizational communication, and nonprofit management.

**Total requirements** — 45 units

**Distribution requirements** — 10 units

**SESP core** — 8 units

**Major program** — 18 units

- Basic courses — 7 units
  - LOC 211 Introduction to Organization Theory and Practice
  - LOC 212 Learning and Understanding
  - LOC 301 Macrocognition: Intelligence in Context
  - LOC 306 Studies in Organizational Change
  - LOC 310 Learning Organizations for Complex Environments
  - 1 course chosen from LOC 311 Tools for Organizational Analysis, LOC 391 Organizational Planning and Analysis, HDPS 311 Group Dynamics, SESP 303 Program Development and Implementation, SESP 318 Adult Development and Work Careers
  - 1 course in learning sciences chosen from COG SCI 207, 210, 211; PSYCH 228
- Major courses — 11 units, at least 5 at the 300 level, selected from an approved list in learning and organizational change, other SESP concentrations, and other areas such as cognitive science, communication studies, computer science, economics, psychology, and sociology. Students who are interested in applying their knowledge in the field of business are encouraged to take at least 3 units in economics (ECON 201, 202, and 260), technology, and international studies or foreign language. Up to 3 units of SESP 390 Research Apprenticeship or SESP 399 Independent Study and 3 units of SESP 398 Honors Thesis may be counted toward this requirement.

**Electives** — 9 units

Students are encouraged to discuss their elective plans with their advisers; they may be able to pursue a second major or a minor using elective credits.

### **Social Policy**

This concentration explores how policies function as the guiding principles on which social programs are based. It analyzes how social policies and social institutions influence the course of human lives and how people can influence social policies. It provides a strong interdisciplinary background in the social sciences and an understanding of current social policy issues, and it draws upon current research in the fields of African American studies, anthropology, communication studies, economics, gender studies, history, philosophy, political science, public health, and sociology. Examples of interdisciplinary specializations include education policy and reform, urban issues and policy, health care issues and policy, legal issues, and environmental issues and policy.

**Total requirements** — 45 units

**Distribution requirements** — 10 units

**SESP core** — 8 units

**Major program** — 18 units

- Basic courses — 7 units
  - SESP 202 Introduction to Community Development
  - SOC POL 201 Introduction to Social Policy
  - SOC POL 304 Social Policy and the Human Services
  - SOC POL 307 Educational Policy
  - ECON 201 Introduction to Macroeconomics
  - ECON 202 Introduction to Microeconomics
  - POLI SCI 220 American Government and Politics
- Major courses — 11 units, at least 6 at the 300 level, selected from an approved list in social policy, other SESP concentrations, and other areas such as African American studies, communication studies, economics, political science, and sociology. Up to 3 units of SESP 390 Research Apprenticeship or SESP 399 Independent Study and 3 units of SESP 398 Honors Thesis may be counted toward this requirement.

**Electives** — 9 units

Students are encouraged to discuss their elective plans with their advisers; they may be able to pursue a second major or a minor using elective credits.

### **Secondary Teaching**

SESP's interdisciplinary secondary teaching curriculum combines course work in a chosen field from Weinberg College — such as English, history, or mathematics — with courses in child and adolescent development, educational philosophy, and urban education.

SESP students: Students who wish to pursue secondary teaching certification must complete the following requirements and apply for formal admission to the SESP teacher preparation program (see page 185). Students completing degree requirements within SESP receive the degree of bachelor of science in education and social policy; 45 units are required for the degree.

Weinberg College students: Students who wish to pursue secondary teaching certification must complete the following requirements and apply for formal admission to the SESP teacher preparation program (see page 185). Students also must complete a major and fulfill the degree requirements of Weinberg College.

#### *Distribution Requirements (14 units)*

Students complete

- 1 oral communication course
- 1 multicultural studies course reflecting a non-Western perspective
- 2 units of intensive writing
- 2 units in each of the following 5 areas:
  - Natural sciences
  - Formal studies (mathematics, logic, etc.)
  - Historical studies
  - Ethics and values (religion, philosophy, etc.)
  - Literature and fine arts

Selected courses from Weinberg College and professional schools throughout the University may be used to fulfill distribution requirements with the consent of the student's adviser and the assistant dean of SESP.

#### *Professional Core (11 units)*

- SESP 201 Human Development: Childhood and Adolescence
- TEACH ED 302 Social Contexts of Education
- TEACH ED 304 Seminar on Teaching: Introduction to Schooling in Communities
- TEACH ED 313 Problems in the Philosophy of Education
- TEACH ED 327 Educating Exceptional Children
- 1 unit chosen from TEACH ED 354–359 Methods and Techniques
- TEACH ED 378 Practicum/Seminar: Humanities or 379 Practicum/Seminar: Mathematics and Science
- TEACH ED 388 Student Teaching Seminar: Humanities or 389 Student Teaching Seminar: Mathematics and Science (4 units)

Note: Students seeking endorsement to teach art or foreign languages or in middle schools must also take Teach Ed 328 Dynamics of Middle School Curriculum and Teach Ed 329 Health and Physical Development.

#### *Teaching Subject Area Requirements (12–19 units)*

Programs in specific teaching major fields listed below are designed to meet requirements of the Illinois State Board of Education. Teaching major requirements may differ from those of a departmental major, and departmental course offerings change frequently. Teacher certification candidates are required to meet regularly with the advising staff of the Office of Student Affairs to ensure that certification requirements are met. In the event that courses listed here are no longer offered by the departments, suitable replacements will be found. Students are also responsible for any prerequisites.

#### **Art (12 units)**

- 4 introductory courses: ART 120, 125, 140, 150
- 5 studio courses: ART 210 or 310; 222 or 225; 231 or 232; 240 or 250; and 1 additional unit in painting and drawing, printmaking, sculpture, or photography
- 3 courses in art history, theory, and criticism: 2 chosen from ART HIST 220, 230, 240, 250; 1 chosen from ART 270, 272, 372 or ART HIST 360-1,2, 365-2, 366

#### **Biological and Physical Sciences**

##### *Biological Sciences (16 units)*

- 7 core science courses: ASTRON 101, 120, or 220; BIOL SCI 210-1; CHEM 101; EARTH 201; PHYSICS 135-1,2,3
- BIOL SCI 210-2,3; 301 or 309; 315
- 1 course chosen from BIOL SCI 330, 331, 332, 347, 349; ENVR SCI 202

- *SESP students*: 4 additional biological sciences courses
- Weinberg College students*: additional courses as needed for the major

##### *Chemistry (17 units)*

- 7 core science courses: ASTRON 101, 120, or 220; BIOL SCI 210-1; CHEM 101; EARTH 201; PHYSICS 135-1,2,3
- CHEM 102, 103, 342-1
- CHEM 210-1,2,3 or 212-1,2,3
- 4 courses chosen from BIOL SCI 301; CHEM 220, 316, 329, 333, 342-2,3, 393

##### *Physics (14 units)*

- 7 core science courses: ASTRON 101, 120, or 220; BIOL SCI 164 or 210-1; CHEM 101; EARTH 201; PHYSICS 135-1,2,3
- PHYSICS 330-1, 332, 333-1; 335 or 339-1
- 3 additional physics or astronomy electives

##### **English (14 units)**

- 3 introductory courses: ENGLISH 210-1,2 or 270-1,2 ENGLISH 298
- TEACH ED 324 Foundations of Reading and Language Acquisition and 325 Foundations of Writing Processes (Secondary)
- 8 literature courses: 2 American literature courses 2 English literature courses 4 additional literature courses, 1 of which must be a non-Western literature
- 1 additional linguistics course chosen from LING 220, 221, 250, 260, 270, 311, 312, 321, 322, 323, 341, 342 or ENGLISH 206 or a poetry course

#### **Foreign Languages**

##### *French (12 units)*

- 6 language courses: FRENCH 202, 203, 301, 302, 303, 305
- 3 literature courses: FRENCH 210 and 2 additional 300-level literature courses taught in French
- 3 culture and civilization courses: FRENCH 201 or 211; 355; 1 chosen from 380, 390, 391-1,2, 396

##### *German (12 units)*

- 4 language courses chosen from GERMAN 201, 205-1,2, 207, 209, 230, 303, 305
- 3 literature and culture courses chosen from GERMAN 211, 221-1,2,3, 223, 227, 245
- 5 other 300-level literature and culture courses chosen from GERMAN 321-1 or higher

##### *Latin (12 units)*

- 3 language courses: LATIN 101-1,2,3
- 4 literature courses: LATIN 201-1,2,3, 310
- 5 other 200- or 300-level Latin, Greek, or classics courses

**Spanish (13 units)**

- 3 language and composition courses: SPANISH 201 or 202 or an appropriate substitute for heritage speakers; 203 or 207; 204
- SPANISH 220
- 3 literature courses chosen from SPANISH 250, 251, 260, 261
- 1 culture and civilization course chosen from SPANISH 360, 361, 380
- 5 additional 300-level courses taught in Spanish, with at least 1 course from a period earlier than 1800

**Mathematics (12 units)**

- 5 calculus/analysis courses chosen from MATH 220, 224, 230, 234, 240, 300
- 1 probability and statistics course chosen from MATH 310-1,2,3; SESP 210; STAT 210, 302
- 1 computer science course
- 5 additional 300-level mathematics courses

Students enrolled in Mathematical Experience for Northwestern Undergraduates courses should consult with the SESP adviser to determine course equivalencies.

**Social Science****History (15 units)**

- HISTORY 201-1,2, 210-1,2
- 2 non-Western civilization courses chosen from HISTORY 255-1,2,3, 270, 281, 284-1,2 285, 381-1,2, 384-1,2, 385, 365, 366, 368-1,2
- 6 additional history courses
- 3 related courses chosen from ANTHRO 214; ECON 201, 202; GEOG 341; POLI SCI 220; PSYCH 110; SOCIOL 110; SOCIOL 226 or SESP 210 or STAT 202 or 210

**Economics (19 units)**

- ECON 201, 202, 281, 310-1,2, 311, 323-1,2
- 4 additional economics courses
- *SESP students:* complete a minor in history (7 units)  
*Weinberg College students:* economics majors complete a minor in history (7 units) or take 7 history courses, 4 in U.S. history (HISTORY 201-1,2 and 210-1,2 recommended)

**Political Science (19 units)**

- POLI SCI 220 and 395
- 2 courses chosen from POLI SCI 201, 230, 240, 250
- 1 course chosen from POLI SCI 310, 311, 312
- *SESP students:* 7 additional political science courses, 4 at the 300 level  
*Weinberg College students:* political science majors take additional courses to meet requirements for the major
- *SESP students:* complete a minor in history (7 units)  
*Weinberg College students:* political science majors complete a minor in history (7 units) or take 7 history courses, 4 in U.S. history (HISTORY 201-1,2 and 210-1,2 recommended)

**Sociology (19 units)**

- SOCIOL 110, 226, 303, 329
- *SESP students:* 8 additional sociology courses, 6 at the 300 level  
*Weinberg College students:* sociology majors take additional courses to meet requirements for the major
- *SESP students:* complete a minor in history (7 units)  
*Weinberg College students:* sociology majors complete a minor in history (7 units) or take 7 history courses, 4 in U.S. history (HISTORY 201-1,2 and 210-1,2 recommended)

**Electives**

Additional units of elective course work must be taken to complete the 45-unit degree requirement. Students are encouraged to discuss their elective plans with the teacher certification manager.

**Teacher Preparation Program**

Students who wish to be certified as teachers must apply to the SESP teacher preparation program. This program is approved by the Illinois State Teacher Certification Board, and those completing the following requirements qualify for secondary or K–12 certification in Illinois.

Note that requirements for the program parallel and are related to courses in the professional core, notably TEACH ED 304, 354–359, 378, 379, 388, and 389. Completion of the courses alone does not result in certification, nor is certification required for completion of the SESP degree.

**Application and Admission**

Students apply to the teacher preparation program when enrolled in TEACH ED 304 Schooling in Communities or by the fall of junior year. To be admitted, they must have received a passing score on the Illinois Certification Testing System (ICTS) Basic Skills exam and have a GPA of 2.5 overall as well as in the teaching subject area requirements. SESP students must be eligible for entrance to the program no later than the end of fall quarter of junior year. Weinberg College students may start the program later than the fall of junior year but then may finish later than June of senior year. Students are required to attend meetings about the certification process.

**Clinical Experience**

Students complete three clinical experiences: a 30-hour nonschool experience (completed during winter of sophomore or junior year as part of TEACH ED 304); a 100-hour school practicum (typically completed during fall of senior year); and student teaching (typically completed during winter of senior year).

To be eligible for the 100-hour practicum, students must have met the GPA requirements for and been admitted to the teacher preparation program and have enough

courses from the teaching subject area to be placed. Those meeting these requirements will be placed with a department or teacher mentor at a local school.

Students are encouraged to begin the practicum at the start of the school year at the assigned site. This is typically one to three weeks prior to the beginning of classes at Northwestern. Clinical experiences gained at the site are central to the discussions of methods and theories in the practicum seminar (TEACH ED 378 or 379) and methodology courses (TEACH ED 354–359).

To be eligible for student teaching, students must have successfully completed TEACH ED 354–359 and TEACH ED 378 or 379, earned a passing score on the ICTS subject exam, fulfilled minimum GPA requirements for student teaching, and passed the first assessment of the digital portfolio. (The portfolio, an electronic document of the student's work, is used as an assessment tool in certification.) Some school districts also require a criminal background check.

Student teaching involves full-time placement in a local school for the entire quarter, during which no other courses are taken. Teacher candidates attend an evening seminar (TEACH ED 388 or 389). The internship and seminar together earn 4 units. Teacher candidates are evaluated by their school mentor, a Northwestern supervisor, and the seminar instructor.

### *Other Requirements*

In addition to successful completion of student teaching, teacher candidates must take and pass three ICTS professional teaching exams and complete the digital portfolio final assessment.

Foreign language teacher candidates other than those in Latin are required to complete the Oral Proficiency Interview of the American Council of Teachers of Foreign Languages with a rating of “intermediate high” or better.

Candidates must be U.S. citizens or possess evidence of permanent resident status. Those without this status must indicate their intention to obtain it within six years of applying for certification.

### *Recommendation for Certification*

Students are recommended for certification when they successfully complete degree requirements and all courses in the teacher education program, earn a rating of recommendation for certification for student teaching, pass all outside examinations as noted above, and successfully complete the digital portfolio.

Although legal requirements for certification vary from state to state, the teacher training program offered through SESP is sufficiently flexible to permit students who plan carefully to complete provisional requirements for most states. As it is easier to obtain a teaching license in another state through reciprocity than through independent certification, we encourage all students who have completed the program to apply for an Illinois license before leaving the state.

We also recommend that students apply for the certificate immediately upon graduation. Graduates of the teacher-training program at Northwestern who are recommended for certification but do not apply for certification upon graduation may not be eligible for certification at a later date due to changes in state requirements.

Please note that the Illinois School Code has provided that school districts may not knowingly employ individuals who have been convicted of certain offenses (principally those related to sex or drugs). All Illinois school districts require that applicants submit to a criminal background check, including fingerprinting.

## **COURSES**

*Note:* First-year students are restricted from most SESP 300-level courses, with the exception of research courses and HDPS 341.

### *Core Courses*

#### **SESP 201-0 Human Development: Childhood and**

**Adolescence** Personal, social, and cognitive development, birth through adolescence. Interplay of biological and experiential factors on linguistic and conceptual development, ego, and personality.

#### **SESP 202-0 Introduction to Community Development**

Historical and contemporary community building efforts, focusing on Chicago's neighborhoods. Community development strategies: the settlement house, community organizing, and community economic development.

#### **SESP 203-0 Human Development: Adulthood and Aging**

Psychological, sociological, and biological factors influencing socialization and development from young and middle adulthood through old age. Influences of family, school, and work on the individual.

#### **SESP 210-0 Introduction to Statistics and Research**

**Methodology** Definitions and classifications of terms used in quantitative methods; measures of typical and maximum performance, reliability, and validity checks; reporting and displaying data; interpreting results.

#### **SESP 303-0 Program Development and Implementation**

Characteristics of successful programs in a variety of areas, including human development, education, social welfare, and health promotion.

#### **SESP 316-0 Moral Values and Human Development:**

**An Introduction** Moral development of the individual from several perspectives: age-developmental differences, cross-cultural and gender differences, relationship between moral reasoning and moral behavior.

**SESP 317-0 Gender and the Life Course** How age and sex serve as a basis for the social construction of men's and women's lives. How social forces operate to create contrasting life trajectories, role patterns, and transitions; the role of social policies. Comparative view of different societies and periods in recent history.



**SESP 318-0 Adult Development and Work Careers**

Adult development and careers from the perspectives of psychology, sociology, and organizational behavior. Individual career-development strategies and alternative career systems.

**SESP 319-0 Family Development in Changing Society**

Societal changes and their effects on the family.

**SESP 351-0 Special Topics** Advanced work on special topics.**SESP 372-0 Methods of Observing Human Behavior**

Guided practice in systematic and participant observation of human behavior. Observer bias, field notes, unobtrusive measures.

**SESP 383-0 Practicum** (2 units) Intensive, supervised participant observation of interpersonal relationships — especially those of professional and client — and the effects of institutional structure and policy on both professionals and clients. For students in the human development and psychological services, learning and organizational change, and social policy concentrations and those enrolled in the summer Field Studies Program. Taken concurrently with 385. Prerequisites: 372 and consent of program director.

**SESP 385-0 Practicum Analysis Seminar** (2 units)

Small-group meetings only for students in the human development and psychological services, learning and organizational change, and social policy concentrations to analyze SESP 383 practicum experiences, organize their perceptions of their own internships, and share them with other class members. Taken concurrently with 383. Prerequisite: 372.

*Research and Other Opportunities*

**SESP 298-0 Student-Organized Seminar** Students initiate courses supervised by sponsoring faculty to explore topics not covered in other courses. Consulting with a faculty sponsor, students prepare a seminar plan and submit it to the assistant dean for student affairs before the middle of the quarter preceding the quarter in which the seminar is to be held. The plan includes a topic description, reading list, specifications of term papers and written examinations, prerequisites, and meeting schedule. All proposals are formally reviewed and approved before the seminar is offered. Enrollment is allowed in only 1 Student-Organized Seminar per quarter and must be on the pass/no credit basis. Consult with the assistant dean for further details.

**SESP 299-1, 2 Service Learning Capstone Research** Independent study courses leading to the completion of a capstone project for the Service Learning Certificate Program.

**SESP 390-0 Research Apprenticeship** Opportunity for undergraduates to apprentice with faculty mentors engaged in research projects centering on questions of learning and human development and the organizational arrangements in which these processes occur. Prerequisites: consent of

instructor directing the research project and assistant dean. (Students wishing to register must first complete the Request for Independent Study/Special Courses Form available in the SESP Office of Student Affairs.)

**SESP 391-0 Advanced Research Methods** Overview of research methods that may be used in the design and implementation of the honors thesis. Prerequisites: 210 and 372 recommended.

**SESP 398-0 Honors Thesis** (3 units) Research experience in which students develop, design, implement, and evaluate a research project under the guidance of a faculty adviser. Prerequisites: senior status; a cumulative grade point average of 3.5 by the end of winter quarter of the junior year; recommendation for the honors program by the SESP 391 instructor(s); and consent of program director.

**SESP 399-0 Independent Study** Under the direction of faculty members, students pursue special topics not covered in regular courses around the questions of learning and human development and the organizational arrangements in which these processes occur. Prerequisites: consent of instructor directing the study and of the assistant dean. (Students wishing to register must first complete the Request for Independent Study/Special Courses Form available in the SESP Office of Student Affairs.)

*Human Development and Psychological Services***HDPS 201-0 Introduction to Psychological Services**

Overview of professional degrees, sites, and various populations in psychological services. Introduction to the most common mental disorders and counseling fundamentals used in clinical mental health careers.

**HDPS 222-0 Career Development: Theory and Counseling**

The process of career development and its relation to the world of work. Discussion of career development theories. Focus on self-assessment; decision-making skills; educational, occupational, and community information; and job-seeking skills.

**HDPS 301-0 Introduction to Counseling** Overview of counseling theories, techniques, client systems, and service settings.

**HDPS 302-0 The Human Personality** Classic and contemporary psychological approaches to personality; understanding the whole person in his or her societal and historical context. Emphasis on both theory and research.

**HDPS 311-0 Group Dynamics** Theory and research in the social psychology of groups and social systems. Small- and large-group dynamics; intergroup relations. Participation in a group relations conference.

**HDPS 341-0: Marriage 101** The intricacies and problems of close, committed, interpersonal relationships, especially marriage.

**HDPS 351-0 Special Topics in Human Development and Psychological Services** Advanced work on special topics.

### *Learning and Organizational Change*

#### **LOC 211-0 Introduction to Organization Theory and Practice**

Major organizational behavior theories are introduced; students have opportunities to examine these theories and practice through organizational analysis.

**LOC 212-0 Learning and Understanding** Framework for learning in all aspects of life: traditional school subjects, professional training, creative and performing arts, personal health, basic survival skills. Students are encouraged to draw from their own experiences.

**LOC 301-0 Macrocognition: Intelligence in Context** How people learn to understand, reason, and solve problems; knowledge representation, expertise, transfer, and metacognition; study of distributed cognition.

**LOC 306-0 Studies in Organizational Change** Theories and methods of organizational changes are examined through analysis of organizational adaptations using theories from learning sciences and organizational behavior.

**LOC 310-0 Learning Organizations for Complex Environments** Major change factors, including technology, globalization, and demographics, and their impact on organizations; how organizations are creating and responding to these changes through organizational design, learning systems, and human resource changes.

**LOC 311-0 Tools for Organizational Analysis** Understanding cause-and-effect relationships pertaining to organizational behavior and performance.

**COMP SCI 330-0 Human-Computer Interaction** See Computer Science, McCormick School of Engineering and Applied Science.

**LOC 351-0 Special Topics in Learning and Organizational Change** Advanced work on special topics.

**LOC 391-0 Organizational Planning and Analysis** Culminating academic experience in which students apply knowledge and skills to analysis of real-world learning and organizational change problems and to the design and analysis of solutions.

### *Secondary Teaching*

**TEACH ED 302-0 Social Contexts of Education** How social contexts such as families, schools, and the workplace shape individuals; how individuals' intellectual and interpersonal capacities, preferences, and goals are shaped by their social contexts. Societal structures that organize, supply, and channel individual learning experiences and how they provide the formal and informal settings in which social interaction takes place. How participation in these socializing settings molds the development of individuals' capacities and forms their goals.

**TEACH ED 304-0 Seminar on Teaching: Introduction to Schooling in Communities** Action research methods — including observation/field notes, interviewing, and artifact analysis — as means to understanding how schools work and how theory and practice relate. Includes 30 hours of field experience. *Note:* Students seeking certification must

take the Illinois Basic Skills Test before the end of the quarter of enrollment in TEACH ED 304.

#### **TEACH ED 313-0 Problems in the Philosophy of Education**

Classical and modern philosophies of education. Text interpretation, analysis of ideas, argument construction; relationship of philosophy to educational issues. Students develop their own philosophy of education.

#### **TEACH ED 324-0 Foundations of Reading and Language**

**Acquisition** Cognitive foundations of reading comprehension processes and their influences on methods of instruction and assessment. Interrelationships between reading processes and language learning and their implications for instruction and assessment.

#### **TEACH ED 325-0 Foundations of Writing Processes**

**(Secondary)** Cognitive and sociocultural foundations of writing processes and their implications for instruction and assessment. Includes supervised field experience.

**TEACH ED 327-0 Educating Exceptional Children** Students with disabilities, including learning disabilities resulting from human development and/or accidents; understanding and application of approved emergency, educational, and rehabilitative activities; interrelationships with medical, health, and educational personnel.

#### **TEACH ED 328-0 Dynamics of Middle School Curriculum**

Identifying and understanding the effects of middle school dynamics (such as principles, structures, and practices) on classroom learning and instruction. Focuses on the development and social problems of children in grades five through eight. This course is required for middle school endorsement and enrollment in type-10 programs.

#### **TEACH ED 329-0 Health and Physical Development**

Interaction and interdependence of physical well-being, mental and emotional health, and the surrounding social environment. Topical areas covered for secondary education students completing state certification requirements.

#### **TEACH ED 351-0 Special Topics in Teacher Education**

Advanced work on special topics.

#### **TEACH ED 354–59 Methods and Techniques**

Students in the Secondary Teaching concentration take 1 of the following 6 methods courses:

- TEACH ED 354 Methods and Techniques: Art
- TEACH ED 355 Methods and Techniques: Foreign Languages
- TEACH ED 356 Methods and Techniques: English
- TEACH ED 357 Methods and Techniques: Secondary Mathematics
- TEACH ED 358 Methods and Techniques: Sciences
- TEACH ED 359 Methods and Techniques: Social Sciences

These methods courses analyze the literature and research related to the subject area and teaching methodology. In addition, they examine the development of learning experiences, methods, and educational techniques appropriate to the middle and high school levels. Concurrent registration in 378 or 379 required.

**TEACH ED 378-0 Practicum/Seminar: Humanities****TEACH ED 379-0 Practicum/Seminar: Mathematics and**

**Science** Students complete a practicum that requires a minimum of 10 hours per week for the whole quarter observing and assisting in a school approved by the director of undergraduate teacher education. Concurrent registration in the applicable methods and techniques course (354–359) required. Prerequisites: 304 and passing score on the Illinois Basic Skills Test.

**TEACH ED 388-0 Student Teaching Seminar: Humanities****TEACH ED 389-0 Student Teaching Seminar: Mathematics**

**and Science** (4 units) This seminar and accompanying internship, which last the entire quarter, help develop teaching methodologies through intensive clinical experience and teaching under the supervision of master teachers in the teacher-training schools. Increasingly sophisticated teaching responsibilities and, finally, primary responsibility for teaching a group or a class. Prerequisites: 304; 378 or 379; the applicable methods and techniques course (354–59); successful completion of the practicum experience; an approved contract for the internship experience; consent of the director of undergraduate teacher education; and passing score on the Illinois subject-area test.

*Social Policy*

**SOC POL 201-0 Introduction to Social Policy** Social policy formulation: the substance of major American social policies, the agenda-setting process, and the manner in which the political system shapes social policy in this country.

**SOC POL 303-0 Administration and Policy Studies** Education and human development as a multi-institutional, ecological, and macrosociological phenomenon. Issues in the philosophy, history, economics, and politics of education.

**SOC POL 304-0 Social Policy and the Human Services**

Development of social policy for human services in the United States. Human service policies for education, mental health, physical health, prisons, income, and aging.

**SOC POL 305-0 Law and Social Policy** Use and influence of the legal system in and on social institutions and policy.

**SOC POL 306-0 Contemporary Issues in Education** Through exploration of current K–12 education policy issues, students gain an understanding of the major debates arising in education and build a skill set that enables them to be critical consumers of policy. Specific topics vary by year.

**SOC POL 307-0 Educational Policy** Conflict between societal imperatives for selecting and preparing youth for future careers and offering youth opportunity; how society and schools address this conflict; various approaches to policy reform.

**SOC POL 310-0 Legal Aspects of Education** Structure of school governance; decision making; relevant state and federal legislation; role of the U.S. Supreme Court in affecting public schooling.

**SOC POL 330-0 Economics of Social Policy** How economists view social policy issues. Economic models of household

decision making. How economists account for costs and benefits of public and private programs and decisions.

Prerequisite: ECON 201, 202, or consent of instructor.

**SOC POL 351-0 Special Topics in Social Policy** Advanced work on special topics.

## Robert R. McCormick School of Engineering and Applied Science

The McCormick School of Engineering and Applied Science is committed to providing leadership for the technological foundation of our society, economy, environment, and culture. The school's mission is twofold: the personal and professional development of its students and faculty and the development and application of new technology, which is increasingly of an interdisciplinary nature.

McCormick is dedicated to a high standard of excellence in

- teaching fundamentals of science and engineering disciplines and stimulating students to become innovative thinkers and leaders able to cope with complex issues in a changing environment
- preparing undergraduate and graduate students capable of understanding, applying, and contributing to technology in whatever areas or careers they subsequently pursue

Undergraduate students in McCormick may follow a curriculum leading to a bachelor of science degree in any of the following fields:

applied mathematics  
 biomedical engineering  
 chemical engineering  
 civil engineering  
 computer engineering  
 computer science  
 electrical engineering  
 environmental engineering  
 industrial engineering  
 manufacturing and design engineering  
 materials science and engineering  
 mechanical engineering  
 medical engineering (Honors Program in Medical Education only)

The programs in biomedical engineering, chemical engineering, civil engineering, computer engineering, electrical engineering, environmental engineering, industrial engineering, manufacturing and design engineering, materials science and engineering, and mechanical engineering are accredited by the Engineering Accreditation Council of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Maryland 21202.

With the proper use and combination of requirements, options, and electives, students may prepare themselves for graduate work in engineering and also for postbaccalaureate degrees in medicine, law, business, or other areas.

Bachelor of science degrees are awarded also in approved ad hoc combined studies programs.

Graduate programs of study are available in all of the above fields as well as in theoretical and applied mechanics, biotechnology, computational biology and informatics, computer information systems, manufacturing management, project management, information technology, product development, and engineering management. Programs leading to degrees at the master's and doctoral levels are described completely in the course catalog for the Graduate School and in publications on engineering graduate programs.

Excellence in research is a distinguishing characteristic of the engineering faculty. A faculty such as this, working at the frontiers of knowledge, is in the best position to maintain currency in courses and curricula and to develop an atmosphere inspiring scholarship, discovery, and originality among students.

McCormick has a student body of approximately 1,500 undergraduates and 1,150 graduate students. It is housed in the Technological Institute complex, which contains more than 1 million square feet of floor area and provides excellent educational and research facilities.

The Seeley G. Mudd Library for Science and Engineering, adjoining the Technological Institute, is an integrated and centralized collection serving engineering, applied mathematics, astronomy, biochemistry, biology, chemistry, and physics. Many of its holdings of scholarly journals are available to Northwestern students over the Internet.

More information about McCormick can be found on its web site ([www.mccormick.northwestern.edu](http://www.mccormick.northwestern.edu)).

## ACADEMIC POLICIES

### Requirements for the Degree of Bachelor of Science

Students must successfully complete all 48 units of the curriculum or have equivalent academic credit. Students who interrupt their programs of study for an extended time during which degree requirements are changed will normally be held to the new requirements. Those who encounter curricular changes during their period of enrollment may choose to follow any curriculum during that period but must meet its requirements completely.

A grade point average (GPA) of not less than 2.0 is required for all units presented for the degree. Students must have received a grade of C or higher in any course

taken elsewhere and used to fulfill a McCormick degree requirement. The GPA of the 16 units in the major program must also be at least 2.0; no more than 2 of these units may carry grades of D.

Every candidate for a degree must file an application for the degree a year in advance of the date of graduation (see Academic Calendar).

In addition to, and independent of, the requirements set by McCormick, all students must satisfy the Undergraduate Residence Requirement. (See the Undergraduate Education section of this catalog.)

### Pass/No Credit Option

The following requirements apply to the pass/no credit (P/N) option:

- No more than 8 units taken P/N may be counted toward the 48 units required for the degree.
- Only 1 unit per quarter may be taken P/N during freshman and sophomore years.
- *Basic program:* Only 4 100- or 200-level courses may be taken P/N to satisfy the 7-unit requirement in the social sciences/humanities. No courses may be taken P/N in the required mathematics, engineering analysis and computer proficiency, basic sciences, design and communications, and basic engineering areas.
- *Major program:* Consult the responsible department office or McCormick's Academic Services Office regarding the regulations for use of P/N in each departmental program.
- Credits earned under a P/N grading scheme at another institution may be applied toward McCormick requirements only if the P/N option is permissible for that requirement.

### Advanced Placement

Advanced placement and college credit may be granted on the basis of the College Entrance Examination Board (CEEB) Advanced Placement tests. Placement or exemption may be granted on the basis of the CEEB tests (or other appropriate international examinations), special examinations in subject areas, or analysis of high school background. Any placement (verified by a grade above C- in a subsequent course) in approved sequential work will reduce the requirements for the BS by the number of courses preceding the placement. These stipulations regarding placement, exemption, and degree requirements may differ from those of other schools of the University. Students receiving credit from Advanced Placement examinations and other such programs must still meet the Undergraduate Residence Requirement.

### Personal Computers

Northwestern's campus is fully networked and has widespread wireless Internet connectivity. Accordingly, the McCormick faculty has adopted a policy making each

engineering undergraduate responsible for his or her own computing hardware and software for basic tasks and connection to the University's computer network. McCormick maintains a number of public and departmental computing laboratories, but these are used primarily for higher-level or specialized applications.

## ACADEMIC OPTIONS

### Cooperative Engineering Education Program

The Walter P. Murphy Cooperative Engineering Education Program alternates periods of paid industrial experience and academic studies for full-time students in all departments of engineering and applied science. During 18 months of industrial employment, students can apply theory while gaining practical experience. This perspective enables them to develop an understanding of the responsibilities of their future professional careers.

Freshmen are invited to participate in workshops to prepare themselves for the co-op program. Sophomores in good academic standing begin applying for co-op positions as early as the fall quarter. The co-op coordinator makes every effort to secure interviews for the students so that cooperative work assignments are related to their professional objectives.

Generally, the first work experience for sophomore co-op students occurs the summer before their junior year. Co-op experience for juniors, transfer students, and others may begin as late as the spring of junior year. If necessary, with the help of the academic advisers, special schedules may be arranged to enable students to meet individual academic requirements as well as co-op requirements.

Students register for their work quarters, but no tuition or fee is charged. This registration keeps co-op students enrolled at Northwestern during work periods. While no academic credit is given for co-op, special BS/MS programs may use co-op experience as the basis for undergraduate projects and master's theses.

Although emphasis is on the experience gained from cooperative work rather than on the income, students in the co-op program can cover a portion of their educational expenses with their earnings.

The following table shows the college-industry schedule for the five years of undergraduate education:

*College-Industry Schedule*

	Summer	Fall	Winter	Spring
Freshman		1	2	3
Sophomore	vacation	4	5	6
Junior	work	7	8	work
Presenior	work	9	work	10
Senior	work	work	11	12

Students who complete the co-op plan receive tuition rebates during their final academic quarters to assure that



they will not pay higher total tuition than other students in the same entering class.

In addition to the academic degree, McCormick awards co-op students a certificate in recognition of successful completion of the Walter P. Murphy Cooperative Engineering Education Program. Students must successfully complete the schedule of school and work — which meets standards set by the program and the co-op employer — in order to receive recognition as co-op students upon graduation from McCormick.

In some states, co-op experience may be credited for up to one year of the usual four years of engineering experience required for the Professional Engineer's License.

Employers of co-op students include government and service institutions as well as industry. Co-op coordinators visit participating employers periodically to discuss students' abilities, attitudes, and progress on the job. At the end of each work period, employers are asked to evaluate student performance and progress. It is important to note that neither students nor cooperative employers obligate themselves to permanent employment by virtue of the co-op status, although most students get impressive permanent job offers as a result of the co-op experience. Others are admitted to prestigious graduate and professional schools.

### Undergraduate Honors Program

Students with good scholastic records may apply to the Undergraduate Honors Program any time during their junior or presenior years. (Students within three quarters of graduation are past this admission point.) At the time of admission, they must have a cumulative GPA of 3.5 or better.

Honors students participating in the program must (1) complete at least three units of approved advanced study (including courses normally accepted at the graduate level) with an average grade of B or better and (2) complete an extended independent study project (at least two quarters on the same topic) leading to an acceptable report.

Successful completion of the honors program will be noted on the student's transcript. Recognition also will be given in the Commencement program. If a student's individually evaluated performance is not judged to meet the standards of success, the student will still receive course grades and credits as earned.

### Undergraduate Research

Opportunities for undergraduate research are made available and encouraged. Each major field of study offers independent study courses for research enrollment on an elective basis.

The Sara Boley Undergraduate Research Fund makes available money for individual research projects.

The Northwestern Student Advisory Board holds an annual competition for the best undergraduate research project, and the winner is recognized with the Harold Benedict Gotaas Award.

Students normally perform undergraduate research projects under the direction of faculty doing research in their department and in laboratories throughout the University, including McCormick research centers such as

Biologically Inspired Materials Center  
Center for Advanced Cement-Based Materials  
Center for Dynamic Systems and Control  
Center for Intelligent Processing of Composites  
Center for Nanofabrication and Molecular Self-Assembly  
Center for Photonic Communications and Computing  
Center for Quality Engineering and Failure Prevention  
Center for Quantum Devices  
Center for Surface Engineering and Tribology  
Center for Ultra-scale Computing and Information Security  
DND Collaborative Access Team Synchrotron Research Center  
Falk Center for Molecular Therapeutics  
Institute for BioNanotechnology in Medicine  
Institute for Environmental Catalysis  
Infrastructure Technology Institute  
Materials Research Science and Engineering Center  
Materials Technology Laboratory  
McCormick Manufacturing Institute  
Motorola Center for Communications Research  
Nanoscale Science and Engineering Center  
Northwestern Center for Engineering Education Research  
Optimization Technology Center  
Segal Design Institute  
Steel Research Group  
Transportation Center

### Second Field of Specialization

Elective opportunities in the McCormick curriculum may be used toward a departmental program in another school of the University. Satisfactory completion of the requirements for the second program, verified by the appropriate department, will be noted on the student's transcript. Carefully planned electives will normally enable students to obtain a second field of specialization within the 48-unit requirement for the BS degree.

### Multiple BS Degrees

Students with wide-ranging interests may work toward two or more bachelor of science degrees in McCormick. The work in additional areas does not need to be completed at the same time, but the full requirements for each degree must be approved by each department or program

no later than two academic quarters before the completion of work for the second degree but no earlier than the junior year. The full requirements for each degree must be satisfied. At least 6 additional units of credit, or their equivalent, must be presented before the awarding of each additional degree.

### Concurrent BS/MS

Qualified undergraduate students at McCormick may work simultaneously toward the bachelor of science and master of science degrees in engineering. Integrated planning of course work allows the possibility of taking graduate-level courses during the third and fourth years. The requirements remain unchanged for the two degrees. The McCormick requirement for the BS is 48 units, and the requirement for the MS is specified by the individual department (9–12 units). No course used for the MS requirement may be counted toward the BS requirement.

Application for admission to concurrent BS/MS study must be approved by the appropriate department and the Graduate School. A department may require that students do additional work beforehand.

### Five-Year BA/BS

McCormick encourages breadth of interest and to this end supports combined degree programs in engineering and liberal arts. A common approach to combining liberal arts and engineering is a parallel arrangement of studies requiring five years and resulting in a BA with a major in Weinberg College and a BS in a particular field of engineering. Students should file a petition outlining this dual plan of study before their fourth year; it must be approved by the departments and schools administering the degree work. Students must complete the stated requirements of both schools and expected majors.

Students receiving financial aid should note the restrictions under Satisfactory Academic Progress and Financial Aid on page 20.

### Engineering and Music Degrees

Highly capable students who have a strong interest in and commitment to both engineering and music may pursue a five-year program leading to bachelor's degrees in both fields. In engineering any field of study may be chosen, resulting in a bachelor of science in the chosen field. In music the bachelor of music or bachelor of arts in music is awarded. The program may be entered no later than the beginning of the sophomore year; admission requires concurrent approval of both the Henry and Leigh Bienen School of Music and McCormick. (See also Five-Year BS/BMus or BS/BAMus in the Bienen School of Music section of this catalog.)

### Business Enterprise Certificate

Students who aim to have business careers and want to improve their ability to make a contribution soon after they graduate may wish to consider pursuing this certificate program. This program involves a combination of required business courses and work experience. Students who complete the Walter P. Murphy Cooperative Engineering Education Program must take 2 units of credit in addition to those needed for their bachelor's degrees; other students must take 4 extra units. An acceptable report on the work experience and successful completion of a McCormick BS degree are required.

### Certificate in Biotechnology and Biochemical Engineering

This certificate program provides specific training for students interested in industries that create and manufacture pharmaceuticals, biomaterials, and agents for gene and cell therapies or for those desiring in-depth preparation for future graduate study in biotech research. Requirements include

- 5 core courses in biological science and biochemical engineering
- 4 electives providing opportunity for greater depth in both fundamental biology and engineering applications
- 1 quarter of independent study to provide hands-on practical experience with a biotech-related project

A minimum GPA of 2.0 must be maintained in the courses in the certificate program, and successful completion of a McCormick BS degree is required.

### Certificate in Engineering Design

This certificate program, administered by the Segal Design Institute, develops a set of design skills that prove valuable in careers across the entire spectrum available to McCormick graduates. The program focuses on innovative engineering design in team-based, cross-disciplinary settings that address real-world problems. In addition to 2.5 units of required course credit and 3.5 units of elective credit, students must build a portfolio demonstrating their accomplishments in prototyping and implementation, modern software tools, design analysis, writing, project management, and effective graphical communication. Successful completion of a Northwestern baccalaureate degree is required.

### Honors Program in Undergraduate Research

The Honors Program in Undergraduate Research in McCormick provides an unusual opportunity for students with superior motivation and scholastic credentials (high school rank and test scores) to be admitted to work with an engineering faculty mentor/adviser in a challenging research project. This research project participation could begin in the first year and continue through all

the undergraduate years, allowing close association with a faculty researcher probing the frontiers of knowledge in engineering or engineering science.

This unique opportunity for experiencing the excitement of original research and the associated approach to learning provides students with not only encouragement but also excellent preparation for graduate study. If students in the Honors Program in Undergraduate Research achieve advanced placement as well as satisfactory performance in the research project and accompanying course work, during their third year of undergraduate study they will be considered for admission to the Graduate School and for award of financial aid.

### Honors Program in Medical Education

The Honors Program in Medical Education (HPME) is designed for unusually gifted high school students who seek a career in medicine or medical science. It provides a plan whereby students entering Northwestern are admitted simultaneously to McCormick, Weinberg College, or the School of Communication and to the Feinberg School of Medicine. HPME students then participate in a challenging program, with the first three or four years in undergraduate study and the last four years in the Feinberg School. Thus, the period of formal training may be reduced by one year.

Students who meet the entrance requirements of McCormick may pursue a program leading to the bachelor of science degree in medical engineering after five years and the doctor of medicine degree after seven years.

### Honors Program in Engineering and Journalism

The Honors Program in Engineering and Journalism is intended to prepare exceptional students for communications careers emphasizing engineering, science, and technology. This joint program involves completing a McCormick bachelor's degree and then a Medill School of Journalism master's degree. It normally requires five years of study, but unusually capable students may be able to shorten the time through use of advanced placement credits and accelerated scheduling. To be considered for the program, applicants to Northwestern complete an additional questionnaire that is evaluated by a Medill faculty panel. Students are evaluated by the faculty during the program to verify that performance is satisfactory. Part of the engineering humanities requirements must be fulfilled with Medill courses JOUR 201-1 Reporting and Writing and 202 Introduction to 21st-Century Media.

## STUDENT RESOURCES

### Tutorial Program

McCormick conducts a program of guided study and tutorial help for freshmen and sophomores in all the required courses in mathematics, chemistry, physics, and

engineering. This program encourages out-of-class work and good study habits and helps provide a full understanding of the early courses that are the foundation for much that is to follow. The aim is not to displace students in their learning efforts but to provide explanations to bridge the uncertain or unknown and lead to depth of understanding.

### Faculty Advisers

During the first year students are assigned a freshman adviser. At the beginning of the sophomore year most students will have selected a major field of study and will be reassigned an adviser in that area. Advisers assist in planning the program of study, but students retain the responsibility of meeting overall graduation requirements. Curricular and other advice may be obtained by addressing an e-mail request to [mccormick-school@northwestern.edu](mailto:mccormick-school@northwestern.edu).

### Organizations for Engineering Students

The McCormick Student Advisory Board is composed of representatives from each class in engineering and from approved McCormick organizations. It is the recognized representative body of undergraduate engineering students and as such serves as a link between the students and faculty and administration. It encourages and coordinates the activities of engineering students and student groups.

The following professional societies have established student branches on the campus:

- American Institute of Chemical Engineers
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- ASM International
- Association for Computing Machinery
- Biomedical Engineering Society
- Engineers for a Sustainable World
- Institute of Electrical and Electronics Engineers and its computer and engineering in medicine and biology subchapters
- Institute of Industrial Engineers
- Materials Research Society
- National Society of Black Engineers
- Society of Automotive Engineers
- Society of Hispanic Professional Engineers
- Society of Manufacturing Engineers
- Society of Women Engineers

The following honorary societies recognize high-achieving McCormick undergraduates:

- Eta Kappa Nu: open to upperclass students in electrical engineering who demonstrate superior scholarship and ability
- Kappa Theta Epsilon: cooperative engineering education honorary society
- Omega Chi Epsilon: for upperclass students in chemical engineering who demonstrate superior scholarship and leadership ability

Phi Eta Sigma: for freshmen who earn a scholastic average equivalent to a grade of A

Phi Lambda Upsilon: open to upperclass students in chemistry and chemical engineering who demonstrate superior scholarship and academic ability

Pi Tau Sigma: for upperclass students in mechanical engineering who demonstrate superior scholarship and leadership ability

Sigma Xi Society: associate membership open to seniors who excel in scholarship in at least two departments

Tau Beta Pi: for upperclass students who have shown superiority in scholarship and ability in engineering work

## PROGRAMS OF STUDY

### McCormick Curriculum Requirements

All curricula leading to the bachelor of science degree in engineering or applied science must have the same basic components — mathematics, engineering analysis and computer proficiency, basic sciences, design and communications, basic engineering, social sciences/humanities, unrestricted electives, and major program. Lists of courses qualifying for these components follow.

The abbreviations used for McCormick departments and major curricula in the listings that follow are

BME (biomedical engineering)

CHEM ENG (chemical and biological engineering)

CIV ENG (civil and environmental engineering)

CRDV (career development)

DSGN (Segal Design Institute/manufacturing and design engineering)

EECS (electrical engineering and computer science)

ES APPM (engineering sciences and applied mathematics)

GEN ENG (general engineering)

IEMS (industrial engineering and management sciences)

MAT SCI (materials science and engineering)

MECH ENG (mechanical engineering)

#### *Mathematics (4 units)*

MATH 220 Differential Calculus of One-Variable Functions

MATH 224 Integral Calculus of One-Variable Functions

MATH 230 Differential Calculus of Multivariable Functions

MATH 234 Multiple Integration and Vector Calculus

Note: ES APPM 252-1,2 satisfy requirements for MATH 230 and 234.

#### *Engineering Analysis and Computer Proficiency (4 units)*

GEN ENG 205-1,2,3,4 Engineering Analysis or 206-1,2,3,4 Honors Engineering Analysis

#### *Basic Sciences (4 units)*

4 courses from at least two of the areas below; no more than 2 from earth and planetary sciences/astronomy; no more than 3 in any other area

##### **Physics**

PHYSICS 135-2,3 General Physics

PHYSICS 335 Modern Physics for Nonmajors

##### **Biological sciences**

BIOL SCI 210-1 Genetics and Evolutionary Biology

BIOL SCI 210-2 Biochemistry and Molecular Biology

BIOL SCI 210-3 Physiology and Cell Biology

CHEM ENG 275 Molecular and Cell Biology for Engineers

##### **Chemistry**

CHEM 101 General Chemistry

CHEM 102 General Inorganic Chemistry

CHEM 103 General Physical Chemistry

CHEM 171 Accelerated General Inorganic Chemistry

CHEM 172 Accelerated General Physical Chemistry

CHEM 210-1,2 Organic Chemistry

##### **Earth and planetary sciences/astronomy**

EARTH 201 Surface Processes

EARTH 202 Earth's Interior

ASTRON 220 Introduction to Astrophysics

#### *Design and Communications (3 units)*

##### **Writing and design**

ENGLISH 106-1,2 Writing in Special Contexts

DSGN 106-1,2 Engineering Design and Communication

##### **Speaking**

GEN CMN 102 Public Speaking, GEN CMN 103

Analysis and Performance of Literature, or BME 390-2

Biomedical Engineering Design

Higher-level courses may satisfy this requirement; they are approved on an individual basis.

#### *Basic Engineering (5 units)*

5 courses from at least four of the following areas:

##### **Computer architecture and numerical methods**

EECS 203 Introduction to Computer Engineering

EECS 205 Fundamentals of Computer System Software

EECS 328 Numerical Methods for Engineers

ES APPM 346 Modeling and Computation in Science and Engineering

##### **Computer programming**

EECS 211 Object-Oriented Programming in C++

EECS 317 Data Management and Information

Processing

EECS 230 Programming for Computer Engineers or

231 Advanced Programming for Computer Engineers

##### **Electrical science**

EECS 202 Introduction to Electrical Engineering

EECS 221 Fundamentals of Circuits

EECS 222 Fundamentals of Signals and Systems

EECS 223 Fundamentals of Solid-State Engineering

EECS 224 Fundamentals of Electromagnetics and Photonics

EECS 270 Applications of Electronic Devices

MECH ENG 233 Electronics Design

### **Fluids and solids**

BME 270 Fluid Mechanics

BME 271 Introduction to Biomechanics

CHEM ENG 321 Fluid Mechanics

CIV ENG 216 Mechanics of Materials I

CIV ENG 219 Continuum Mechanics I

MECH ENG 241 Fluid Mechanics I

### **Materials science and engineering**

MAT SCI 201 Introduction to Materials, 203 Microstructure and Engineering Properties of Materials, or 301 Materials Science Principles

### **Probability, statistics, and quality control**

BME 220 Introduction to Biomedical Statistics

CHEM ENG 312 Probability and Statistics for Chemical Engineering

CIV ENG 306 Uncertainty Analysis in Civil Engineering

EECS 302 Probabilistic Systems and Random Signals

IEMS 201 Introduction to Statistics

IEMS 303 Statistics I

MECH ENG 359 Reliability Engineering

### **Systems engineering and analysis**

CHEM ENG 210 Analysis of Chemical Process Systems

CIV ENG 304 Civil and Environmental Engineering Systems Analysis

IEMS 310 Operations Research

IEMS 326 Economics and Finance for Engineers

### **Thermodynamics**

BME 250 Thermodynamics

CHEM 342-1 Thermodynamics

CHEM ENG 211 Thermodynamics

MAT SCI 314 Thermodynamics of Materials

MAT SCI 315 Phase Equilibria and Diffusion in Materials

MECH ENG 220 Thermodynamics I (may not be taken with CHEM 342-1 or CHEM ENG 211)

MECH ENG 370 Thermodynamics II

### *Social Sciences/Humanities (7 units)*

7 courses, which must be approved in advance by the McCormick Humanities Panel, chosen according to one of two options in the following areas:

- Social and behavioral sciences
- Historical studies and values
- Fine arts, language, and literature

*Option A:* At least 2 courses must be chosen in each area.

Only 3 may be 100-level introductory courses; 3 must be thematically related to provide depth.

*Option B:* 5 of the 7 courses must be clearly thematically related. For breadth, no more than 5 courses may come from a single area.

### *Unrestricted Electives (5 units)*

Students may take any credit course in the University to explore or extend technical or nontechnical interests.

### *Major Program (16 units)*

Any program of study finds its depth or concentration in the 16 units given to the major program of the curriculum. Each engineering curriculum provides considerable elective opportunity within these courses. The intent is to provide opportunity for individualization, but coherence in the selection of elective courses is still necessary. In accredited programs, the understanding is that certain criteria will be met, and guidance to this end is essential. Accordingly, it is required that a plan of study listing intended selections be submitted for approval by the end of the eighth quarter of study (winter quarter of junior year). All 16 units in the major program must be at the 200 level or higher.

Most curricula offer suggested areas of specialization or options that provide excellent guidance in using electives. These course plans are available in the department or program offices or the McCormick Academic Services Office and can be the basis for course planning. Alternately, self-designed plans may be submitted, but they should be worked out in consultation with a faculty adviser.

### **Curricula in Majors**

Students must meet not only McCormick curriculum requirements but also the specific requirements for the major curriculum being pursued. The following listings of these curricula present additional information or specifics to be used with the basic curriculum.

Some of the listed curricula contain specializations or options within the curriculum. These are for advice and guidance for elective course choice. In addition, some courses may be regarded as duplicates (contact the Undergraduate Engineering Office or see the McCormick web site for this list), and taking them will increase the number of requirements needed to earn a McCormick degree. For further details about the options or specializations within a particular program, consult with the department coordinator sponsoring that curriculum, check with McCormick's Academic Services Office, or see the school's web page at [www.mccormick.northwestern.edu](http://www.mccormick.northwestern.edu).

### *Applied Mathematics (48 units)*

*Department of Engineering Sciences and Applied Mathematics*

#### **Mathematics (4 units)**

#### **Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

#### **Basic sciences (4 units)**

PHYSICS 135-2,3

2 additional basic science courses (biological sciences, chemistry, geological sciences, or astronomy)



**Design and communications (3 units)****Basic engineering (5 units)**

EECS 230 or 231

4 courses from at least three of the following areas:

- Computer architecture and numerical methods
- Electrical science
- Fluids and solids
- Materials science and engineering
- Systems engineering and analysis
- Thermodynamics

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**• **Required courses (7 units)**

- ES APPM 311-1,2 Methods of Applied Mathematics
- ES APPM 311-3 Methods of Applied Mathematics:  
Complex Variables or MATH 325 Complex Variables  
for Applications
- ES APPM 322 Applied Dynamical Systems
- ES APPM 346 Modeling and Computation in Science  
and Engineering
- ES APPM 421-1 Models in Applied Mathematics
- 1 modeling course from an approved list

• **Additional courses (3 units)**

- MATH 334 Linear Algebra: Second Course
- 2 courses chosen from EECS 302; IEMS 202, 303, 310,  
313; MATH 330-1,2,3

• **Engineering or the sciences (4 units)**

- 4 courses at the 300-level or higher leading to an  
approved concentration in one of the following areas:
- Engineering
- Mathematical social sciences (e.g., economics)
- Mathematics (e.g., discrete mathematics or analysis)
- Numerics
- The sciences

• **Technical electives (2 units)**

- 2 courses at the 300 level or higher in engineering,  
science, or mathematics

*Biomedical Engineering (48 units)**Department of Biomedical Engineering***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2,3

CHEM 102 and 103 or 171 and 172

**Design and communications (3 units)**

ENGLISH 106-1,2

DSGN 106-1,2

BME 390-2

**Basic engineering (5 units)***Fluids and solids:* BME 270 and 271*Materials science and engineering:* MAT SCI 201 or 301*Probability, statistics, and quality control:* BME 220;

EECS 302; IEMS 201, 303; or MECH ENG 359

*Thermodynamics:* BME 250; CHEM 342-1; or

MECH ENG 220

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**

The major program consists of 16 courses at the 200 level or higher, none of which may be taken P/N.

- BME 101 Introduction to Biomedical Engineering  
(noncredit)

• **Core (9 units)**

- BIOL SCI 210-2 Biochemistry and Molecular Biology
- CHEM 210-1 Organic Chemistry
- BME 301, 302, 303 Systems Physiology
- BME 305 Biomedical Signals Analysis
- BME 306 Biomedical Systems Analysis
- BME 307 Quantitative Experimentation and Design
- BME 390-1 Biomedical Engineering Design

• **Areas of specialization (7 units)**

- Students select 5 courses from one of the following  
tracks or an alternate set of courses developed with their  
advisers and approved by the Biomedical Engineering  
Undergraduate Committee:
- Biological materials and molecular engineering
- Biomechanics and rehabilitation
- Biomedical signals and images
- Computer engineering
- Electrical engineering
- Transport processes and tissue engineering
- The 2 additional technical electives may include  
BIOL SCI 210-1,3; CHEM 101, 210-3; EECS 230; and  
any courses in engineering, science, or mathematics at  
the 300 level or higher. Students are urged to choose  
technical electives that emphasize engineering design.

*Chemical Engineering (48 units)**Department of Chemical and Biological Engineering***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2,3

CHEM 102 and 103 or 171 and 172

**Design and communications (3 units)****Basic engineering (5 units)***Fluids and solids:* CHEM ENG 321*Materials science and engineering:* MAT SCI 301*Probability, statistics, and quality control:* CHEM ENG  
312; IEMS 201, 303; or BME 220*Systems engineering and analysis:* CHEM ENG 210*Thermodynamics:* CHEM ENG 211

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**• **Required courses (12 units)**

- CHEM 210-1,2 Organic Chemistry
- CHEM 342-2 Quantum Mechanics and Spectroscopy
- CHEM ENG 212 Phase Equilibrium and Staged Separations
- CHEM ENG 275 Molecular and Cell Biology for Engineers (BIOL SCI 210-2 may substitute)
- CHEM ENG 307 Kinetics and Reactor Engineering
- CHEM ENG 322 Heat Transfer
- CHEM ENG 323 Mass Transfer
- CHEM ENG 341 Process Dynamics and Control
- CHEM ENG 342 Chemical Engineering Laboratory
- CHEM ENG 351 Process Economics, Design, and Evaluation
- CHEM ENG 352 Chemical Engineering Design Projects

• **Areas of specialization (4 units)**

The remaining 4 units are chosen from advanced engineering, mathematics, or science courses. They must be selected to fulfill one of the six areas of specialization offered by the department:

- Biomedical engineering
- Biotechnology
- Chemical process engineering
- Environmental engineering
- General chemical engineering
- Polymer science and engineering

At least 1 of these courses must be an approved 200- or 300-level science elective.

*Civil Engineering (48 units)**Department of Civil and Environmental Engineering***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

- PHYSICS 135-2
- CHEM 101, 102
- CHEM 103 or PHYSICS 135-3

**Design and communications (3 units)****Basic engineering (5 units)**

- Electrical science:* 1 course
- Fluids and solids:* CIV ENG 216; MECH ENG 241
- Thermodynamics:* 1 course
- MAT SCI 203 or 1 other course from system engineering and analysis, computer architecture and numerical methods, computer programming, or materials science

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**

The major program consist of 16 courses, 10 of which must be civil engineering.

• **Basic civil engineering (7 units)**

- CIV ENG 221 Theory of Structures I
- CIV ENG 222 Structural Steel Design
- CIV ENG 250 Introductory Soil Mechanics
- CIV ENG 260 Fundamentals of Environmental Engineering
- CIV ENG 330 Construction Management
- CIV ENG 340 Fluid Mechanics II
- CIV ENG 371 Introduction to Transportation Planning and Analysis or 376 Transportation System Operations

• **Mathematical techniques and science (2 units)**

2 courses chosen from an approved list, 1 of which must be a calculus-based probability and statistics course

• **Technical electives (7 units)**

7 courses at the 200 level or higher in mathematics, science, engineering, or another area supporting their specialty; 2 must be chosen from an approved list of design and synthesis courses, and 1 of those 2 must be the currently designated “capstone design course”

Listed below are samples of some traditional areas of specialization, but students are encouraged to design with their advisers a program that meets their own particular interests.

- Applied mechanics
- Construction
- Environmental engineering
- Geotechnical engineering
- Structural engineering
- Transportation systems

*Computer Engineering (48 units)**Department of Electrical Engineering and Computer Science***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

- PHYSICS 135-2,3
- 2 units from biological sciences, chemistry, or earth and planetary sciences/astronomy

**Design and communications (3 units)****Basic engineering (5 units)**

- Computer architecture and numerical methods:* EECS 203 (grade of C– or better required for graduation).
- Computer programming:* EECS 231
- Electrical science:* EECS 202 (grade of C– or better required for graduation)
- Probability, statistics, and quality control:* EECS 302
- 1 course in fluids and solids, materials science, systems engineering and analysis, or thermodynamics

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)**

**Major program (16 units)****• Required courses (5 units)**

EECS 205 Fundamentals of Computer System Software  
 EECS 303 Advanced Digital Logic Design  
 EECS 361 Computer Architecture  
 EECS 311 Data Structures and Data Management  
 EECS 343-1 Operating Systems

**• Technical electives (10 units)**

Technical electives may be used to tailor a program to a particular area of specialization. Students must take at least 5 units from the following four tracks and 2 units from the fundamental electrical engineering courses listed below. The remaining 3 electives may be chosen from BIOL 210-1,2,3; CHEM 210-1,2,3; or 300-level technical courses in science, mathematics, computer science, or engineering. No more than 2 units of 399 will be counted as technical electives. Additional units of 399 may be taken but will be counted as unrestricted electives.

*Embedded systems track*

EECS 332 Digital Image Analysis  
 EECS 346 Microprocessor System Design  
 EECS 347-1 Microprocessor System Projects I  
 EECS 347-2 Microprocessor System Projects II  
 EECS 390 Introduction to Robotics  
 BME 384 Biomedical Computing

*Fundamental electrical engineering courses*

EECS 221 Fundamentals of Circuits  
 EECS 222 Fundamentals of Signals and Systems  
 EECS 223 Fundamentals of Solid-State Engineering  
 EECS 224 Fundamentals of Electromagnetics and Photonics

EECS 225 Fundamentals of Electronics

*High-performance computing track*

EECS 328 Numerical Methods for Engineers  
 EECS 333 Introduction to Communication Networks  
 EECS 358 Introduction to Parallel Computing  
 EECS 362 Computer Architecture Project

*Software track*

EECS 310 Mathematical Foundations of Computer Science  
 EECS 322 Compiler Construction  
 EECS 336 Design and Analysis of Algorithms  
 EECS 339 Introduction to Database Systems  
 EECS 394 Software Project Management and Development

*VLSI and CAD track*

EECS 353 Digital Microelectronics  
 EECS 357 Introduction to VLSI CAD  
 EECS 391 VLSI Systems Design  
 EECS 392 VLSI Systems Design Projects

**• Design requirement (1 unit)**

1 course chosen from  
 EECS 347-1 Microprocessor System Projects I  
 EECS 362 Computer Architecture Project  
 EECS 392 VLSI Systems Design Projects

*Computer Science (48 units)*

*Department of Electrical Engineering and Computer Science*

**Mathematics (4 units)**

MATH 220, 224, 230  
 EECS 310

**Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3  
 EECS 111

**Basic sciences (4 units)****Design and communications (3 units)****Basic engineering (5 units)**

*Computer programming:* EECS 211

*Probability, statistics, and quality control:* IEMS 201, 303  
 or EECS 302

3 other basic engineering courses, excluding computer science

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)****• Required courses (3 units)**

EECS 101 An Introduction to Computer Science for Everyone  
 EECS 213 Introduction to Computer Systems  
 EECS 311 Data Structures and Data Management

**• Technical electives (13 units)**

5 courses chosen from the list of breadth courses  
 (available from the department)

6 courses chosen from the list of depth courses  
 (available from the department)

2 project courses, each resulting in the construction and demonstration of a proposed solution to some organization's problem. Projects must be approved by a faculty adviser beforehand. Project work will typically occur in independent study projects (EECS 399) or in project-oriented courses (e.g., EECS 394). No more than 4 units of EECS 338 may be used for the degree requirements.

Courses at the 400 level are primarily for graduate students but may be open to advanced undergraduate students with the consent of the instructor. EECS 110 may be used as an unrestricted technical elective if taken before EECS 111.

*Electrical Engineering (48 units)*

*Department of Electrical Engineering and Computer Science*

**Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2,3  
 2 additional basic science courses

**Design and communications (3 units)**

**Basic engineering (5 units)**

*Electrical science:* EECS 202 (grade of C- or better required for graduation)

*Computer architecture and numerical methods:* EECS 203 (grade of C- or better required for graduation)

*Computer programming:* EECS 211 or 230

*Probability, statistics, and quality control:* EECS 302

1 other course chosen from fluids and solids, materials science and engineering, systems engineering, or thermodynamics

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**• **Required courses (5 units)**

EECS 221 Fundamentals of Circuits

EECS 222 Fundamentals of Signals and Systems

EECS 223 Fundamentals of Solid-State Engineering

EECS 224 Fundamentals of Electromagnetics and Photonics

EECS 225 Fundamentals of Electronics

• **Technical electives (10 units)**

Technical electives may be used to tailor a program to a particular area of specialization. Students must take at least 6 courses chosen from the following six tracks and 2 courses from 300-level EECS technical electives (which may include the courses below). The remaining 2 electives may be chosen from BIOL 210-1,2,3; CHEM 210-1,2,3; or 300-level technical courses in science, mathematics, computer science, or engineering and may include the courses below. No more than 2 units of 399 will be counted as technical electives. Additional units of 399 may be taken but will be counted as unrestricted electives.

*Biomedical engineering track*

BME 317 Biochemical Sensors

BME 325 Introduction to Medical Imaging

BME 327 Magnetic Resonance Imaging

BME 333 Modern Optical Microscopy and Imaging

BME 383 Cardiovascular Instrumentation

*Circuits and electronics track*

EECS 303 Advanced Digital Logic Design

EECS 346 Microprocessor System Design

EECS 353 Digital Microelectronics

EECS 355 ASIC and FPGA Design

EECS 391 VLSI Systems Design

EECS 393 VLSI Design and Analysis of High-Speed Integrated Circuits

*Communications systems track*

EECS 307 Communications Systems

EECS 333 Introduction to Communication Networks

EECS 378 Digital Communications

EECS 380 Wireless Communications

*Control systems track*

EECS 360 Introduction to Feedback Systems or

MECH ENG 391 Fundamentals of Control Systems

EECS 374 Introduction to Digital Control

EECS 390 Introduction to Robotics

MECH ENG 333 Introduction to Mechatronics

*Digital signal processing track*

EECS 332 Digital Image Analysis

EECS 359 Digital Signal Processing

EECS 363 Digital Filtering

*Electromagnetics and optics track*

EECS 308 Advanced Electromagnetics and Photonics

EECS 379 Lasers and Coherent Optics

EECS 382 Photonic Information Processing

EECS 383 Fiber-Optic Communications

EECS 386 Computational Electromagnetics and Photonics

*Solid-state engineering track*

MECH ENG 381 Introduction to Microelectromechanical Systems (MEMS)

EECS 250 Physical Electronics and Devices

EECS 381 Electronic Properties of Materials

EECS 384 Solid-State Electronic Devices

EECS 385 Optoelectronics

EECS 388 Nanotechnology

• **Design requirement (1 unit)**

1 course chosen from

EECS 347-1 Microprocessor System Projects I

EECS 392 VLSI Systems Design Projects

EECS 398 Electrical Engineering Design

EECS 399 Projects (when 399 is a design project)

*Environmental Engineering (48 units)**Department of Civil and Environmental Engineering***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2

CHEM 101, 102, 103

**Design and communications (3 units)****Basic engineering (5 units)**

*Computer architecture and numerical methods:* EECS 328 or ES APPM 346 or 1 materials science course

*Fluids and solids:* MECH ENG 241

*Probability, statistics, and quality control:* 1 unit (CIV ENG 306 recommended)

*Systems engineering and analysis:* CIV ENG 304 or IEMS 326

*Thermodynamics:* CHEM 342-1

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)**

**Major program (16 units)**• **Core (12 units)**

CHEM 210-1 Organic Chemistry  
 CIV ENG 260 Fundamentals of Environmental Engineering  
 CIV ENG 340 Fluid Mechanics II  
 CIV ENG 361 Environmental Microbiology and Public Health  
 CIV ENG 363 Environmental Engineering Applications I: Air and Land  
 CIV ENG 364 Environmental Engineering Applications II: Water  
 CIV ENG 365 Environmental Laboratory  
 CIV ENG 367 Aquatic Chemistry  
 CIV ENG 370 Environmental Engineering Design  
 ENVR SCI 201 Earth: A Habitable Planet  
 ENVR SCI 202 The Health of the Biosphere  
 ENVR SCI 203 Energy and the Environment: The Automobile

• **Technical electives (4 units)**

2 courses from an approved list  
 2 courses, 200 level or higher, in engineering or mathematics or science in Weinberg College

*Industrial Engineering (48 units)**Department of Industrial Engineering and Management Sciences***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2 and 1 unit of chemistry recommended

**Design and communications (3 units)****Basic engineering (5 units)**

EECS 230  
 EECS 317 or 328  
 IEMS 326  
 2 additional basic engineering courses

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**• **Probability and statistics (2 units)**

IEMS 202 Probability  
 IEMS 303 Statistics I

• **Operations research (3 units)**

IEMS 313 Deterministic Models and Optimization  
 IEMS 315 Stochastic Models and Simulation  
 IEMS 317 Discrete-Event Systems Simulation

• **Applied behavioral science (1 unit)**

IEMS 340 Field Project Methods or  
 342 Organization Behavior

• **Production and logistics (1 unit)**

IEMS 381 Supply-Chain Modeling and Analysis  
 or 382 Production Planning and Scheduling  
 or 383 Service Operations Management

• **Senior design project (2 units)**

IEMS 390 Systems Management, 391 Industrial Engineering Design, or 392 Systems Project Management  
 IEMS 393 Industrial Engineering Design Project

• **Electives (7 units)**

3 courses chosen from the Department of Industrial Engineering and Management Sciences (excluding 399)  
 DSGN 344 Manufacturing Engineering Design  
 1 additional engineering course  
 2 engineering courses at the 200 level or higher or any course chosen from an approved list  
 P/N is permitted only in the last group. No more than 2 units of 399 are permitted. A list of electives may be found on the department web site.

• **Concentration (optional)**

At least 4 courses chosen from an approved list  
 Students may pursue more than one concentration. Concentrations may be created from courses that satisfy other requirements or concentrations. A list of available concentration areas may be found on the department web site.

*Manufacturing and Design Engineering (48 units)**Segal Design Institute***Mathematics (4 units)****Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2,3  
 2 chemistry courses

**Design and communications (3 units)****Basic engineering (5 units)**

*Computer architecture and numerical methods or electrical science:* EECS 202 or 203  
*Fluids and solids:* CIV ENG 216  
*Materials science and engineering:* MAT SCI 201  
*Systems engineering and analysis:* IEMS 326  
 1 additional course

**Social sciences/humanities (7 units)****Unrestricted electives (5 units)****Major program (16 units)**• **Core (10 units)**

DSGN 308 Human-Centered Product Design or  
 MECH ENG 315 Theory of Machines — Design of Elements  
 DSGN 344 Manufacturing Engineering Design  
 IEMS 201 Introduction to Statistics or 303 Statistics I  
 IEMS 305 Statistical Methods for Quality Improvement  
 or 307 Quality Improvement by Experimental Design  
 IEMS 310 Operations Research  
 IEMS 382 Production Planning and Scheduling  
 MAT SCI 318 Materials Selection  
 MECH ENG 240 Introduction to Mechanical Design and Manufacturing



MECH ENG 340-1 Computer-Integrated Manufacturing

MECH ENG 340-2 or -3 Computer-Integrated Manufacturing

• **Senior design project (2 units)**

DSGN 398 Interdisciplinary Design Project II  
1 course chosen from

DSGN 298 Interdisciplinary Design Projects I

IEMS 391 Industrial Engineering Design

MECH ENG 398 Engineering Design

• **Technical electives (4 units)**

2 courses from an approved list and 2 300-level engineering courses

*Materials Science and Engineering (48 units)*

*Department of Materials Science and Engineering*

**Mathematics (4 units)**

**Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2,3

CHEM 102 and 103 or 171 and 172

**Design and communications (3 units)**

**Basic engineering (5 units)**

*Fluids and solids:* CIV ENG 216 or 219

*Materials science and engineering:* MAT SCI 301

*Thermodynamics:* MAT SCI 314 and 315

*Elective:* 1 course selected from computer architecture and numerical methods, computer programming, electrical science, probability, statistics, and quality control, or systems engineering and analysis

**Social sciences/humanities (7 units)**

**Unrestricted electives (5 units)**

MAT SCI 190 recommended

**Major program (16 units)**

• **Required courses (11 units)**

MAT SCI 316-1,2 Microstructural Dynamics

MAT SCI 331 Physical Properties of Polymers

MAT SCI 332 Mechanical Behavior of Solids

MAT SCI 351-1,2 Introductory Physics of Materials

MAT SCI 361 Crystallography and Diffraction

MAT SCI 390 Materials Design

MAT SCI 391 Process Design

MAT SCI 396-1,2 Senior Project in Materials Science and Engineering

• **Technical electives (5 units)**

Each student must choose the remaining courses in a consistent manner to fulfill an area of concentration. These courses may be in engineering, natural sciences (usually chemistry or physics), and mathematics. No more than 2 of the 5 units may be 200-level courses; at least 2 of the 5 must be 300-level materials science and engineering courses.

Examples of programs for concentrations in biomaterials, design and manufacturing, electronic materials, metals and ceramics, nanomaterials, polymeric materials, and surface science are described in a departmental manual for majors.

*Mechanical Engineering (48 units)*

*Department of Mechanical Engineering*

**Mathematics (4 units)**

**Engineering analysis and computer proficiency (4 units)**

GEN ENG 205-1,2,3,4

**Basic sciences (4 units)**

PHYSICS 135-2,3

2 chemistry courses

**Design and communications (3 units)**

**Basic engineering (5 units)**

*Electrical science:* MECH ENG 233 (students planning to take advanced EECS courses may substitute EECS 221)

*Fluids and solids:* CIV ENG 216; MECH ENG 241

*Materials science and engineering:* MAT SCI 201

*Thermodynamics:* MECH ENG 220

**Social sciences/humanities (7 units)**

**Unrestricted electives (5 units)**

**Major program (16 units)**

• **Required courses (7 units)**

MECH ENG 202 Mechanics II

MECH ENG 224 Experimental Engineering I

MECH ENG 240 Introduction to Mechanical Design and Manufacturing

MECH ENG 315 Theory of Machines — Design of Elements

MECH ENG 340-1 Computer-Integrated Manufacturing

MECH ENG 377 Heat Transfer

MECH ENG 390 Introduction to Dynamic Systems

• **Advanced study (4 units)**

At least 1 course from each group:

*Dynamics/controls*

MECH ENG 314 Theory of Machines — Dynamics

MECH ENG 362 Stress Analysis

MECH ENG 363 Mechanical Vibrations

MECH ENG 365 Finite Elements for Stress Analysis

MECH ENG 391 Fundamentals of Control Systems

CIV ENG 327 Finite Element Methods in Mechanics

EECS 360 Introduction to Feedback Systems

*Thermofluid science*

MECH ENG 370 Thermodynamics II

MECH ENG 373 Engineering Fluid Mechanics Design

MECH ENG 340-2 Computer-Integrated Manufacturing

MECH ENG 366 Finite Elements for Design and Optimization

MECH ENG 398 Engineering Design

• **Electives (5 units)**

- 2 300-level mechanical engineering courses
- 1 200- or 300-level technical elective
- 2 300-level technical electives

At least 1 unit must be in mathematics or basic sciences: it may be chosen from IEMS 201 or 202; 200- or 300-level courses in biological sciences, chemistry, geological sciences, or physics and astronomy; or 300-level courses in mathematics, applied mathematics, or statistics (*Exceptions*: BIOL SCI 307, CHEM 393, PHYSICS 301). No more than 2 units of 399 are allowed.

Students are encouraged to concentrate electives in areas of interest. A list of seven areas of concentration, including appropriate courses and descriptions, is available from the department office.

### Combined Studies Program

For students whose particular interests and goals cannot be satisfied by one of the regular programs of study in engineering or applied science, the Combined Studies Program provides an alternative. If endorsed and guided by three faculty members and approved by McCormick's Curriculum Committee, an ad hoc curriculum leading to the bachelor of science degree may be pursued.

Available courses may be combined in a variety of interdisciplinary plans as long as the all-school specification of eight basic components is met. Examples of combined studies programs from recent years include public health, engineering physics, biomedical engineering and molecular biology, and computers and mechanical design.

Students interested in the Combined Studies Program should consult with the associate dean for undergraduate engineering.

## GENERAL ENGINEERING COURSES

### DSGN 106-1,2 Engineering Design and Communication

(.5 unit each) Integrated introduction to the engineering design process and technical communication. Approaches to unstructured and poorly defined problems; conceptual and detailed design; team structure and teamwork; project planning; written, oral, graphical, and interpersonal communications; use of software tools; discussion of societal and business issues. One lecture, two workshops, lab. Registration for both quarters required. Primarily intended for freshmen.

**GEN ENG 190-0 Engineering Freshman Seminar** Broad engineering or interdisciplinary subjects of current interest.

**GEN ENG 191-0 MEOP Complete Seminar** Issues unique to minority engineering students. Working in groups, achieving one's full potential, succeeding in class, increasing involvements with faculty and in their research. Primarily intended for freshmen.

### GEN ENG 195-1,2,3,4 Engineering Dialog (.33 unit each)

A weekly seminar addressing subjects of interest in engineering, design, engineering policy, and entrepreneurial activities. For participants in the invitation-only Murphy Institute Scholars Program. May be repeated.

**GEN ENG 205-1,2,3,4 Engineering Analysis** **1.** Introduction to linear algebra from computational, mathematical, and applications viewpoints. Computational methods using a higher-level software package such as Matlab. Taken concurrently with 215-1. **2.** Linear algebra and introduction to vector methods in engineering analysis. Statics and dynamics of rigid bodies and matrix analysis of trusses and networks. Engineering design problems. Taken concurrently with 215-2. Prerequisites: C- or better in 205-1; MATH 220. **3.** Dynamic behavior of the elements. Modeling of mechanical (both translational and rotational), electrical, thermal, hydraulic, and chemical systems composed of those elements. Taken concurrently with 215-3. Prerequisite: C- or better in 205-2. **4.** Solution methods for ordinary differential equations, including exact, numerical, and qualitative methods. Applications and modeling principles; solution techniques. Taken concurrently with 215-4. Prerequisites: C- or better in 205-2; MATH 224.

**GEN ENG 206-1,2,3,4 Honors Engineering Analysis** Covers topics addressed in 205 at a deeper level. Intended for students with demonstrated strength in mathematics, computer programming, and/or physics. Prerequisite: consent of instructor.

### GEN ENG 215-1,2,3,4 Advanced Conceptual Workshop

Exercises related to work in 205. Taken concurrently with 205-1,2,3,4.

**GEN ENG 220-1,2 Analytic and Computer Graphics** (.5 unit each) **1.** Creating in autoCAD software. **2.** 3D parametric modeling with AutoDesk Inventory.

### CRDV 301-0 Introduction to Career Development (0 units)

This course prepares students for the Walter P. Murphy Cooperative Engineering Education Program, internships, and full-time employment. It includes units on job-search skills, self-assessment, transition to the workplace, workplace-management issues, and transition back to school.

### CRDV 310-1,2,3,4,5,6 Cooperative Engineering Education

(0 units) This sequence of courses covers the work terms of students enrolled in the Walter P. Murphy Cooperative Engineering Education Program. Prerequisite: CRDV 301 or consent of program director.

### CRDV 311-1,2,3 Professional Engineering Internship

(0 units) This series of courses is designated for students pursuing the Business Enterprise Certificate, seeking University recognition of their internship experience, or participating in an approved internship during the regular academic year. Prerequisite: consent of program director.

**GEN ENG 394-0 Special Topics in Engineering Design**

Product/process design. Topics include requirements definition, conceptual and detailed design, analysis and simulation, prototype development, laboratory and field evaluation, technical assessment, and report writing.

**GEN ENG 395-0 Special Topics in Engineering**

Topics suggested by faculty members and approved by the curriculum committee.

**GEN ENG 397-0 Selected Topics in Engineering (.5 unit)**

Topics of limited scope as suggested by faculty members and approved by the curriculum committee.

**BIOMEDICAL ENGINEERING**

Biomedical engineers solve problems in the life sciences and clinical medicine by applying engineering and mathematical techniques. This approach has been fruitful where a descriptive approach is no longer adequate for studying complex systems involved in the body's transport, regulation, and information processing. Equally important has been the development of devices used inside or outside the body to replace or supplement physiological functions and to enhance the quality of diagnosis and care. Thus, biomedical engineering refers to the application of engineering techniques to problems in medicine and biology.

The interplay among the physical sciences, engineering, biology, and the medical sciences takes many forms. The traditional study of complex systems, whether for power transmission, communications, or the operation and control of industrial processes, has provided engineers with a number of concepts and techniques that proved valuable in analysis and design. These principles expressed in mathematical form are applicable to a wide range of phenomena, including those in biological processes. Information theory, statistics, and computer technology have opened new areas for exploration of sensory and central nervous activity as well as patient handling and diagnosis. Theories for feedback controls, transport processes, materials science, and mechanics provide new insight into homeostatic physiological processes. Analysis of heat transfer, fluid flow, and chemical-process control in living organisms requires competence in both engineering and the life sciences. Current studies help provide understanding of many physiological processes. This understanding, in turn, leads to improvements in clinical practice, diagnosis, and patient care.

**Undergraduate Program**

Northwestern was among the first schools to recognize the value of a biomedical engineering background, and today the Department of Biomedical Engineering offers, at both the undergraduate and graduate levels, one of the largest and broadest programs in the country. The primary path students follow is the biomedical engineering program administered by the biomedical engineering department,

but alternative biomedical options are offered in other engineering departments.

The biomedical engineering program provides biomedical training that is quantitative, emphasizes problem solving, and treats phenomena from the molecular to the systems levels. This curriculum prepares students for careers in dentistry, medicine, and/or research or with corporations in the health care industry. Required courses in mathematics, engineering, and science establish a strong foundation on which to build a biomedical framework. In addition, each student selects one sequence of courses with which to develop an area of specialization.

**Areas of Specialization**

All areas are suitable for students planning to enter medical school, continue their biomedical engineering education in graduate school, or pursue careers in the biomedical industry or hospitals.

*Biological Materials and Molecular Engineering*

Principles from biochemical and materials science engineering, molecular biology, and biosensors are applied to the creation and adaptation of materials for medical applications (e.g., implants, medical-device coatings, drug delivery). Students in this area learn about various aspects of biology and chemistry from the engineer's perspective.

*Biomechanics and Rehabilitation*

Solid (e.g., musculoskeletal) and fluid (e.g., cardiovascular, pulmonary) mechanics are applied to human physiology in the design and manufacture of limb prostheses or artificial organs. Students in this area learn the fundamental engineering principles needed for this work.

*Biomedical Signals and Images*

The application of imaging, signal processing, and signal analysis to biomedical problems has become an important part of medicine. MRI, CT-imaging, PET, EKG, and EEG are all examples of physiological signals. Students in this area learn the physiology that underlies these signals and the engineering that underlies their recording and analysis.

*Electronic Instrumentation*

Electronic instruments are used widely in the diagnosis and treatment of disease and in the study of normal physiological function. Students in this area learn the fundamentals of electronic and computer (hardware and software) instrumentation.

*Transport Processes and Tissue Engineering*

The study of transport processes in living tissue is important in understanding blood flow, lung ventilation, and

oxygen transport to and from red blood cells to various tissue beds. Students in this area learn the fundamental chemical engineering principles that relate to these processes.

## Curriculum

Students earning a biomedical engineering degree must obtain a minimum of 18 total course credits in engineering design and engineering science and have obtained substantial training in design.

Those seeking admission to dental or medical school should be familiar with the entrance requirements of those schools to which they intend to apply. In addition to the specifically required courses of the biomedical engineering program, many professional schools also require additional courses in physics, organic and/or physical chemistry, and laboratory biology. These requirements may be satisfied by judicious use of electives.

## Courses

**BME 101-0 Introduction to Biomedical Engineering** (0 units) Faculty, students, and guests present various topics introducing the field of biomedical engineering: different tracks within the major, possible career and research opportunities, and ethics.

**BME 220-0 Introduction to Biomedical Statistics** Basic statistical concepts presented with emphasis on their relevance to biological and medical investigations.

**BME 250-0 Thermodynamics** Physical and chemical principles as applied to biological systems and medical devices. Topics include material balances, thermodynamics, solution chemistry, electrochemistry, surface chemistry, transport, and kinetics.

**BME 270-0 Fluid Mechanics** Fundamentals of fluid mechanics and their applications to biological systems.

**BME 271-0 Introduction to Biomechanics** Analysis of stresses and deformations in solids. Problems in biomechanics, with particular emphasis on assumptions appropriate to modeling biological materials including bone, skin, muscle, and cell membranes.

**BME 301-0 Systems Physiology** Functional/structural aspects of mammalian nervous system. Neural biophysics. Laboratory exercises. Prerequisites: PHYSICS 135-2; junior standing.

**BME 302-0 Systems Physiology** Cardiovascular and respiratory physiology. Human physiology from a quantitative viewpoint. Anatomy and pathology, where appropriate. Prerequisite: MATH 230.

**BME 303-0 Systems Physiology** Cellular mechanisms of and quantitative systems approach to human renal, digestive, endocrine, and metabolic physiology. Prerequisite: BIOL SCI 210-2; junior standing recommended.

**BME 305-0 Biomedical Signal Analysis** Introduction to biomedical signals and systems. Time and frequency domain analysis: convolution representation, Fourier

series, Fourier transforms, frequency response, filtering, sampling. Prerequisite: PHYSICS 135-2 or consent of instructor.

**BME 306-0 Biomedical Systems Analysis** Introduction to linear systems analysis. Time and frequency domain techniques for analyzing linear systems, emphasizing their applications to biomedical systems. Matlab-based problem sets and lab illustrate topics covered in class. Prerequisites: GEN ENG 205-4; BME 305.

**BME 307-0 Quantitative Experimentation and Design** Laboratory and associated lecture concerning quantitative physiology, physiological measurement techniques, instrument design, and statistical design of experiments. Prerequisites: 305, 306.

**BME 308-0 Biomedical Engineering Laboratory** Laboratory and associated lecture concerning quantitative physiology, testing, and evaluation of biomedical apparatus. Prerequisites: at least 2 courses chosen from 301, 302, 303. Preference given to seniors in biomedical engineering.

**BME 310-0 Molecular and Cellular Aspects of Bioengineering** Molecular/cellular structure and function, mechanical influences on biological systems, molecular/cellular experiments. Prerequisites: BIOL SCI 210-2; GEN ENG 205-3.

**BME 314-0 Models of Biochemistry and Molecular Biology** Mathematical modeling of biochemical and molecular biological problems, such as allosteric enzymes, bacterial transduction, X-ray diffraction, study of DNA.

**BME 315-0 Application of Genetic Engineering to Immunochemistry** Recent developments in genetic engineering as applied to the rapidly developing field of immunochemistry for antibodies and related proteins.

**BME 317-0 Biochemical Sensors** Theory, design, and applications of chemical sensors used in medical diagnosis and patient monitoring. Electrochemical and optical sensors. Prerequisites: chemistry through 210-2; physics through 135-3.

**BME 323-0 Visual Science** Mammalian visual system. Optics of the eye. Visual image representation and interpretation. Visual adaptation. Motion. Color vision. Prerequisite: PHYSICS 135-2.

**BME 325-0 Introduction to Medical Imaging** Diagnostic X rays; X-ray film and radiographic image; computed tomography; ultrasound. Prerequisites: PHYSICS 135-3 or equivalent.

**BME 327-0 Magnetic Resonance Imaging** Nuclear magnetic resonance; two-dimensional Fourier transform, spin-echo and gradient-echo imaging; gradient and RF hardware. Prerequisites: PHYSICS 135-3.

**BME 333-0 Modern Optical Microscopy and Imaging** Rigorous introduction to principles, current trends, emerging technologies, and biomedical applications of modern optical microscopy.

**BME 343-0 Biomaterials and Medical Devices** Structure-property relationships for biomaterials. Metal, ceramic,

and polymeric implant materials and their implant applications. Interactions of materials with the body.

Prerequisites: MAT SCI 201 or 301; senior standing.

**BME 344-0 Biological Performance of Materials** Structure-property relationships of materials, physical chemistry of surfaces and interfaces, materials-tissue interactions, applications to the selection and design of materials for medical implants and devices. Prerequisite: MAT SCI 201.

**BME 346-0 Tissue Engineering** In vivo molecular, cellular, and organ engineering, with an emphasis on the foundations, techniques, experiments, and clinical applications of tissue engineering. Prerequisites: BIOL SCI 210-2 or CHEM ENG 375; GEN ENG 205-3.

**BME 349-0 Bioregenerative Engineering** Fundamentals, mechanisms, and clinical significance of biological regeneration and application of engineering principles to regenerative medicine. Prerequisite: BIOL SCI 210-2.

**BME 350-0 Transport Fundamentals** Fundamental and biomedical applications of diffusive and convective heat and mass transfer. Prerequisites: 270; MATH 230; BME 377 recommended.

**BME 365-0 Control of Human Limbs and Their Artificial Replacements** Human movement, biomechanics, skeletal and muscular anatomy, comparative anatomy, muscle physiology, and locomotion. Engineering design of artificial limbs. Prerequisite: senior standing with engineering or physical science background.

**BME 366-0 Biomechanics of Movement** Engineering mechanics applied to analyze human movement, including models of muscle and tendon, kinematics of joints, and dynamics of multijoint movement. Applications in sports, rehabilitation, and orthopedics. Prerequisite: MECH ENG 202, BME 271, or consent of instructor.

**BME 371-0 Mechanics of Biological Tissues** Stress and strain for small and large deformations. Nonlinear elastic, viscoelastic, pseudoelastic, and biphasic models. Prerequisites: GEN ENG 205-1,2; BME 271.

**CHEM ENG 371-0 Transport Phenomena in Living Systems** See Chemical Engineering.

**BME 377-0 Intermediate Fluid Mechanics** Fundamental concepts of fluid dynamics. Kinematics, mass and momentum balances, constitutive relations. Navier-Stokes equations and methods of solution. Sealing techniques. Prerequisite: 270 or consent of instructor.

**BME 383-0 Cardiovascular Instrumentation** Theory, design, and application of instrumentation used for diagnosis, monitoring, treatment, and research investigation of cardiac and cardiovascular diseases. Examples from the current literature. Prerequisite: EECS 202, 270, equivalent, or consent of instructor.

**BME 384-0 Biomedical Computing** Principles of modern (computer-based) medical instrumentation, including analogy versus digital design tradeoffs, efficient digital filter designs, and algorithms for physiological signal processing, automated event recognition, and classification.

Prerequisites: EECS 270 or equivalent and some experience in computer programming, or consent of instructor.

**BME 390-1,2 Biomedical Engineering Design 1.** Open-ended team-designed projects in the medical devices arena. Systems approach requiring design strategy and concepts, including reliability, safety, ethics, economic analysis, marketing, FDA regulations, and patents. Written and oral reports. Prerequisite: 307. **2.** Development of a design project initiated during the previous quarter. Prerequisite: 390-1.

**BME 395-0 Special Topics in Biomedical Engineering**

**BME 399-0 Projects**

## CHEMICAL ENGINEERING

Chemical engineering is concerned primarily with the principles and processes involved in the conversion of raw materials into products vital to modern civilization. The products of the chemical and process industries range from antibiotics to zirconium, from petroleum to pharmaceuticals, from agricultural chemicals to plastics and synthetic rubber. The rapid introduction of new products by the chemical and bioprocess industries gives chemical engineering its characteristic concern with the management and development of innovation. Preparation for careers in chemical engineering requires a comprehension of physical, chemical, biological, and engineering principles. The program aims at developing people who can plan, design, and operate new processes and who may have potential for managerial responsibility in highly technical industrial enterprises.

The chemical engineering curriculum provides this broad fundamental training and prepares graduates for the chemical and process industries or advanced study. The first two years are devoted largely to mathematics, physics, chemistry, and basic engineering. After this, the fundamentals of chemical engineering fall into two sequences: the chemical process principles, emphasizing thermodynamics and kinetics of chemical change, and the transport processes, emphasizing the transfer of mass, momentum, and thermal energy in the physical handling of substances and in their heating, cooling, separation, and purification. Theoretical principles and practical applications are then integrated in courses in systems design and control. Supporting courses in allied fields of engineering and the sciences broaden the technical proficiency of chemical engineers, while courses in the social sciences, humanities, and arts deepens their background in the common hopes and problems of humanity.

## Areas of Specialization

The curriculum permits students to select an area of specialization and to develop background for further study at the graduate level or for application to specific industries. Students are encouraged to select one of the six areas listed



below or to plan an alternate program with an adviser. There are numerous electives in the basic program, and students are urged to give early consideration to planning for effective use of these opportunities.

### *Biomedical Engineering*

Increasing numbers of chemical engineers enter medical school and work in related areas such as pharmaceutical production, biomedical materials, and artificial organs. The biomedical engineering option satisfies the needs of these students by adding courses in biology, biochemistry, and biomedical engineering to the foundation in chemical engineering. Students therefore can prepare for careers in medicine or biomedical engineering as they obtain a degree in chemical engineering.

### *Biotechnology*

Biotechnology is the industrial exploitation of biological systems or processes. Microorganisms are employed for production of food, beverages, antibiotics, and solvents as well as for waste treatment. Advances in genetic engineering have led to the production (in animal cells, yeast, and bacteria) of a wide range of enzymes, growth factors, hormones, immunoregulators, and monoclonal antibodies for use in disease diagnosis and therapy. Animal cells and microorganisms produce chemicals via a complex network of tightly regulated chemical reactions, making biotechnology a natural extension of chemical engineering. The biotechnology option provides the background necessary to apply chemical engineering skills in biological systems, especially for process optimization, control, scale-up, and product recovery.

### *Chemical Process Engineering*

The chemical process engineering option is designed to prepare students for many areas, including design, operations, research, and management. Recommended for students who want a broad background in chemical engineering, it provides preparation for employment in many fields, including the chemical process and petroleum industries. It is also good preparation for graduate work in chemical engineering or other areas, both technical and nontechnical.

### *Environmental Engineering*

Means for improving the quality of our environment, disposing of wastes, and devising waste-free processes often involve chemical processing. The development, construction, and operation of these processes increasingly involves chemical engineers in a leading role. The next decade will see the replacement of many present industrial processes by new ones designed to eliminate or minimize waste products, requiring imaginative engineering. The environmental engineering specialization offers students a way to add special competence in environmental and civil

engineering concerns to a chemical engineering degree and to prepare for attacking environmental problems.

### *Polymer Science and Engineering*

Synthetic polymers are large molecular substances that now provide the basis for the plastics, fiber, and rubber industries. Synthetic polymers are used in fields as diverse as the automotive industry, pollution abatement, low-cost housing, and biomedical engineering and indeed wherever needs exist for new materials with unique properties. The polymer field requires a knowledge of chemistry and some background in materials science in combination with expertise in chemical engineering, especially in transport processes. The option in polymer science and engineering provides training to undergraduates considering working in the field or going to graduate school.

### *General Chemical Engineering*

This option provides flexibility for students who desire exposure to a wide range of topics or who wish to specialize in fields of science or engineering not listed above.

## **Laboratories**

The Undergraduate Chemical Engineering Laboratory provides facilities for exploring firsthand the quantitative experimental implications of fundamental laws in their application to practical problems of heat transfer, distillation, reaction engineering, and other basic operations. Process dynamics and automatic control principles are studied in the Process Dynamics and Control Laboratory. A computing laboratory is used in a variety of courses. Chemical laboratory experience is also a part of the polymer course.

## **Courses**

**CHEM ENG 190-0 Engineering of Chemical and Biological Processes** Survey of engineering principles as they are applied to processes involving chemical and biological transformations. Examples from the chemical, pharmaceutical, biotechnology, food processing, electronics, and other industries. Impact of economics, ethics, and other nontechnical constraints.

**CHEM ENG 210-0 Analysis of Chemical Process Systems** Introduction to process systems. Material balances and stoichiometry. Analysis of process system flow sheets. Introduction to departmental computing facilities. Basic numerical analysis. Prerequisites: CHEM 103; GEN ENG 205-4 (may be taken concurrently).

**CHEM ENG 211-0 Thermodynamics** The first and second laws of thermodynamics. Entropy and equilibrium. Material and energy balances. Equations of state and properties of fluids. Solutions, phase equilibria, and chemical reactions. Prerequisite: 210.

**CHEM ENG 212-0 Phase Equilibrium and Staged Separations** Thermodynamic models of mixtures and phase equilibrium. Analysis and design of staged separation processes

such as distillation, absorption, stripping, and extraction. Prerequisite: 211.

**CHEM ENG 275-0 Molecular and Cell Biology for Engineers** Introduction to cell and molecular biology concepts that provide the foundation for modern biotechnology and bioengineering. Prerequisite: CHEM 103.

**CHEM ENG 307-0 Kinetics and Reactor Engineering** Chemical reaction kinetics with application to the design of chemical reactors. Prerequisites: 210 (C– or better); 211.

**CHEM ENG 312-0 Probability and Statistics for Chemical Engineering** Introduction to probability theory and statistical methods necessary for analyzing the behavior of processes and experiments. Statistical tests for detecting significant changes in process parameters.

**CHEM ENG 321-0 Fluid Mechanics** Derivation and applications of continuity and Navier-Stokes equations. Macroscopic mass, momentum, and energy balance. Dimensional analysis: friction factors in pipes and packed beds; drag coefficients. Prerequisites: completion of mathematics requirements with no grades of D; GEN ENG 205-4.

**CHEM ENG 322-0 Heat Transfer** The differential equations of energy transport. Solutions for various applications. Prerequisite: completion of mathematics requirements with no grades of D.

**CHEM ENG 323-0 Mass Transfer** Diffusion and rate concepts; application to distillation, extraction, absorption, humidification, drying. Prerequisites: 321, 322.

**CHEM ENG 341-0 Process Dynamics and Control** Dynamic behavior of chemical process components. Feedback control principles. Prerequisite: senior standing; 307 recommended.

**CHEM ENG 342-0 Chemical Engineering Laboratory** Operation and control of process equipment for the determination of operating data. Analysis and written presentation of results. Prerequisites: 307, 323.

**CHEM ENG 345-0 Process Optimization** Modern techniques and application to the design and operation of chemical process systems. Steady-state and dynamic methods. Experimental search for the optimum. Prerequisite: senior standing.

**CHEM ENG 351-0 Process Economics, Design, and Evaluation** Preliminary design of industrial processes for the production of chemical and allied products by the application of the engineering sciences and economics. Prerequisites: 212, 307, 323.

**CHEM ENG 352-0 Chemical Engineering Design** Projects Design of chemical and process plants applying the principles of unit operations, thermodynamics, reaction kinetics, and economics. Mechanical design and selection of chemical process equipment. Prerequisite: 351.

**CHEM ENG 361-0 Introduction to Polymers** Polymerization mechanisms and their relation to molecular structure, polymerization processes, and the mechanical properties of polymers, especially flow behavior. Prerequisites: 211; CHEM 210-1.

### **CHEM ENG 364-0 Chemical Processing and the Environment**

Application of chemical engineering fundamentals to environmental problems. Chemistry and mechanisms, chemical reaction and rate, and transport emphasized. Risk assessment and analysis revealed through case studies. Prerequisites: 212, 307.

### **CHEM ENG 365-0 Sustainability, Technology, and Society**

Technical discussion of sustainability, sustainable development, global warming, natural and renewal resources and utilization, industrial ecology, ecoefficiency, technology related to sustainability, and risk assessment. Prerequisite: junior standing in science or engineering.

### **CHEM ENG 371-0 Transport Phenomena in Living Systems**

Application of transport theory, principally diffusion, to movement of molecules in biological systems, including blood, cornea, microcirculation, and lung. Prerequisites: 275 or BIOL SCI 210-2; 321, 323, or BMD ENG 270; or consent of instructor.

### **CHEM ENG 372-0 Interfacial Phenomena and Bionanotechnology**

The physical chemistry of systems of large interfacial area, with specific examples of their unusual behavior and useful properties for applications in bionanotechnology. Prerequisite: senior standing or consent of instructor.

**CHEM ENG 375-0 Biochemical Engineering** Modern biochemical engineering. Life sciences: microbiology, biochemistry, and molecular genetics. Metabolic stoichiometry, energetics, growth kinetics, transport phenomena in bioreactors, and product recovery. Prerequisite: 307, 323, or consent of instructor.

**CHEM ENG 377-0 Bioseparations** Downstream process in biotechnology. Separation and lysis of cells. Recovery of organelles and proteins. Protein separation and purification. Prerequisite: 323 (may be taken concurrently), 375, or BIOL SCI 210-2.

### **CHEM ENG 379-0 Computational Biology: Principles and Applications**

Introduction to the development and application of data-analytical and theoretical methods, mathematical modeling, and computational simulation techniques to the study of biological systems.

### **CHEM ENG 390-0 Personal and Organizational Effectiveness**

Introduction to nontechnical skills required in a business environment, with the goal of increasing personal effectiveness and marketability of seniors and graduate students. Prerequisite: senior standing.

### **CHEM ENG 395-0 Special Topics in Chemical Engineering**

Topics suggested by students or faculty and approved by the department.

### **CHEM ENG 396-0 Focused Topics in Chemical Engineering**

(.5 unit) Emerging topics suggested by students or faculty and approved by the department.

**CHEM ENG 399-0 Projects** Supervised investigation of a chemical engineering problem with submission of a final report.

## CIVIL ENGINEERING

Civil engineers plan systems such as transportation networks or procedures for water control and supply, and they design structures such as buildings, bridges, dams, and sewage disposal plants. They work together with ecologists, sociologists, economists, lawyers, and others to plan how to wisely use the human and natural resources of large areas such as river basins and how to redevelop cities. With few exceptions, each planning or design job is one of a kind, as contrasted with more routine solutions to other engineering problems.

Planning, of course, requires abundant data of all sorts — topography, geology, soils, vegetation, weather and climate, stream-flow and lake currents, traffic routes and patterns, pollution, population, cultural background and preferences, skills and ambitions. Many civil engineers collect, analyze, and present the data, developing and improving measuring instruments as part of their job. Others apply probability and statistical methods to the data to forecast such things as population growth, demand for water and transportation, maximum winds and precipitation, height of floods, and air and water quality.

Designing systems and structures requires the planning forecasts plus accurate data on the mechanical properties of materials such as steel, concrete, soils, rocks, and plastics and on the behavior of structural components made from them. Some civil engineers test materials and physical models to obtain such data. Many more use known physical properties and the laws of mechanics — energy, momentum, and conservation of mass — to design structures, foundations, pavements, pipe networks, and treatment plants that will do the job safely and economically.

Civil engineers who design water and waste treatment facilities or set up programs to reduce air and water pollution need to understand certain chemical reactions and biological processes as well as the usual fluid and solid mechanics. Engineers who help to plan and design a system understand how and why it works and what may go wrong with it. Hence, civil engineers may operate treatment facilities or systems of flood control reservoirs or set up and administer traffic control plans. Civil engineers may become city engineers.

Engineers who design structures and know soil mechanics learn the practical difficulties of providing a foundation and erecting the structure. Thus, they become partly qualified to operate construction companies, with some entering the construction business. Administrative and business activities require them also to learn something about accounting, personnel management, and contracts.

Since civil engineering students have such a wide range of career options, the Department of Civil and Environmental Engineering prescribes a minimum of required courses and required subjects. Students elect the remainder

freely or from specified broad categories. The breakdown, from which honors students may deviate with consent of the department's education committee, is as follows:

Courses specified by name and number	21
Courses specified by subject	6
Courses required to fit into broad categories	16
Free electives	5
Total	48

For details see the civil engineering curriculum.

## Areas of Specialization

Civil engineering students may select a program that fits their needs by choosing courses judiciously. Students are encouraged to discuss with faculty any proposed program that meets a well-defined goal. Examples of courses selected in the areas of specialization most often pursued by students are listed in the civil engineering curriculum.

## Laboratories

### *Computation*

The department integrates computing through its own dedicated servers and network administrator. The system aids project management, geotechnical, and structural computing as well as specialized software accessed from other departments.

### *Geotechnical Engineering*

This facility has a variety of conventional and special equipment for computer-controlled testing and evaluation of rocks, soils, and soil-foundation systems — under both static and dynamic loadings — for undergraduate study, graduate study, and research. In addition, construction-monitoring instruments are remotely operated via telemetry.

### *Structural Engineering and Structural Mechanics*

The department has a large first-class modern laboratory for testing structural materials, especially cement-based materials and composites. The laboratory is equipped with several closed-loop computer-controlled or servo-controlled testing machines capable of static and dynamic loading as well as advanced instrumentation for electron and optical microscopy studies with facilities for image analysis and holographic capabilities, creep testing in programmed environmental chambers, multiaxial or torsional loading, impact testing, acoustic defect detection, and other nondestructive test methods. Basic facilities, including a perforated testing floor, are available also for static and dynamic testing of structural models and structural components. Students conduct experiments using electrical and mechanical strain gauges, structural models, and photo-elastic models. A fully equipped shop and technical assistance are available for the design and construction of special loading devices.

## Courses

**MAT SCI 203-0 Microstructure and Engineering Properties of Materials** See Materials Science and Engineering.

**CIV ENG 206-0 Environmental Literacy** Simple concepts from the sciences and engineering applied to specific environmental problems, including the concepts of risk. Understanding of and quantitative facility in multi-disciplinary aspects of environmental decisions.

**CIV ENG 212-0 Mechanics** Force systems, equivalence of force systems, and resultants. Equilibrium of a rigid body and systems. Kinematics and dynamics of a rigid body in plane motion. Work and energy relations for a rigid body in plane motion. Prerequisites: PHYSICS 135-1; registration in MATH 234.

**CIV ENG 216-0 Mechanics of Materials I** Analytical and experimental study of stresses and deformations and their application to the design of machine and structural elements subjected to static, dynamic, and repeated loads. Prerequisite: 212 or GEN ENG 205-2.

**GEN ENG 220-1,2 Analytical and Computer Graphics** (.5 unit each) See General Engineering Courses.

**CIV ENG 221-0 Theory of Structures I** Deflections of structures, energy concepts, idealization of structures, truss analysis, column stability, and influence lines. Introduction to indeterminate truss and frame analyses, slope-deflection analysis, and moment distribution. Portal method. Prerequisite: 216.

**CIV ENG 222-0 Structural Steel Design** Rational basis of structural design. Design approach for structural steel components of a building system. Prerequisite: 221.

**MECH ENG 241-0 Fluid Mechanics I** See Mechanical Engineering.

**CIV ENG 250-0 Introductory Soil Mechanics** Fundamental properties and behavior of soils as engineering materials. Origin of soils through the properties of soil components to the strength, permeability, and deformation of soil masses. Prerequisite: 216.

**CIV ENG 260-0 Fundamentals of Environmental Engineering** Mass and energy concepts applied to major issues facing environmental engineers: safe drinking water, surface water quality, ambient air quality, global atmosphere, managing solid and hazardous wastes. Prerequisites: CHEM 101; MATH 224 (may be taken concurrently).

**CIV ENG 261-0 Environmental Engineering Analysis** Development of quantitative analytical tools for describing physical, chemical, and microbiological processes in natural and engineering systems relevant to environmental engineering. Prerequisites: 260; CHEM 102.

**CIV ENG 267-0 Chemistry of the Natural Environment** Fundamental principles of organic and inorganic chemistry applied to air, water, soil, and sediments. Focus on problem solving. Laboratory/field projects. Prerequisite: CHEM 103.

**CIV ENG 302-0 Engineering Law** The American legal system from an engineer's perspective. Socratic-method analysis

of statutory and case law. Contract, patent, corporation, antitrust, property, and environmental law. Torts, product liability, and arbitration. Prerequisite: junior standing.

**CIV ENG 303-0 Environmental Law and Policy** An introduction to important aspects of environmental law and policy. A wide range of environmental topics are covered, with a focus on national environmental policy as implemented through major federal environmental statutes.

**CIV ENG 304-0 Civil and Environmental Engineering Systems Analysis** Quantitative techniques to develop descriptive and prescriptive models that support efficient planning and management of civil and environmental engineering systems. Prerequisite: MATH 224 or equivalent.

**CIV ENG 306-0 Uncertainty Analysis in Civil Engineering** Probability, statistics, and decision theory. Discrete and continuous random variables, marginal and conditional distributions, moments, statistical model selection and significance tests, hypothesis testing, and elementary Bayesian decision theory. Application to problems in soil mechanics, water resources, transportation, and structures.

**CIV ENG 307-0 Microstructure of Cement-Based Materials** Chemistry of the principal silicate and aluminate cements used in building and civil and environmental engineering. Emphasis on underlying science rather than on practical application. Experimental and theoretical aspects of cement chemistry; relationships between processing, microstructure, and properties.

**CIV ENG 318-0 Mechanics of Fracture** Stress concentration: analysis of the stress field near a crack tip; fracture modes; brittle and ductile fracture; fracture toughness; fracture criteria; fracture-mechanics design; fatigue; dynamic effects. Prerequisites: course in mechanics of materials.

**CIV ENG 319-0 Theory of Structures II** Shear center, non-prismatic members, nonlinear materials, influence lines, Mueller-Breslau principle, approximate methods of analysis, energy methods, stiffness matrix, and computer methods of analysis. Prerequisite: 221.

**CIV ENG 320-0 Structural Analysis — Dynamics** Single and multiple degree-of-freedom systems subjected to periodic, seismic, and general loadings. Time-history analysis of linear and nonlinear systems. Design methods for earthquakes. Prerequisite: 221.

**CIV ENG 321-0 Properties of Concrete** Concrete as a composite material; relationship between constitutive laws and microstructure; failure theories; fracture; fatigue; strain rate effects; destructive and nondestructive testing; creep and shrinkage; chemistry of cement hydration; admixtures; aggregates; proportioning; new materials.

**CIV ENG 322-0 Structural Design** Design criteria; planning and design aspects of structural systems for gravity and lateral loads. A total design project involving the analysis and design of a structure. Prerequisite: 222 or equivalent.

**CIV ENG 325-0 Reinforced Concrete** Fundamentals of reinforced concrete theory and design. Analysis and design of beams, slabs, and columns. Concurrent familiarization

with current building codes, specifications, and practices. Prerequisite: 221.

**CIV ENG 327-0 Finite Element Methods in Mechanics**

Development of finite elements from variational principles and application to static stress analysis. Introduction to techniques for transient and generalized field problems. Computer implementation of finite element techniques.

**CIV ENG 330-0 Construction Management** Techniques for coordinating decisions and actions of various parties in the design and construction of civil and environmental engineering projects. Delivery systems; preconstruction services; project planning; cost control and value engineering; bidding. Prerequisite: consent of instructor.

**CIV ENG 332-0 Building Construction Estimating** Estimation of cost at different stages of design; conceptual estimating, quantity takeoff of various elements, such as materials, labor, equipment. Prerequisite: 330 or consent of instructor.

**CIV ENG 336-0 Project Scheduling** Project planning, scheduling, and control using CPM arrow and precedence networks; basic resource allocation and leveling; earned-value analysis; linear scheduling; PERT charts; hands-on experience in using computer tools. Prerequisite: 330 or consent of instructor.

**CIV ENG 338-0 Public Infrastructure Management** Explores the complexity of managing public infrastructure facilities by means of a five-part interactive model. Aims to impart a realistic appreciation of contemporary policies and practices. Prerequisite: senior standing.

**CIV ENG 340-0 Fluid Mechanics II** Civil engineering applications of fluid mechanics. Turbulent flow in pipes, pipe networks, and open channels. Prerequisite: CHEM ENG 321; MECH ENG 241; or consent of instructor.

**CIV ENG 346-0 Meteorology and Hydrology** Mechanics of the atmosphere. Precipitation, runoff, groundwater flow. Methods of analyzing rainfall and stream-flow records for power generation, flood control, and water supply. Prerequisite: MECH ENG 241.

**CIV ENG 349-0 Environmental Management** The roles and responsibilities of project managers who deal with environmental issues. How managers deal with previously created environmental problems, respond to current requirements, and anticipate future needs. Prerequisites: a technical background and senior standing.

**CIV ENG 352-0 Foundation Engineering** Application of soil mechanics to analysis and design of foundations and embankments. Settlement of structures, bearing capacities of shallow and deep foundations, earth pressures on retaining structures, and slope stability. Prerequisite: 250.

**CIV ENG 355-0 Engineering Aspects of Groundwater Flow** Applied aspects of groundwater flow and seepage, including Darcy's law, parameter determination, aquifer test analysis, flow-net construction and application, modeling techniques, slope stability analysis, drainage, and filter design. Prerequisite: fluid mechanics.

**CIV ENG 356-0 Transport Processes in Porous Media**

Transport processes in porous media, including unsaturated flow, flow in deformable porous media, convective transport of solutes with hydrodynamic dispersion effects, and coupled flow phenomena with particular emphasis on electrokinetics. Prerequisite: 355.

**CIV ENG 358-0 Airphoto Interpretation** Principles and practice of using aerial photographs to obtain information about natural features of the earth's surface, with emphasis on earth materials. Landforms, geological processes, rocks, and soils. Stereoscopic photographs, elements of photogrammetry. Prerequisite: junior standing or consent of instructor.

**CIV ENG 359-0 Hazardous Waste Management** Definition and regulation of wastes. Pollutant transport, fate, and toxicology. Management via audits and prevention. Treatment and control. Risk and site assessment and site remediation. Prerequisite: junior or senior standing in engineering or science or consent of instructor.

**CIV ENG 360-0 Environmental Impact Evaluation** Environmental legislation and quality indices. Methods for evaluating impact of engineering projects on environmental quality. Impact statements, projects, and summary impact reports. Prerequisite: junior standing.

**CIV ENG 361-0 Environmental Microbiology and Public Health** Evaluation of the disease status of a community; elements of vital statistics and epidemiology; etiology of infectious and noninfectious diseases; control of environmentally based health hazards.

**CIV ENG 363-0 Environmental Engineering Applications I: Air and Land** Nature and control of community air pollution. Sources, physical and chemical properties, and effects of major air pollutants; analytical measurements and monitoring of air pollutants; engineering and legislative control. Prerequisite: junior standing.

**CIV ENG 364-0 Environmental Engineering Applications II: Water** Engineering elements of water supply and water pollution abatement. Water quality standards, water and wastewater treatment processes, and the management of receiving waters to control pollution. Prerequisite: MECH ENG 241; CIV ENG 340 recommended.

**CIV ENG 365-0 Environmental Laboratory** Chemical and microbiological aspects of environmental engineering and science are explored through an integrated laboratory course.

**CIV ENG 366-0 Ecosystems and Ecotoxicology** Terrestrial, freshwater, marine, and estuarine ecosystems. Fundamentals of toxicology and their application to natural environments and biotic components; tolerance limits and adaptation of organisms to environmental change brought on naturally or by human technology and activity. Prerequisite: junior standing in engineering or science.

**CIV ENG 367-0 Aquatic Chemistry** Terrestrial, freshwater, marine, and estuarine chemical equilibria in natural waters. Development of theoretical basis for the investigation of



chemical behavior of aquatic systems emphasizing a problem-solving approach. Prerequisite: CHEM 103 or CIV ENG 267.

**CIV ENG 369-0 The Industrial Ecology of Materials and Products** A course to increase students's knowledge of ecodesign, green products, environmentally friendly manufacturing, reuse of various materials, and recycling.

**CIV ENG 370-0 Environmental Engineering Design** Decision making in selection and implementation of environmental control measures. Water supply and wastewater management: quantities to be handled, transportation systems, treatment processes, solid wastes management. Prerequisite: senior standing in civil or environmental engineering or consent of instructor.

**CIV ENG 371-0 Introduction to Transportation Planning and Analysis** Analysis and design of solutions to transportation problems; introduction to selected operations research and statistical analysis techniques; use of case studies in urban transportation, intercity passenger transport, and freight movements. Prerequisite: junior standing or consent of instructor.

**CIV ENG 376-0 Transportation System Operations** Traffic-flow theory; vehicle and human factors, capacity analysis, intersection performance and control; management and control of arterial streets and networks; neighborhood traffic restraint, urban transit operations. Operations concepts and theories applied to actual problems through laboratory practice. Prerequisite: basic understanding of calculus and statistics; knowledge of MATLAB is desirable but not required.

**CIV ENG 382-0 Infrastructure Facilities and Systems** Theory, function, planning, design, ownership, finance, and operation of contemporary infrastructure systems presented in lecture-discussion format, along with weekly field trips to sample systems. Prerequisite: senior standing in civil or environmental engineering or consent of instructor.

**CIV ENG 395-0 Special Topics in Civil Engineering** Topics suggested by students or faculty and approved by the department.

**CIV ENG 398-1,2 Community-Based Design** Yearlong participation in two- or three-person team projects involving research, analysis, and/or design in the solution of environmental problems affecting primarily lower-income communities. Grade assigned only on completion of both units. Prerequisite: consent of instructor.

**CIV ENG 399-0 Projects** Special studies under faculty direction. Credit to be arranged.

## DESIGN ENGINEERING

The Segal Design Institute is the unit of the McCormick School that promotes the importance of design throughout the undergraduate curriculum and is dedicated to fostering

innovation among engineering students and faculty. The institute administers

- introductory courses required of all McCormick students (DSGN 106-1,2)
- the bachelor's degree in manufacturing and design engineering
- a certificate in engineering design
- a master's degree in product development

Through the institute students gain design experience using state-of-the-art tools by participating in projects on topics that range from blast-resistant structures to HIV monitoring in the developing world. They also develop portfolios to showcase their design work.

## Courses

**DSGN 106-1,2 Engineering Design and Communication** (.5 unit each) See General Engineering Courses.

**DSGN 245-1,2 Computer-Aided Design I, II** (.5 unit each)

**1.** Introduction to CAD software. Students develop solid models, detail drawings, and product assemblies.

**2.** Building more complex shapes such as splines and other developed curves, building sheets through one or more sets of curves, and applying specially shaped transitions between faces.

**DSGN 297-0 Intermediate Topics in Engineering Design** (.5 unit) Topics suggested by students and faculty with approval of the institute.

**DSGN 298-0 Interdisciplinary Design Projects I** Product or system design projects carried out by small student groups. Conceptual and detailed design, implementation and evaluation, reporting and archiving. At least one team member must be registered in 398. Prerequisite: 106-1,2.

**DSGN 306-0 Technology Assessment and Innovation** Application of real-world methodologies to innovative engineering design. Critical evaluation of candidate technologies; consideration of stakeholder needs and constraints; design review; design proposal. Prerequisite: sophomore standing or 106-1,2.

**DSGN 307-0 Introduction to Industrial Design Methods** The process of product development from an industrial design perspective.

**DSGN 308-0 Human-Centered Product Design** Project-based course focusing on user needs: observational methods, brainstorming, prototyping, business models, and the social and engineering concerns for product design. Prerequisite: sophomore standing or 106-1,2.

**DSGN 344-0 Manufacturing Engineering Design** Production-system design with emphasis on manual assembly, machining processes, material handling and storage, and product design for manufacture and assembly. Prerequisite: MECH ENG 340-1 or consent of instructor.

**DSGN 350-0 Innovation and Invention** This course aims to help engineering students understand their critical role in the invention/creative process and to yield insight on the

technologist's role in wealth creation. Prerequisite: senior standing or consent of instructor.

**DSGN 370-0 Engineering Portfolio** Development Students create portfolios that showcase engineering work and further career goals. The portfolio is a design project aimed at presenting a story about its creator in a physical presentation that embodies its goals.

**DSGN 371-0 Communicating Complex Data** (.5 unit)

Best practices in creating graphs, tables, and diagrams to communicate complex technical data clearly and powerfully. The course emphasizes the display of complex data as evidence in support of effective arguments.

**DSGN 395-0 Special Topics in Manufacturing Engineering**

Topics relevant to manufacturing engineering and approved by the institute. Prerequisite: consent of instructor.

**DSGN 398-0 Interdisciplinary Design Project II** Large-scale, open-ended team projects in real-world settings. Integrated, multidisciplinary approach addressing product, process, and systems considerations. Written and oral reports. Prerequisite: senior status or consent of instructor.

**DSGN 399-0 Independent Study** Independent study on a manufacturing engineering topic supervised by a faculty member. Prerequisite: consent of instructor.

## ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

The Department of Electrical Engineering and Computer Science offers three programs for undergraduate students leading to the bachelor of science degree: electrical engineering, computer engineering, and computer science. It also offers graduate programs leading to the MS and PhD degrees in those three areas. The department boasts an internationally renowned faculty, state-of-the-art research equipment, and the considerable resources offered by a great university. It combine these advantages with an uncommon commitment to students.

The department offers several interdisciplinary options, including premedical/biomedical studies, animate arts, cognitive science. It collaborates with Weinberg College to offer the computing and information systems major (see the Weinberg College section of this catalog).

Detailed information on degree requirements and elective courses is available from the department office or at [www.eecs.northwestern.edu](http://www.eecs.northwestern.edu).

### Electrical Engineering

Electrical engineering involves the development and application of electronic and optical technologies for generating, communicating, and processing information. The electrical engineering curriculum includes courses in electronic circuits, solid-state electronics, electromagnetics, optics, lasers, controls, digital signal processing, communications and networks. Students may specialize in any of the following areas.

### *Circuits and Electronics*

This area of study is concerned with the analysis and design of circuits that employ electronic devices, such as integrated circuits, transistors, diodes, light-emitting diodes, data storage elements, and image-forming devices. Important applications include AM and FM radio, television, digital computers, and electronic control instrumentation systems.

### *Communications Systems*

A communication system involves the generation of an electrical signal representing information to be transmitted, its encoding in some form for efficient transmission, its actual transmission, its decoding at the receiving end of the system, and its reconversion into something intelligible to the user. The thorough study of communications systems theory requires knowledge of a broad range of mathematical methods and of the capabilities and limitations of electronic circuits. This subject also covers the design and analysis of communication networks for the transmission of audio, video, and data among many users.

### *Control Systems*

The study of control systems deals with the analysis and design of automatic regulators, guidance systems, numerical control of machines, robotics, and computer control of industrial processes. Students are concerned with identifying these systems and with such topics as system stability, system performance criteria, and optimization. These concepts find application in other fields of engineering and in the development of better understanding of biological, energy, economic, and social systems.

### *Digital Signal Processing*

Study in this area focuses on the digital representation and algorithmic manipulation of speech, audio, image, and video signals. Specific topics within this general area include image and video processing, recovery and compression, multimedia signal processing, filter design and rank-order operators, image and video transmission, medical and biomedical signal processing, medical imaging, and algorithms for medical instrumentation.

### *Electromagnetics and Photonics*

Study in the area of photonic systems and technology focuses on microcavity lasers, nanostructures, quantum and nonlinear optics, integrated optics, fiber-optic and infrared waveguide devices, fiber-optic communications, computational electromagnetics, and imaging through turbulence. Special emphases include applications of novel quantum amplifiers in optical communications, imaging, and cryptography; devices for tera-bit second WDM and TDM optical networks; and applications of computational techniques in integrated and nonlinear optics.

### *Solid-State Engineering*

This area is concerned with the design, physical principles, and applications of solid-state devices both as discrete units and integrated circuit systems. In addition to the various diode, transistor, and FET devices fabricated from silicon technology, other devices developed from compound semiconductor materials are reviewed. Both analog and digital circuit applications are stressed. Another important topic is the behavior of conductors in the superconducting state, with a stress on applications.

### **Computer Engineering**

Computer engineering deals with digital design, computer hardware and architecture, robotics, microprocessors, software and programming, and the interrelationships between hardware and software. The computer engineering curriculum involves courses in digital logic, electronic circuits, computer architecture, robotics, VLSI design, VLSI CAD, software programming, operating systems, microprocessor systems, and parallel computing. The computer engineering curriculum allows students to develop a particular specialization in the following areas.

#### *Embedded Systems*

This area focuses on the use of digital hardware to monitor and control physical systems. Topics include discrete dynamics systems, digital controllers, analog-to-digital converters, microprocessor-based design, and the economic trade-offs of different software and hardware systems.

#### *High-Performance Computing*

This area introduces students to the field of state-of-the-art high-performance computing. In particular, it deals with aspects of computing involving multiple processors working together on a common problem, including issues of computer architecture, parallel programming and algorithms, numerical computing, and computer networking.

#### *Software*

This area exposes students to the field of writing software that runs on compilers. Students are taught the techniques of designing and analyzing efficient algorithms, how to develop operating systems and compilers, and how to write programs using efficient data structures and software engineering practices.

#### *VLSI and Computer-Aided Design*

This area focuses on systematic approaches to designing high-performance integrated circuits consisting of millions of transistors. This specialization includes topics such as low-power, high-speed, and reliable circuit design, hardware-software codesign, design verification, design of multi-FPGA systems, and CAD techniques.

### **Computer Science**

Computer science involves the understanding, use, and extension of computational ideas and their implementation. A Northwestern computer science graduate will

- comprehend the breadth of computer science, its key intellectual divisions and questions, and its past and likely future influence on engineering, science, medicine, business, and law
- approach problems from the algorithmic perspective, understanding the nature and broad reach of computation and how to apply it abstractly
- approach problems from the systems perspective, understanding the evolving layers of the software/hardware stack and how to create, use, and extend them
- approach problems from the perspective of artificial intelligence, understanding how to make progress solving seemingly intractable problems
- design and implement complex software systems, individually and as a team member
- design and implement effective human-machine interfaces

Courses and undergraduate research opportunities focus on software, ranging from theoretical models to practical applications, and establish a common breadth of knowledge in computer science, allowing students flexibility in areas in which they choose to specialize, such as

- *artificial intelligence*, including mobile robots with perceptual systems, models of memory and reasoning, knowledge representation, natural-language comprehension, planning, and problem solving
- *computer systems*, including parallel, distributed, and real-time systems, performance evaluation, prediction, and scheduling
- *networked systems*, including peer-to-peer computing, large-scale data storage, network security, and pervasive computing environments
- *programming languages and compilers*, including semantics, optimization, and software
- *human-computer interaction*, including interface design, task modeling, intelligent interfaces, and authoring tools
- *distributed interactive systems*, including client-server and web-based applications, such as heterogeneous databases and multimedia learning environments
- *theoretical computer science*, focusing on algorithm design and analysis of algorithms' worst- and average-case behavior
- *intelligent information systems*, including "frictionless" proactive systems and context- and task-sensitive retrieval systems
- *computer graphics and human-computer interfaces* for spatial applications, visualization, and computer entertainment

### **Facilities**

Students have access to state-of-the-art research and teaching facilities, ranging from laboratories for electronic

devices to parallel computers and worldwide distributed testbeds.

Electrical engineering facilities include laboratories for electronic circuits, digital circuits, solid-state electronics, the fabrication of solid-state lasers and other quantum electronic/ photonic devices, thin-film device development, biomedical electronics, microwave techniques, holography and coherent light optics, biological and other control systems, and signal, image, and speech processing.

Computer engineering facilities include laboratories in digital systems design, microprocessor systems, micro-programming, robotics, computer-aided design, and computer networking. The department has major research facilities for work in parallel and distributed computing systems, database systems, computer vision, VLSI design, CAD, robotics, solid-state devices, fiber optics, lasers, computational electromagnetics, electronic materials, and biomedical engineering.

Computer science students benefit from access to computing laboratories that provide Linux, Windows, Solaris, and PocketPC machines, a private network, sensor networks, and the worldwide PlanetLab distributed systems testbed. Students taking courses in experimental computer systems also have access to a special cluster on which they can instantiate their own collections of virtual machines. The department is part of the Microsoft Developer Network Academic Alliance, which provides free or inexpensive access to Microsoft products that are used widely in desktop computing.

## Courses

### **EECS 101-0 An Introduction to Computer Science for Everyone**

General introduction to historical and current intellectual questions in computer science; suitable for majors and nonmajors. Theory, systems, artificial intelligence, interfaces, software development, and interactions with business, politics, law, medicine, engineering, and other sciences.

### **EECS 110-0 Introduction to Computer Programming**

Introduction to programming practice using a modern programming language. Analysis and formulation of problems for computer solution. Systematic design, construction, and testing of programs. Substantial programming assignments. Not to be taken for credit with or after EECS 111.

### **EECS 111-0 Fundamentals of Computer Programming**

Introduction to principles of programming and procedural thinking. Procedural abstraction, data abstraction, modularity, object-oriented programming. Uses the Scheme programming language and computer facilities. Substantial programming assignments, including numerical and symbolic programs. Required for computer science majors.

### **EECS 130-0 Tools and Technology of the World Wide Web**

Introduction to the theory and practice of developing

sites on and technology for the web. Basics of HTML, JavaScript, ASP, and CGI programming.

**EECS 202-0 Introduction to Electrical Engineering** Concepts and applications of electrical engineering. Quantization, binary representation, performance. Power spectral density, digital filtering, fundamental limitations. Control systems, feedback systems. Properties of lasers, amplifiers, passive circuit elements, active circuit elements. Electronic devices and materials. Prerequisite: GEN ENG 205-3.

**EECS 203-0 Introduction to Computer Engineering** Overview of computer engineering design. Number systems and Boolean algebra. Logic gates. Design of combinational circuits and simplification. Decoders, multiplexers, adders. Sequential logic and flip flops. Introduction to assembly language. Application of concepts to a computer engineering design project.

### **EECS 205-0 Fundamentals of Computer System Software**

Basics of assembly language programming. Macros. System stack and procedure calls. Techniques for writing assembly language programs. Features of INTEL 8086/88-based PC. Interfaces between C and assembly codes. Prerequisite: GEN ENG 205-1,2,3,4 or EECS 110; EECS 203 recommended.

### **EECS 211-0 Object-Oriented Programming in C++**

Continuation of 111. Key concepts in software design and systems programming. Object-oriented programming in C++, design of interpreters and compilers, and register machines. Required for computer science majors. Prerequisite: 110 or 111 or knowledge of any programming language. Not to be taken for credit with or after 230 or 231.

**EECS 213-0 Introduction to Computer Systems** The hierarchy of abstractions and implementations that make up a modern computer system; demystifying the machine and the tools used to program it; systems programming in C in the UNIX environment. Preparation for upper-level systems courses. Prerequisite: 211 or 230.

**EECS 221-0 Fundamentals of Circuits** Circuit analysis and network theorems; linearity and superposition; series/parallel combinations of R, L, and C circuits; sinusoidal forcing; complex frequency and Bode plots; mutual inductance and transformers; two-port networks; Fourier analysis; response of circuits to periodic nonsinusoidal sources. Prerequisite: 202.

### **EECS 222-0 Fundamentals of Signals and Systems**

Comprehensive introduction to analysis of continuous and discrete-time signals and systems. Linear time-invariant systems, convolution. Fourier series representations of periodic signals. Continuous time and discrete time Fourier transforms. Laplace transform; z-transform. Prerequisite: 202.

### **EECS 223-0 Fundamentals of Solid-State Engineering**

Crystalline state of matter; quantum phenomena and quantum mechanics; electrons in atoms, atoms in crystals, electrons in crystals; semiconductors; thermal properties

of crystals, electrical properties of crystals and semi-conductors; p-n junction. Prerequisites: 202; PHYSICS 135-3; MATH 234.

**EECS 224-0 Fundamentals of Electromagnetics and Photonics**

Concepts of flux, potential, gradient, divergence, curl, and field intensity. Boundary conditions and solutions to Laplace and Poisson equations. Capacitance and inductance calculations. Conductors, insulators, and magnetic materials. Prerequisite: 202.

**EECS 225-0 Fundamentals of Electronics** Diode, BJT, and FET circuits; design using ideal operational amplifiers; feedback; frequency response; biasing; current sources and mirrors; small-signal analysis; design of operational amplifiers. Prerequisites: 221, 223.

**EECS 230-0 Programming for Computer Engineers** Introduction to computer programming in an object-oriented language. Emphasis on applications to computer systems, computer simulation, and discrete optimization. Basic principles of software engineering. Not to be taken for credit with or after 211 or 231. Prerequisites: GEN ENG 205-1,2.

**EECS 231-0 Advanced Programming for Computer Engineers**

Object-oriented programming, classes and data hiding, dynamic object construction and destruction, derived classes and inheritance, virtual functions; file processing; introduction to UNIX; testing and test generation. Not to be taken for credit with or after 211 or 230. Prerequisite: 110 or knowledge of a programming language.

**EECS 250-0 Physical Electronics and Devices** The physical basis of electronic and optoelectronic devices and their application in analog and digital systems. Diodes, transistors, LEDs, photodetectors, and lasers are described, and their properties are explored. Prerequisites: 221; PHYSICS 135-2.

**EECS 270-0 Applications of Electronic Devices** DC and AC networks, rectifiers, transistor amplifiers, feedback and operational amplifiers, digital electronics, and microprocessors. Not open to electrical engineering majors. Prerequisites: MATH 224; PHYSICS 135-2; or equivalent.

**EECS 302-0 Probabilistic Systems and Random Signals**

Basic concepts of probability theory and statistics, random variables, moments; multiple random variables, conditional distributions, correlation; random signals; applications to engineering systems. Prerequisite: MATH 234.

**EECS 303-0 Advanced Digital Logic Design** Overview of digital logic design. Technology review. Delays, timing in combinational and sequential circuits, CAD tools, arithmetic units such as ALUs and multipliers. Introduction to VHDL. Prerequisite: 203.

**EECS 307-0 Communications Systems** Analysis of analog and digital communications systems, including modulation, transmission, and demodulation of AM, FM, and TV systems. Design issues, channel distortion and loss, bandwidth limitations, additive noise. Prerequisites: 222, 302.

**EECS 308-0 Advanced Electromagnetics and Photonics**

Electromagnetic waves, transmission lines; impedance transformation; transients on lines; electrostatics, conductors, and capacitors; magnetostatics and inductors; wave reflection and transmission; electromagnetic motor, Maxwell's equations; metallic waveguides and wave transmission; antenna and diffraction, antenna arrays, communication, and radar. Prerequisite: 224.

**EECS 310-0 Mathematical Foundations of Computer Science**

Basic concepts of finite and structural mathematics. Sets, axiomatic systems, the propositional and predicate calculi, and graph theory. Application to computer science: sequential machines, formal grammars, and software design. Prerequisites: 110 or 111; MATH 230.

**EECS 311-0 Data Structures and Data Management** The design, implementation, and analysis of abstract data types; data structures and their algorithms. Topics include data and procedural abstraction, linked lists, stacks, queues, binary trees, searching, and sorting. Required for computer science majors. Prerequisite: 211 or 230.

**EECS 313-0 Telecommunication Networks for Multimedia**

Signals and bandwidth concepts, spectra, basics of electronics, information and coding, modulation, multiplexing, transmission systems, transmission media, analog versus digital communications, computer networks, and switching techniques. Not for electrical engineering or computer engineering majors.

**EECS 317-0 Data Management and Information Processing**

Data representation, file and record organization, linear and linked lists, and scatter storage techniques. Sorting and searching algorithms. Solving problems involving large databases. Not for students in computer science. Prerequisite: 110, 111, or programming experience.

**EECS 322-0 Compiler Construction**

Overview of compilers and context-free languages, top-down parsing, LL(1) parser construction, translation grammars, implementation of lexical analyzer, parser and translator, compiler optimization, error handling, and recovery. Prerequisite: 311.

**EECS 325-1,2 Artificial Intelligence Programming** Introduction to LISP and programming knowledge-based systems and interfaces. Strong emphasis on writing maintainable, extensible systems. Topics include semantic networks, frames, pattern matching, deductive inference rules, case-based reasoning, and discrimination trees. Project driven. Substantial programming assignments. Prerequisite: 110, 111, or programming experience.

**EECS 328-0 Numerical Methods for Engineers** Introduction to numerical methods; numerical differentiation, numerical integration, solution of ordinary and partial differential equations. Students write programs in FORTRAN, C, or Pascal using methods presented in class. Prerequisites: GEN ENG 205-1,2,3; MATH 220, 224, 230.

**EECS 330-0 Human-Computer Interaction** Introduction to human-computer interaction and the design of systems



that work for people and their organizations. Understanding the manner in which humans interact with and use their computers for productive work. Prerequisite: programming experience.

**EECS 332-0 Digital Image Analysis** Introduction to computer and biological vision systems, image formation, edge detection, image segmentation, texture, representation and analysis of two-dimensional geometric structures, and representation and analysis of three-dimensional structures. Prerequisites: 311; IEMS 202; MATH 240.

**EECS 333-0 Introduction to Communication Networks** Data communication basics. Telephone, cellular, cable, and computer networks. Layered network architectures, models, and protocols. Switching, routing, flow control, and congestion control. Medium access control, ARQ, and local area networks. Queuing models and network performance analysis. Prerequisite: 302; IEMS 202; MATH 320-1,2,3; or equivalent basic probability theory.

**EECS 334-0 Introduction to Computer Vision** Introduction to computer and biological vision systems, image formation, edge detection, image segmentation, texture, and representation and analysis of two- and three-dimensional structures. Prerequisites: 311; IEMS 201.

**EECS 336-0 Design and Analysis of Algorithms** Analysis techniques: solving recurrence equations. Algorithm design techniques: divide and conquer, the greedy method, backtracking, branch-and-bound, and dynamic programming. Sorting and selection algorithms, order statistics, heaps, and priority queues. Prerequisite: 310, 311, or consent of instructor.

**EECS 337-0 Natural Language Processing** Semantics-oriented introduction to natural language processing, broadly construed. Representation of meaning and knowledge inference in story understanding, script/frame theory, plans and plan recognition, counterplanning, and thematic structures. Prerequisite: 348 or consent of instructor.

**EECS 338-0 Practicum in Intelligent Information Systems** A practical excursion into building intelligent information systems. Students develop a working program in information access, management, capture, or retrieval. Project definition, data collection, technology selection, implementation, and project management.

**EECS 339-0 Introduction to Database Systems** Data models and database design. Modeling the real world: structures, constraints, and operations. The entity relationship to data modeling (including network hierarchical and object-oriented), emphasis on the relational model. Use of existing database systems for the implementation of information systems. Prerequisite: 311.

**EECS 340-0 Introduction to Networking** A top-down exploration of networking using the five-layer model and the TCP/IP stack, covering each layer in depth. Students build web clients, servers, and a TCP implementation and implement routing algorithms. Prerequisite: 311.

**EECS 343-1,2 Operating Systems** Fundamental overview of operating systems. **1.** Operating system structures, processes, process synchronization, deadlocks, CPU scheduling, and memory management. **2.** File systems, secondary storage management, issues in distributed systems, case studies, and special topics. Requires substantial programming projects. Prerequisites: 311 and either 213 or 205 and 231.

**EECS 344-0 Design of Computer Problem Solvers** Principles and practice of organizing and building artificial intelligence reasoning systems. Pattern-directed rule systems, truth-maintenance systems, and constraint languages. Prerequisite: 348 and 325-1 or equivalent LISP experience.

**EECS 345-0 Distributed Systems** Basic principles behind distributed systems (collections of independent components that appear to users as a single coherent system) and main paradigms used to organize them. Prerequisites: 340, 343.

**EECS 346-0 Microprocessor System Design** Structure and timing of typical microprocessors. Sample microprocessor families. Memories, UARTS, timer/counters, serial devices, and related devices. MUX and related control structures for building systems. Sample single-board computers. Standard bus structures. Interrupt programming. Hardware/software design tradeoffs. Prerequisites: 203, 205.

**EECS 347-1 Microprocessor System Projects I** Programmable logic devices such as PAL and FPGA. Design, prototype, and test individual projects involving microprocessors and programmable logic devices. Prerequisites: 303, 346.

**EECS 347-2 Microprocessor System Projects II** Students design, prototype, and test individual projects involving microprocessors and related devices, such as PAL/FPGA and special-purpose ICs. Embedded-system tools such as special-purpose compilers and ICE (in-circuit emulation). Manufacturing issues such as PCB layout. Survey of microprocessor platforms. Prerequisite: 347-1.

**EECS 348-0 Introduction to Artificial Intelligence** Core techniques and applications of AI. Representing, retrieving, and applying knowledge for problem solving. Hypothesis exploration. Theorem proving. Vision and neural networks. Prerequisite: 325-1 or LISP programming experience.

**EECS 349-0 Machine Learning** Machine learning is the study of algorithms that improve through experience. Topics covered typically include Bayesian learning, decision trees, genetic algorithms, neural networks, Markov models, and reinforcement learning. Assignments include programming projects and written work. Prerequisite: 348.

**EECS 350-0 Introduction to Computer Security** Basic principles and practices of computer and information security. Software, operating system, and network security techniques, with detailed analysis of real-world examples.

Topics include cryptography, authentication, software and operating system security (e.g., buffer overflow), Internet vulnerability (DoS attacks, viruses/worms, etc.), intrusion detection systems, firewalls, VPN, and web and wireless security. Prerequisite: 213 or equivalent or consent of instructor; 340 highly recommended.

**EECS 351-0 Introduction to Computer Graphics** Mathematical software and hardware requirements for computer graphics systems. Data structures and programming languages. Random displays. Graphic applications. Prerequisite: 311.

**EECS 352-0 Machine Perception of Music and Audio** Machine extraction of musical structure in audio and MIDI and score files, covering areas such as source separation and perceptual mapping of audio to machine-quantifiable measures. Prerequisite: GEN ENG 205-2, EECS 211, EECS 231, or prior programming experience in MATLAB.

**EECS 353-0 Digital Microelectronics** Logic families, comparators, A/D and D/A converters, combinational systems, sequential systems, solid-state memory, large-scale integrated circuits, and design of electronic systems. Prerequisites: 203, 225.

**EECS 355-0 ASIC and FPGA Design** Overview of computer-aided design tool flow for ASIC and FPGA design. Synthesis from hardware description languages and creation of finite-state machines. Differences between FPGA and ASIC design flows. Exploration of concepts in several projects. Prerequisite: 303.

**EECS 356-0 Introduction to Formal Specification and Verification** Introduction to formal techniques used for system specifications and verifications: temporal logic, set theory, proofs, and model checking. TLA<sup>+</sup> (Temporal Logic of Actions) specifications. Safety and liveness properties. Real-time specs and verifications.

**EECS 357-0 Introduction to VLSI CAD** VLSI physical design, including logic design, architectural design, and packaging. Development of CAD tools for VLSI physical design. Prerequisites: 303; EECS 311.

**EECS 358-0 Introduction to Parallel Computing** Introduction to parallel computing for scientists and engineers. Shared-memory parallel architectures and programming, distributed memory, message-passing data-parallel architectures, and programming. Prerequisites: 361; 211 or 230.

**EECS 359-0 Digital Signal Processing** Discrete-time signals and systems. Discrete-time Fourier transform, z-transform, discrete Fourier transform, digital filters. Prerequisite: 222.

**EECS 360-0 Introduction to Feedback Systems** Linear feedback control systems, their physical behavior, dynamical analysis, and stability. Laplace transform, frequency spectrum, and root locus methods. System design and compensation using PID and lead-lag controllers. Digital implementations of analog controllers. Not to be taken for credit with or after MECH ENG 391. Prerequisite: 222.

**EECS 361-0 Computer Architecture** Design and understanding of the computer system as a whole unit. Performance evaluation and its role in computer system design; instruction set architecture design, datapath design and optimizations (e.g., ALU); control design; single cycle, multiple cycle, and pipeline implementations of processor. Hazard detection and forwarding; memory hierarchy design; cache memories, virtual memory, peripheral devices, and I/O. Prerequisites: 205, 303.

**EECS 362-0 Computer Architecture Project** Quarter-long team project designing a processor for a complete instruction set. Involves ISA design, design of components, datapath, and control for a pipelined processor to implement the ISA. Students use industrial-strength design tools and VHDL as the design specification language. Designs are evaluated using benchmark programs for correctness and performance. Prerequisite: 361.

**EECS 363-0 Digital Filtering** Recursive and nonrecursive digital filters, decimation and interpolation, A/D and D/A conversion as digital filtering problems. Implementation of nonrecursive filters via FFT, quantization problems, e.g., companding and limit cycles. Prerequisite: 359.

**EECS 366-0 Designing and Constructing Models with Multiagent Languages** How to translate a situation into a multiagent model, construct multiagent models and networked situations, and analyze their behavior and performance. Prerequisite: 311.

**EECS 370-0 Computer Game Design** Plot, narrative, and character simulation for creating game worlds; artificial intelligence for synthetic characters; tuning gameplay. Substantial programming and project work. Prerequisites: 311; 1 unit of 322, 343, 348, or 351.

**EECS 374-0 Introduction to Digital Control** Discrete dynamics systems; discrete models of continuous systems feedback and digital controllers; analog-digital conversion; digital control design including PID, lead/lag, deadbeat, and model-matching controllers. Prerequisite: 360.

**EECS 378-0 Digital Communications** Sampling and time-division multiplexing, baseband digital signals and systems. Coded pulse modulation, error control coding, digital modulation systems, information measure and source encoding, and introduction to spread spectrum communications. Prerequisites: 302, 307.

**EECS 379-0 Lasers and Coherent Optics** Optical resonators; fundamental operation of lasers; mode-locking and Q-switching; optical propagation and diffraction; Gaussian beams; thin-lens imaging; optical signal processing. Prerequisites: 222, 224.

**EECS 380-0 Wireless Communications** Overview of existing and emerging wireless communications systems; interference, blocking, and spectral efficiency; radio propagation and fading models; performance of digital modulation in the presence of fading; diversity techniques; code-division multiple access. Prerequisite: 378.

**EECS 381-0 Electronic Properties of Materials** Fundamental properties of electrons in materials. Classical and quantum mechanical descriptions of free and bound electrons. Optical, electrical, thermal, and magnetic properties of materials. Microelectronic, optoelectronic, magnetic recording, superconductivity. Prerequisites: 223 and 224 or consent of instructor.

**EECS 382-0 Photonic Information Processing** Coherent and incoherent light; electro-optic and acousto-optic modulation; optical signal processing; holography; optical storage. Prerequisites: 222 and 224 or consent of instructor.

**EECS 383-0 Fiber-Optic Communications** Semiconductor diode lasers, internal modulation, electro-optic modulation, coherent and incoherent detection, optical fibers and their properties, optical amplifiers, communication systems, optical networks. Prerequisites: 223, 224.

**EECS 384-0 Solid-State Electronic Devices** Energy-band model for semiconductors; carrier statistics and transport; diodes, bipolar and field-effect transistors; integrated circuits, optoelectronic and heterojunction devices. Prerequisite: 381 or consent of instructor.

**EECS 385-0 Optoelectronics** Introduction to solid-state optoelectronic devices; display devices, laser diodes, photodetectors, and light modulators; optical waveguides and fibers; system application of optoelectronic devices. Prerequisite: 381 or consent of instructor.

**EECS 386-0 Computational Electromagnetics and Photonics** Introduction to the finite-difference time-domain (FDTD) method in numerical modeling of electromagnetic and optical wave interactions with engineering structures. Finite differences; Maxwell's equations; numerical dispersion and stability; free-space and waveguide field sources; absorbing boundary conditions; material dispersions and nonlinearities; modeling examples in modern electromagnetic and optical engineering. Prerequisite: 308.

**EECS 388-0 Nanotechnology** Physics and fabrication of photonic and electronic devices. Physics of semiconductors: crystal structures, reciprocal lattice, elements of quantum mechanics, heterojunctions, quantum wells, and superlattices. Bulk crystal, thin-film, and epitaxial growth technologies. Device processing technologies: diffusion oxidation, ion implantation, annealing, etching, and photolithography. Prerequisite: 223 or consent of instructor.

**EECS 389-0 Superconductivity and Its Applications** Properties of materials in the superconducting state; charge flow dynamics of type II superconductors; high- $T_c$  superconductors; applications for computers and high-frequency devices. Prerequisite: 381 or consent of instructor.

**EECS 390-0 Introduction to Robotics** Homogeneous vectors and planes; homogeneous transformation, position and orientation transformations, kinematics and inverse kinematic solutions of robot manipulators; Jacobian and inverse Jacobian relation; robot trajectory and task planning; dynamic formulation and computation of robot

manipulators; robot programming and control systems. Prerequisite: 230.

**EECS 391-0 VLSI Systems Design** Design of CMOS digital integrated circuits, concentrating on architectural and topological issues. Tradeoffs in custom design, standard cells, gate arrays. Use of VLSI design tools on a small project. Prerequisite: 303.

**EECS 392-0 VLSI Systems Design Projects** Design of a cutting-edge VLSI chip. Teams of 5 to 10 students undertake a large circuit design problem, going from specification to VLSI implementation while optimizing for speed, area, and/or power. Group collaboration and engineering design. Prerequisite: 391.

**EECS 393-0 VLSI Design and Analysis of High-Speed Integrated Circuits** Issues that arise in the design and analysis of VLSI circuits at high speeds, such as buffer sizing, repeater insertion, noise, electromigration, Elmore decay, scaling trends, and power consumption. Prerequisite: 391.

**EECS 394-0 Software Project Management and Development** Software development methodologies. Object-oriented analysis and design, CASE tools, software life cycle. Project management tools, programming teams. Executable specifications, automatic test generation. Prerequisite: 343 or equivalent programming experience.

**EECS 395-0 Special Topics in Electrical Engineering and Computer Science** Topics suggested by students or faculty and approved by the department.

**EECS 398-0 Electrical Engineering Design** Design of electrical and electronic devices, circuits, and systems by the application of the engineering sciences, economics, and Institute of Electrical and Electronics Engineers or other national standards. Prerequisite: senior standing.

**EECS 399-0 Projects** Seminar and projects for advanced undergraduates on subjects of current interest in electrical and computer engineering.

## ENGINEERING SCIENCES AND APPLIED MATHEMATICS

The Department of Engineering Sciences and Applied Mathematics offers course work in applied mathematics and administers an undergraduate program leading to a BS in applied mathematics and a graduate program in applied mathematics.

The applied mathematics program is intended to provide the knowledge necessary for applying mathematical ideas and techniques to the problems that arise in engineering or science. It is expected that a student receiving a BS in applied mathematics would have the background for suitable employment in industry or for graduate study in either mathematics (pure or applied) or an engineering field, including computer science and operations research. To achieve these goals, the applied mathematics program is designed to be flexible and allow the student to concentrate a substantial part of the course work either in mathematics or one or more areas of application.

## Courses

**ES APPM 252-1,2 Honors Calculus for Engineers** Alternative to standard calculus sequence. Covers more material at a deeper level with more applications. Satisfies same requirements as MATH 230 and 234. Prerequisite: invitation or consent of instructor.

**ES APPM 311-1,2 Methods of Applied Mathematics** Ordinary differential equations; Sturm-Liouville theory, properties of special functions, solution methods including Laplace transforms. Fourier series: eigenvalue problems and expansions in orthogonal functions. Partial differential equations: classification, separation of variables, solution by series and transform methods. Prerequisite: 252-3; MATH 250; or GEN ENG 205-4.

**ES APPM 311-3 Methods of Applied Mathematics: Complex Variables** Imaginary numbers and complex variables, analytic functions, calculus of complex functions, contour integration with application to transform inversion, conformal mapping. May be taken independently of 311-1,2. Prerequisite: 252-3; MATH 250; or GEN ENG 205-4.

**ES APPM 321-0 Modeling Soft Matter: Networks, Membranes, Fluctuations** Fundamental mathematical tools (e.g., differential geometry, variational calculus) are applied to modern concepts of soft-matter structure and mechanics in various fields (e.g., biological membranes, polymers). Prerequisites: 311-1,2 or consent of instructor.

**ES APPM 322-0 Applied Dynamical Systems** Example-oriented survey of nonlinear dynamical systems, including chaos. Combines numerical exploration of differential equations describing physical problems with analytic methods and geometric concepts. Applications to mechanical, fluid dynamical, electrical, chemical, and biological systems. Prerequisites: 311-1,2 or equivalent or consent of instructor.

**ES APPM 346-0 Modeling and Computation in Science and Engineering** Advanced techniques for initial value problems, differential algebraic systems, bifurcations, chaos, and partial differential equations. Applications drawn from different physical areas. Prerequisites: MATH 234, 240; MATH 250 or GEN ENG 205-4; PHYSICS 135-1,2 or equivalent; familiarity with a programming language; or consent of instructor.

**ES APPM 399-0 Projects** Special studies to be carried out under faculty direction. Credit to be arranged.

## ENVIRONMENTAL ENGINEERING

Environmental engineering is concerned with the interactions of people and environment, the applications of scientific knowledge to the understanding and analyses of these interactions, and the improvement of the quality of our environment. This undergraduate program provides an engineering and scientific basis for understanding contemporary environmental problems and approaches to their solutions, understanding the natural systems with which human activities must be compatible, and

developing a grasp of engineering analysis and design for environmental control systems planning and design.

McCormick faculty members are engaged in research on physical, chemical, and biological processes for water supply, waste treatment, pollution control, and resource recovery; water resources; toxicology; environmental systems planning and design; chemistry and treatment of industrial wastes; land reclamation and contaminant effects on ecosystems.

Completion of the undergraduate degree program in environmental engineering prepares students to practice engineering at the entry level or to continue their education at the graduate level. It serves as preparation for the Fundamentals of Engineering (FE) examination and, with adequate experience, the Professional Engineer (PE) examination.

## Environmental Engineering Laboratory

Facilities are provided for instruction and research in environmental chemistry, environmental microbiology, environmental fluid mechanics, and the unit operations of water and waste treatment. Specialized apparatuses and instrumentation are available for studies in each area.

## INDUSTRIAL ENGINEERING AND MANAGEMENT SCIENCES

Northwestern's industrial engineering students graduate with the skills needed to create, design, analyze, and improve the operation of complex organizational systems, e.g., financial systems, information systems, production systems, logistics, and transportation. All students acquire an understanding of statistics, economics, optimization, computing, and simulation techniques. Elective opportunities include courses in business management, advanced economics and mathematics, quality control and reliability, communications and information systems, and production and supply-chain management. Realistic (i.e., open-ended and ill-defined) problems are used to help students refine the application of these principles as well as their ability to work in teams and to communicate their results effectively. These are the experiences that employers find most valuable in our graduates regardless of the field they enter.

Students may pursue an optional concentration using technical electives and other courses from one or more of the following areas: economics and finance, general business management, industrial behavioral sciences, mathematical sciences/graduate research, production and logistics, and statistics and quality control.

Many IE graduates eventually assume management positions. In preparation for such careers, students take full advantage of the additional academic, business, and leadership programs available at Northwestern: a major or minor in economics, the business enterprise certificate for engineers, the Undergraduate Leadership Program, the Business Institutions Program, study abroad, and the



co-op program. The two-quarter senior design project allows students to integrate all of these experiences.

To learn more about the program, visit the department's web site at [www.iems.northwestern.edu](http://www.iems.northwestern.edu).

## Courses

### *Economics and Financial Decisions*

**IEMS 373-0 Introduction to Financial Engineering** Financial markets, derivative securities, risk management, mathematical models in finance. Foreign exchange, debt, equity, commodity markets. Investing, trading, hedging, arbitrage. Forwards, futures, options, swaps, exotic derivatives. Models of price dynamics, binomial model, introduction to Black-Scholes theory and Monte Carlo simulation. Homework, projects, and guest speakers. Prerequisites: 315, 326, MATH 234, EECS 230, or equivalent or consent of instructor.

### *General Business Management*

**IEMS 205-0 Methods, Standards, and Work Design** Introduction to traditional topics in industrial engineering, including time study, work measurement, standards, and design. This course enables industrial engineering students to understand and assume traditional industrial engineering roles upon graduation. Prerequisite: sophomore standing and knowledge of probability and statistics.

**IEMS 325-0 Engineering Entrepreneurship** Overview of the entrepreneurial process from an engineering perspective. Idea generation, planning, financing, marketing, protecting, staffing, leading, growing, and harvesting. Students write startup business plans. Lectures, guest speakers, and case studies. Prerequisite: 1 course in accounting or finance such as 326 or ECON 260.

**IEMS 326-0 Economics and Finance for Engineers** Principles of corporate finance; financial decisions of firms; value; risk and return; investment and capital budgeting decisions under certainty and uncertainty; performance evaluation. Homework and exams. Prerequisites: MATH 220; basic understanding of probability and economics recommended.

### *Operations Research*

**IEMS 310-0 Operations Research** Survey of operations research techniques. Linear programming, decision theory, stochastic processes, game theory. Not open to industrial engineering majors. May not be taken with 313 or 315.

**IEMS 313-0 Deterministic Models and Optimization** Formulation and solution of applicable optimization models, including linear, integer, nonlinear, and network problems. Efficient algorithmic methods and use of computer modeling languages and systems. Homework, exams, and project. Prerequisites: GEN ENG 205-1; MATH 230; sophomore standing.

**IEMS 315-0 Stochastic Models and Simulation** Modeling and analysis of dynamic systems subject to uncertainty. Integrated approach to stochastic analysis and simulation.

Rough-cut analysis of queuing systems. Homework, exams, computer labs, and project. Prerequisites: 202, 303; GEN ENG 205-1.

**IEMS 317-0 Discrete-Event Systems Simulation** Computer simulation of discrete-change systems subject to uncertainty. Choice of input distributions; development of models; design and analysis of simulation experiments. Miniprojects, exams, and computer labs. Prerequisites: 303; 310 or 315.

### *Organization Theory, Behavioral Science, and Technology Management*

**IEMS 340-0 Field Project** Methods Use of field research methods to solve management problems. Assignments focus on individual student projects. Students define projects, design field studies and pilot tests of data collection instruments, and present results. Prerequisite for nonmajors: consent of instructor.

**IEMS 342-0 Organizational Behavior** Manager's view of tools available to recruit, develop, appraise, compensate, organize, and lead a team going through change. Application of psychological principles relating to human dynamics, motivation, teams, power, and organizational culture. Lectures, guest speakers, and exams. Work experience recommended.

**IEMS 343-0 Project Management for Engineers** A case study-based exploration of the body of project management knowledge. Key topics include project scheduling, risk management, project leadership, small-group dynamics, project methodologies, lifecycle concepts, and project controls. A Socratic approach is taken to exploring various case studies in the context of established and leading-edge project-management concepts. Prerequisites: 303 and 342 recommended.

**IEMS 345-0 Negotiations and Conflict Resolution for Engineers** Highly interactive case-study-based exploration of the field of negotiation and dispute resolution. Students interact in simulated negotiations and disputes ranging in complexity from single-party/single-issue to multiparty/multi-issue cases that illustrate integrative negotiation techniques. Also, dispute resolution techniques in the context of typical industrial situations. Prerequisites: 303 and 342 recommended.

### *Probability and Statistics*

**IEMS 201-0 Introduction to Statistics** Collecting data; summarizing and displaying data; drawing conclusions from data; probability background, confidence intervals, hypotheses tests, regression, correlation. Not open to industrial engineering majors. Not to be taken for credit with or after STAT 210.

**IEMS 202-0 Probability** Introduction to probability theory and its applications. Random variables and distributions including binomial, Poisson, exponential, and normal. Monte Carlo simulation. Examples in reliability, inventory,



finance, and statistics. Homework, labs, and exams. Not to be taken for credit with or after MATH 310-1. Prerequisite: concurrent enrollment in MATH 234.

**IEMS 303-0 Statistics I** Statistical methods for data analysis. Descriptive plots and statistics; observational studies and experiments; confidence interval estimation; hypothesis testing; regression and correlation. Homework, labs, and project. Not to be taken for credit with or after STAT 320-1. Prerequisite: 202 or equivalent.

**IEMS 304-0 Statistics II** Advanced statistical methods. Multiple regression; analysis of variance; design and analysis of single-factor and multifactor experiments; categorical data; nonparametric methods. Homework and project. Not to be taken for credit with or after STAT 320-2. Prerequisite: 303 or equivalent.

**IEMS 305-0 Statistical Methods for Quality Improvement** Methods for controlling and improving industrial processes. Control charts; process capability; gage repeatability and reproducibility. Multifactor experiments; screening experiments; robust design. Homework, labs, and project. Prerequisite: 303 or equivalent.

**IEMS 306-0 Decision Analysis** Theory and practice of analyzing decisions in the public and private sectors. Multiple objectives; influence diagrams; decision trees; sensitivity analysis; probability assessment; utility; human biases. Problems, cases, and projects. Prerequisite: 202 or equivalent.

**IEMS 307-0 Quality Improvement by Experimental Design** Methods for designing and analyzing industrial experiments. Blocking; randomization; multiple regression; factorial and fractional factorial experiments; response surface methodology; Taguchi's robust design; split plot experimentation. Homework, labs, and project. Prerequisite: 303 or equivalent.

### *Production and Logistics*

**IEMS 381-0 Supply-Chain Modeling and Analysis** Application and development of mathematical modeling tools for the analysis of strategic, tactical, and operational supply-chain problems including facility location, customer assignment, vehicle routing, and inventory management. Related topics including the role of information and decision support systems in supply chains. Homework, exams, and project. Prerequisite: 313.

**IEMS 382-0 Production Planning and Scheduling** Applications of operations research methods to practical problems of production planning and inventory control. Forecasting; aggregate planning; deterministic and stochastic inventory models; MRP; JIT; variability; scheduling in production and service systems. Case studies, homework, and exams. Prerequisites: 202; 310 or 313.

**IEMS 383-0 Service Operations Management** Exploration of service industries: cost-reduction and service-enhancement models, location planning, workforce scheduling, yield

management, queuing analysis, and call-center management. Prerequisites: 313, 315.

### *Senior Design Project*

**IEMS 390-0 Systems Management** Introduction to systems problems and methods. Small-group development of potential classwide projects to be carried out the following quarter. Identifying projects, team skills, presenting plans and proposals. Prerequisite: 340.

**IEMS 391-0 Industrial Engineering Design** Case studies and small-scale projects involving application of operations research techniques to complex-decisions problems. Mathematical modeling, optimization, and policy analysis in public and private sector systems. Written and oral presentations of analyses. Prerequisite: senior standing; 313 and 315 for industrial engineering majors; 310 for manufacturing engineering majors.

**IEMS 392-0 Systems Project Management** Project management methods applied to analysis and design of a complex real-world system. Students choose and carry out a single classwide project. Planning, organizing, staffing, directing, and controlling; working with clients and stakeholders. Prerequisite: senior standing.

**IEMS 393-0 Industrial Engineering Design Project** Large-scale, open-ended team projects from selected fields of industrial engineering. Systems approach requiring establishment of objectives and criteria, analysis and synthesis of alternatives, feasibility, trade-offs, testing, and evaluation. Written and oral reports. Prerequisite: 390, 391, or 392.

### *Special Topics*

**IEMS 395-0 Special Topics in Industrial Engineering** Topics suggested by students or faculty members and approved by the department.

**IEMS 399-0 Independent Study** Independent study on an industrial engineering topic supervised by a faculty member.

## **MATERIALS SCIENCE AND ENGINEERING**

Materials science and engineering is a discipline that has expanded rapidly in response to growing demand for materials that make improved use of existing resources or are needed for new technologies. The program at Northwestern is broad based, offering educational and research opportunities in polymer science, ceramics, metallurgy, surface science, biomaterials, nanomaterials, and electronic materials. Engineers, scientists, and technologists who work on these different materials all apply basically the same scientific principles governing the interrelation of processing, structure, properties, and material performance. A key theme of the Northwestern program is the integration of these principles in the systematic design of new materials.

The department offers an undergraduate program leading to the BS degree. The department also participates

in the co-op and BS/MS programs. The curriculum centers on basic engineering and materials course work but also provides the flexibility to focus on different areas of concentration as described below. A student's educational experience is broadened by courses in the humanities, arts, sciences, and other areas of engineering. The undergraduate program culminates in the senior project, in which each student carries out a research/development project with a faculty member and his or her research group.

Students who complete the BS program will be well prepared for professional work or graduate study in the application, production, processing, or research and development of materials. Graduates find opportunities in materials science and engineering in many other areas, since materials expertise is important in various engineering fields as well as in medicine, physics, and chemistry.

### **Areas of Concentration**

The undergraduate program at Northwestern offers a close relationship between students and faculty. Every effort is made to tailor specific programs to needs and interests. Several broad areas of concentration are described below. Students are encouraged to create other areas that fit particular interests.

#### *Biomaterials*

The growth of biotechnology has stimulated interest in the interface of the life sciences and materials science. The field of biomaterials spans three broad areas: biomedical implant materials to replace natural structures; biomimetic materials applying biological concepts to the design of new engineering materials; and application of materials science principles to the understanding of structure and function in biological systems.

#### *Design and Manufacturing*

Engineers in industry typically work in teams on projects requiring experience with design and manufacturing. This concentration is meant for students desiring additional strength in these areas and is especially appropriate for those planning a career in industry. It builds on the design content in the materials science curriculum and provides additional interdisciplinary design experience. The concentration also provides industrially relevant strengths in the areas of materials selection, computational tools, materials processing, and failure analysis.

#### *Electronic Materials*

As microelectronics enters the era of ultralarge-scale integration, materials scientists face new challenges in developing materials and processes for integrated circuits with components of nanometer dimensions. New scientific principles, materials fabrication techniques, and improved instrumentation will be needed to exploit electronic-level structure/property relations in these devices and their

components. New electronic materials must be developed to meet requirements in a growing range of application areas such as spintronics, optical computing, and fuel cells.

#### *Metals and Ceramics*

The ability to design increasingly higher-strength alloys allows for lighter structures, and higher-temperature materials provide energy efficiency. Heat-treatable and toughened ceramics exploit advanced knowledge of solid-state phase transformations and reactions. Exciting developments are taking place in high-performance composite combinations of these and other materials for structural and electronic applications.

#### *Nanomaterials*

The area of nanomaterials, focusing on materials with feature sizes in the range of 1 to 100 nanometers, is an important research topic that will become increasingly emphasized as nanotechnology industries develop. Examples of nanomaterials include new ultrahigh-strength materials with nanometer-range structural features and new structures designed and self-assembled atom by atom or molecule by molecule. Machines smaller than the tip of a pin can be built using either semiconductor materials processing or biologically inspired processing technology. This specialization is designed to give students the knowledge needed to work at the nanoscale, including design and synthesis, characterization, and theory/modeling/simulation of nanomaterials.

#### *Polymeric Materials*

Synthetic polymers offer the engineering community an ever-expanding array of materials having properties that are tailored by chemical and physical processing. New developments are opening up applications for polymers as high-strength, low-weight materials; optoelectronic components; and key materials in other revolutionary areas. The basic understanding of engineering properties in terms of multilevel microstructure is essential for the full utilization of polymers.

#### *Surface Science*

A solid communicates with the outside world through its surface. Wear, corrosion, and passivation are well-known surface processes. Chemical, electronic, and mechanical properties of materials depend critically on composition at surfaces and grain boundaries (internal surfaces), surface treatments, and the environment. The surface scientist must be able to not only determine the properties of surfaces or interfaces but also to control them.

### **Laboratories and Facilities**

Materials science and engineering demands sophisticated experimental techniques for the preparation and characterization of advanced materials. The undergraduate program

makes heavy use of state-of-the-art laboratory facilities in core courses, technical electives, and senior projects.

Materials preparation and processing equipment is available for all classes of materials, including an advanced crystal growth facility in a clean room environment for preparing single crystals of metals, oxides, alkali halides, and semiconductors. Investigation of complex microstructures employs a wide array of microscopy, diffraction, and microanalysis techniques. This features a unique combination of instruments (cold field-emission transmission electron microscope, atom-probe field-ion microscopes, scanning tunneling microscopes), providing atomic resolution imaging and chemical analysis, complemented by an extensive surface analytical laboratory. Characterization of material properties employs an advanced mechanical testing facility featuring static and dynamic loading under controlled temperature and environment. Specialized facilities measure electrical, spectroscopic, magnetic, and photonic properties. Computer laboratories and a design studio address thermodynamic modeling and simulation of microstructural evolution, with application in materials design.

## Courses

**MAT SCI 101-0 Modern Materials and Society** Introduction to materials — how they function, how they are made, the devices they enable, and their impact on society. Role of materials developments in technological innovation and global competitiveness. Prerequisites: high school mathematics and science background. Fulfills Weinberg College distribution requirements. Not intended for engineering majors.

**MAT SCI 190-0 Materials Science and Engineering Freshman Projects** Laboratory-oriented, with research projects emphasizing use of the scanning electron microscope and other modern apparatus; correlation of structure with other properties of materials. Lectures, laboratory.

**MAT SCI 201-0 Introduction to Materials** Introduction to atomic and molecular organization in solids, with emphasis on structure-property relations in ceramics, electronic materials, metals, and polymers. Not to be taken for credit with or after 203 or 301. Prerequisite: CHEM 102.

**MAT SCI 203-0 Microstructure and Engineering Properties of Materials** Processing, microstructure, and properties of engineering materials with emphasis on structural materials such as concrete, steel, wood, glass, and ceramics. Not to be taken for credit with or after 201 or 301. Prerequisites: CHEM 102; MATH 230.

**MAT SCI 301-0 Materials Science Principles** Equilibrium and nonequilibrium development of microstructures. Mechanical behavior of metals, ceramics, and polymers. Corrosion and stability of engineering materials. Materials processing. Not to be taken for credit with or after 201 or 203. Prerequisite: CHEM 102.

**MAT SCI 314-0 Thermodynamics of Materials** Classical and statistical thermodynamics; entropy and energy functions

in liquid and solid solutions, and their applications to phase equilibria. Lectures, problem solving. Majors in materials science and engineering cannot take this course for credit with or after CHEM 342-1.

**MAT SCI 315-0 Phase Equilibria and Diffusion in Materials** Application of thermodynamics to ternary phase equilibria. Defects and diffusion in solids. Interdiffusion. Short-circuit diffusion. Defects and transport in ionic solids. Lectures, problem solving. Prerequisite: 314 or equivalent.

**MAT SCI 316-1,2 Microstructural Dynamics** Principles underlying development of microstructures. Defects, diffusion, phase transformations, nucleation and growth, thermal and mechanical treatment of materials. Lectures, laboratory. Prerequisite: 315 or equivalent.

**MAT SCI 318-0 Materials Selection** Methods of specifying materials and the processes for making them in the context of a given application. Service performance of materials based on their physical and chemical properties. Case studies and use of high-level databases. Prerequisite: 201.

**MAT SCI 322-0 Kinetics of Heterogeneous Reactions** Rates and mechanisms of heterogeneous gas-solid, liquid-solid, and solid-solid reactions such as carburization, reduction, oxidation, corrosion, stress-corrosion, and heterogeneous structural transformations. Role of microscopic and macroscopic defects.

**MAT SCI 331-0 Physical Properties of Polymers** Different kinds of polymeric materials. Relationships between structure and physical properties; rubber elasticity, the glassy state, crystallinity in polymers. Lectures, laboratory. Prerequisites: 201 or equivalent; 314 or CHEM 342-1.

**MAT SCI 332-0 Mechanical Behavior of Solids** Plastic deformation and fracture of metals, ceramics, and polymeric materials; structure/property relations. Role of imperfections, state of stress, temperatures, strain rate. Lectures, laboratory. Prerequisites: 316-1,2; 316-2 may be taken concurrently.

**MAT SCI 333-0 Composite Materials** Introduction to ceramic-, metal-, polymer-matrix composites for structural applications. Emphasis on structure (reinforcements, architecture), properties (elasticity, strength, toughness, creep), processing, role of interface. Prerequisites: 316-1,2, 332.

**MAT SCI 335-0 Polymer Processing and Properties** Effects of processing flows on microstructure and properties of semicrystalline and glassy polymers. Extrusion and molding; structural characterization and mechanical behavior; additives.

**MAT SCI 340-0 Ceramic Processing** Steps in production of fired ceramic articles. Powder preparation and characterization, compact formation, slip casting, extrusion and injection molding; firing, liquid-phase and solid-state sintering. Lectures, laboratory. Prerequisite: 316-1 or equivalent.

**MAT SCI 341-0 Introduction to Modern Ceramics** Applications of ceramic materials, with emphasis on structure (bond, crystal, glass, defect, micro-); properties (thermal,

electrical, optical, magnetic, mechanical); and processing (powders, forming, densification). Prerequisites: 316-1,2 or consent of instructor.

**MAT SCI 351-1,2 Introductory Physics of Materials** Quantum mechanics; applications to materials and engineering. Band structures and cohesive energy; thermal behavior; electrical conduction; semiconductors; amorphous semiconductors; magnetic behavior of materials; liquid crystals. Lectures, laboratory, problem solving. Prerequisites: GEN ENG 205-4; PHYSICS 135-2,3.

**MAT SCI 355-0 Electronic Materials** Principles, models, and characterization of semiconductor materials. Crystal growth and doping. Diffusion, epitaxy, and monolithic processes. Current transport, nonequilibrium processes, thin films, low-mobility materials, and interfaces. Prerequisite: 316-1 or consent of instructor.

**MAT SCI 360-0 Introduction to Electron Microscopy** Theories and practice involved in application of scanning electron microscopy and transmission electron microscopy. Lectures, laboratory. Primarily for undergraduates and for graduate students in other departments. Prerequisites: 201; PHYSICS 135-2,3 or equivalent.

**MAT SCI 361-0 Crystallography and Diffraction** Elementary crystallography. Basic diffraction theory; reciprocal space. Applications to structure analysis, preferred orientation. Film and counter techniques. Lectures, laboratory. Prerequisites: GEN ENG 205-4; PHYSICS 135-2,3.

**MAT SCI 362-0 Point, Line, and Planar Imperfections** Introduction to point defects, dislocations, and internal interfaces in crystalline solids. Interactions among point, line, and planar imperfections. Metals, ionic solids, semiconductors. Prerequisite: 315.

**MAT SCI 370-0 Biomaterials** Introduction to biomaterials from a materials science perspective, focusing on synthesis, structure, and properties. Materials used for human repair (permanent implants, devices, materials for drug delivery, tissue-engineering scaffolds); naturally occurring and engineered materials synthesized through biotechnology; biomimetic materials that copy microstructures from nature.

**MAT SCI 376-0 Nanomaterials** Introduction to structure-property relationships of materials processed at the nanometer scale. This highly interdisciplinary course is appropriate for undergraduate and graduate students in other departments. Prerequisite: 351-1 or consent of instructor.

**MAT SCI 380-0 Introduction to Surface Science and Spectroscopy** Surface spectroscopy, including Auger spectroscopy, photoemission, and LEED. Surface dynamics and thermodynamics. Electronic properties of surfaces and interfaces. Gas-surface interactions. Prerequisite: 351-1 or equivalent.

**MAT SCI 385-0 Image Analysis** Quantitative analysis of microstructures in materials from measurements on two-dimensional sections, transmission micrographs, and scanning electron micrographs.

**MAT SCI 390-0 Materials Design** Analysis and control of microstructures. Quantitative process/structure/property/performance relations with case studies. Computer lab for modeling multicomponent thermodynamics and transformation kinetics. Prerequisites: 315, 316-1,2, or consent of instructor.

**MAT SCI 391-0 Process Design** Processing of materials. Design and analysis of experiments to identify and optimize key parameters to control properties and performance. Resolving conflicting requirements. Statistical process control.

**MAT SCI 394-0 Honors Project in Materials Science** Independent study and/or research linked to 396. Comprehensive report on a specific area of modern materials science and engineering. Prerequisite: registration in department honors program.

**MAT SCI 395-0 Special Topics in Materials Science and Engineering** Topics suggested by students or faculty and approved by the department.

**MAT SCI 396-1,2 Senior Project in Materials Science and Engineering** To be taken in two consecutive quarters. Independent basic or applied research project, conceived and performed under the direction of a department faculty member. Prerequisite: senior standing in materials science program.

**MAT SCI 398-0 Introduction to Plasma Science and Processing Technology** Plasma production, plasma properties (microscopic and macroscopic); plasma characterization, transport phenomena, plasma processing of powders and advanced materials.

**MAT SCI 399-0 Special Problems in Materials Science** Individual problems, including library and design work; comprehensive report on a specific phase of modern materials science. Credit to be arranged.

## MECHANICAL ENGINEERING

The Department of Mechanical Engineering offers a broad range of programs leading to the bachelor of science degree in mechanical engineering.

Mechanical engineering has always meant engines and machinery, but the character of modern engines and machinery has changed enormously because of the ever-increasing demands of performance, compactness, reliability, and productivity. The early devices were built by ingenious mechanics, individuals who possessed the know-how to reduce these ideas to practice. Today, traditional know-how and creative ability are as necessary as ever but no longer sufficient in an increasingly competitive world. It has become necessary to also know why things occur and thus to be able to exert the proper guidance at the earliest stages of planning. Furthermore, in a world of finite resources and in a society increasingly aware of its environment, mechanical engineers must cope with not only the traditional concerns of efficiency and safety but also the undesirable effects of pollution. Clearly, the tools that future mechanical engineers need to possess must be more

sophisticated to allow the important but ever-subtle effects to be recognized and controlled.

Mechanical engineering plays a dominant role in a wide spectrum of industries, among them the transportation industry (automotive, rail, air, and marine), heavy machinery (machines producing other machines), the power industry, the environmental industry (heating, ventilation, and air-conditioning), robotics, the light precision-machine enterprises (optical, prosthetic devices, mechanical instruments, and the like), and numerous commercial product industries. Preparation for a career in mechanical engineering requires a basic understanding of the mathematical, physical, and engineering principles essential to planning, designing, and manufacturing new equipment.

The curriculum in mechanical engineering provides a broad fundamental education preparing students for direct entry into industry as well as further professional study. The first part of the curriculum is devoted to mathematics, physics, and chemistry. With this background, fundamental mechanical engineering subjects are studied. These include dynamics, solid mechanics, fluid mechanics, and thermodynamics followed by specialized subjects such as manufacturing, heat transfer, and automatic control. During the final two years, design courses, laboratory courses, and project courses allow students to acquire a taste for the complex task of designing, analyzing, and building a piece of "hardware." In particular, students become aware of the relationships among conceptual design, subsequent analysis (mathematical modeling), manufacturing, systematic experimentation, and final testing. Supporting courses in allied fields of science and engineering broaden the technical proficiency of mechanical engineering, while the elective courses in social sciences, fine arts, history, and philosophy enlarge their background in the problems of humanity.

### Elective Concentrations

The program in mechanical engineering is designed to appeal to students with a wide variety of interests and professional goals. By choosing the 5 required elective courses wisely, students can develop a highly personalized curriculum. Some areas of concentration are computer-aided design/computer-aided manufacturing, fluid mechanics, robotics, systems and control, and tribology. In addition, there are special concentrations: biomedical engineering, design, energy, intelligent mechanical systems, manufacturing, nanotechnology/MEMS, and solid mechanics.

The biomedical engineering concentration is open to students interested in the biological and medical applications of mechanical engineering procedures. Students in this concentration can also satisfy the entrance requirements of medical schools.

The design concentration focuses on product design with related conceptual and manufacturing processes.

The energy concentration emphasizes the mechanical aspects of energy conversion and management.

The intelligent mechanical systems concentration focuses on the design of devices featuring mechanical hardware interfaces to electronic hardware and software.

The manufacturing concentration is directed toward planning and selecting manufacturing methods, design for manufacture, computer-aided flexible automation and robotics, and increased efficiency and productivity of current and emerging manufacturing technologies.

The nanotechnology/MEMS concentration focuses on engineering at nanometer- and micrometer-length scales, including properties of materials and design and fabrication of devices.

The solid mechanics concentration focuses on the study of stress and strain in solid bodies, along with the application of computational methods for stress analysis.

A listing of courses that satisfy the elective requirements may be found in the department office.

### Facilities

A detailed description of facilities in the reconstructed mechanical engineering laboratories is available in the department office.

### Courses

**MECH ENG 201-0 Mechanics I** Equivalent force systems. Equilibrium of rigid bodies. Distributed forces and centers of gravity. Kinematics of rigid bodies in planar motion. Prerequisites: PHYSICS 135-1; concurrent registration in MATH 234.

**MECH ENG 202-0 Mechanics II** Dry friction. Kinetics of rigid bodies in planar motion. Kinetics of particles. Moments of inertia of rigid bodies. Prerequisite: GEN ENG 205-4.

**MECH ENG 220-0 Thermodynamics I** Basic definitions; Zeroth Law and the meaning of temperature; the First Law applied to flow and nonflow processes; the Second Law and its applications; properties of pure substances; equations of state, the Third Law of Thermodynamics, and introduction to cycles. Prerequisites: GEN ENG 205-3; concurrent registration in MATH 234.

**MECH ENG 224-0 Experimental Engineering I** Modern electronics; analog and digital circuit construction and conversion. Modern data acquisition involving temperature measurements, control of stepper motors, transient heat transfer, fluid mechanics, deformation of beams. Prerequisites: 220 and 241; 233 or EECS 270; 262 or CIV ENG 216.

**MECH ENG 233-0 Electronics Design** Design and prototyping of analog and digital electronic circuits using semiconductor devices: diodes, transistors, op amps, logic chips, etc. Optical and other sensors, power electronics, filters, and feedback control. Intended for engineers in all disciplines. Extensive hands-on construction and debugging.



**MECH ENG 240-0 Introduction to Mechanical Design and Manufacturing** Introduction to strategy and methods of designing, manufacturing, and testing of mechanical products. Material properties and selection methodology, engineering drawing and CAD, and simple manufacturing processes. Prerequisite: MAT SCI 201; CIV ENG 216.

**MECH ENG 241-0 Fluid Mechanics I** Fundamentals of fluid mechanics. Properties and statics of fluids. Kinematics and dynamics of fluid motion — continuity, momentum, and energy equations. Dimensional analysis, flow in closed conduits. Prerequisites: GEN ENG 205-4.

**MECH ENG 260-0 Mechanics of Sports** Applications of mechanics and mathematical modeling to sports: baseball, basketball, golf, soccer, swimming, running, and others. Introduction to the biomechanics of sports. Prerequisites: GEN ENG 205-2; MATH 230; or high school physics and consent of instructor.

**MECH ENG 262-0 Stress Analysis and Finite Elements I** Analytical and numerical methods for study of strains, stresses, and deformations in solids, with applications to design of mechanical components subjected to static and repeated loads. Prerequisite: GEN ENG 205-3.

**MECH ENG 314-0 Theory of Machines — Dynamics** Three-dimensional kinematics: rotation axes and mechanism analysis, rotation matrices and Euler's angles for rigid bodies. Three-dimensional kinetics: dynamics of particles, central force problems, dynamics of rigid bodies, rotational inertia matrices and principal axes, dynamics of mechanisms, the gyroscope and other torque-free problems. Prerequisite: 202.

**MECH ENG 315-0 Theory of Machines — Design of Elements** Factors influencing the proportioning of machine elements — stresses, deformations, and failure criteria as applied to shafts, springs, belts, bearings, gears. Lectures, laboratory. Prerequisite: MAT SCI 201; CIV ENG 216.

**MECH ENG 316-0 Mechanical Systems Design** Design of mechanical systems such as cams, multibar linkages, and precision machines. Design principles and best practices. Case studies and team-based projects. Prerequisite: 315.

**MECH ENG 317-0 Molecular Modeling and the Interface to Micromechanics** Introduction to modern computational methods for calculating thermodynamic, transport, and structural properties of materials. Computational chemistry, molecular simulation, and mesoscopic methods, with emphasis on tribology applications.

**MECH ENG 318-0 Multiscale Simulations** Introduction to multiscale modeling and simulation methods for studying material interactions in micro- and nanomechanical systems, as well as in electronic packaging. Hands-on exercises using equipment to characterize nanoscale properties and parallel computer codes.

**MECH ENG 319-0 Applications of Surface Science to Nanomechanics and Nanotribology** Overview of the composition, structure, chemical, and mechanical properties of

surfaces and how they affect surfaces mechanically and tribologically.

**MECH ENG 320-0 Micro- and Nanomechanical Properties of Surfaces** Micro- and nanomechanical interactions between surfaces, fractal nature of surfaces, interfacial forces, principles of micromechanics, characterization of surfaces using atomic-force microscopy, optical interferometry, and nanoindentation.

**CIV ENG 327-0 Finite Element Methods in Mechanics** See Civil Engineering.

**MECH ENG 333-0 Introduction to Mechatronics** Introduction to microprocessor-controlled electromechanical systems. Interfacing sensors and actuators to computers, electrical and mechanical prototyping, dissection of a commercial product. Final team project. Prerequisite: 233, EECS 221, or consent of instructor.

**MECH ENG 340-1,2,3 Computer-Integrated Manufacturing** Use of computers to improve productivity and reduce costs in the manufacture of discrete parts and assemblies.

**1.** Manufacturing processes: Analysis and evaluation of process usage in the contemporary manufacturing environment. Prerequisite: 240 or consent of instructor.

**2.** CAD/CAM: Geometric modeling, dimensioning systems, tolerances, design for manufacture, programming of machine tools. Prerequisites: 340-1; 262 or CIV ENG 216; or consent of instructor.

**3.** Manufacturing automation: sensors, actuators, and computers for automation; principles of computer control; programmable logic controllers; robotic devices; assembly automation. Prerequisite: 340-2 or consent of instructor.

**MECH ENG 341-0 Computational Methods for Engineering Design** Introduction to a wide range of computational techniques for engineering design. Modeling, simulation, optimization, design software, examples, and projects with emphasis on computational techniques for design and manufacturing related applications. Prerequisite: senior standing or consent of instructor.

**MECH ENG 342-0 Mechanics of Cutting and Forming** Introduction to plasticity theory applications to simple cutting and forming processes. Process analysis and design: force estimation, friction and redundant work effects, temperature-generated defects, and process and equipment limitations. Prerequisites: 262 or CIV ENG 216; senior standing.

**MECH ENG 346-0 Introduction to Tribology** Fundamentals of surface contact: surface topography, asperity contact, interfacial phenomena. Friction theories and wear mechanisms. Temperatures in sliding contacts. Hydrodynamic, hydrostatic, elastohydrodynamic, and boundary lubrication.

**MECH ENG 358-0 Experimental Engineering II** Optical metrology. Stress analysis, fluid flows, combustion, dynamics, and control. Use of optical interferometry, anemometers and pitot tubes, accelerometers, and other advanced measurement devices.

**MECH ENG 359-0 Reliability Engineering** Probability concepts and random variables. Failure rates and reliability testing. Wear-in, wear-out, random failures. Probabilistic treatment of loads, capacity, safety factors. Reliability of redundant and maintained systems. Fault tree analysis. Prerequisite: GEN ENG 205-4.

**MECH ENG 362-0 Stress Analysis** Theory of elasticity: elastic stability, principle of minimum potential energy, Rayleigh-Ritz methods. Introduction to finite element methods of stress analysis: computer implementation and use of commercial codes. Structural analysis of rods, beams, columns, and plates. Prerequisite: 262 or CIV ENG 216.

**MECH ENG 363-0 Mechanical Vibrations** Analysis of vibrations in single- and multidegree-of-freedom systems. Free and forced vibrations with various types of damping. Response to steady-state and transient excitations. Prerequisites: 202; GEN ENG 205-4.

**MECH ENG 365-0 Finite Elements for Stress Analysis** Introduction to the finite-element method for stress analysis, with emphasis on linear elasticity. Computer implementation of finite-element techniques: finite-element code development and modification; use of commercial codes. Prerequisite: 262, MATH 234, or CIV ENG 216.

**MECH ENG 366-0 Finite Elements for Design and Optimization** Numerical methods for interaction and optimal CAD. Fully stressed design; design sensitivity analysis and descent methods; optimality criteria to automated design. Prerequisites: senior standing; 365 or consent of instructor.

**MECH ENG 370-0 Thermodynamics II** Elementary classical thermodynamics, application of first and second laws of thermodynamics to power and refrigeration cycles, mixtures and solution, thermodynamic relations, chemical reactions, phase and chemical equilibrium. Prerequisite: 220.

**MECH ENG 373-0 Engineering Fluid Mechanics** Laminar and turbulent duct flows. Boundary layers and potential flows. Lift and drag forces. Thermodynamics and mechanics of compressible flow. Nozzle flows and choking. Wave motion and shock waves. Applications to fluid machinery. Prerequisite: 220, 241, or equivalent.

**MECH ENG 377-0 Heat Transfer** Fundamentals of heat transfer by conduction, convection, and radiation. Steady and transient heat conduction in solids. Forced and free convection in fluids. Properties of thermal radiation. Radiation heat transfer between solids. Solar radiation. Prerequisite: 241.

**MECH ENG 379-0 Elements of Combustion Engineering** Introduction to combustion processes, providing an understanding of flame processes as they relate to efficiency and pollution due to propulsion and power-generating systems. Diffusion and premixed flames, problems of ignition, quenching, flammability limits, and detonation. Prerequisite: senior standing in mechanical engineering or consent of instructor.

**MECH ENG 381-0 Introduction to Microelectromechanical Systems (MEMS)** Introduction to microelectromechanical devices, with an emphasis on their manufacturing and mechanical behavior. Materials properties, microfabrication technology, mechanical behavior of microstructures, design, and packaging. Case studies on sensors, wireless communications, fluidic systems, microengines, and biological devices. Prerequisites: CIV ENG 216 or consent of instructor.

**MECH ENG 382-0 Experiments in Micro- and Nanoscience and Engineering** Interdisciplinary topics spanning the physical and biological sciences and engineering. Seven integrated labs in which students acquire hands-on experience in various aspects of micro- and nanoscience and engineering: clean-room microfabrication, flow visualization in microchannels, nanomechanics, AFM and dip-pen nanolithography, multiphysics computational tools, and experimental techniques to evaluate micro- and nanoscale devices. Prerequisites: 381 or consent of instructor.

**MECH ENG 385-0 Nanotechnology** Manipulation of matter at the nanometer-length scale to produce useful devices and materials. Scientific and engineering properties of nanoscale systems. Emphasis on development of new techniques.

**MECH ENG 389-0 Molecular Machines in Biology** Introduction to engineering principles that govern cellular activities at the molecular level. Particular emphasis on the dynamics and kinematics of proteins, especially those that are locomotory or force generating. Lectures, team projects, and presentations. Prerequisite: MATH 230 or consent of instructor.

**MECH ENG 390-0 Introduction to Dynamic Systems** Modeling the dynamic behavior of physical systems. Concepts of causality, dependent and independent storages, and state. Introduction to bond graphs. Generation of state equations; analytical and computer simulation of system behavior. Application to problems of engineering interest. Prerequisite: GEN ENG 205-4.

**MECH ENG 391-0 Fundamentals of Control Systems** Mathematical modeling of automatic control systems. Open-loop and closed-loop control. Laplace transform techniques and transfer functions. Stability. Root locus technique, Bode plots, Nyquist criterion. Approaches to control system design, including PID and lead-lag compensation. Not to be taken for credit with or after EECS 360. Prerequisite: 390 or consent of instructor.

**MECH ENG 395-0 Special Topics in Mechanical Engineering** Topics suggested by students or faculty members and approved by the department.

**MECH ENG 398-0 Engineering Design** Product or system design projects carried out by small student groups. Project definition, conceptual and detailed design, evaluation, and documentation. Prerequisite: senior standing.

**MECH ENG 399-0 Projects** Special studies to be done under faculty direction. Credit to be arranged.

## Medill School of Journalism

The Medill School has epitomized excellence in journalism since 1921. Now, as the media face unprecedented change, Medill's undergraduate program is leading the way in preparing multimedia journalists who can help shape and navigate a dynamic media landscape. A Medill education ensures that students become skilled not only in writing, reporting, editing, production, and critical thinking but also in using multiple platforms (print, online, broadcast, and wireless) so that they can create compelling, high-impact journalism for increasingly interactive audiences.

Producing such versatile graduates requires broad faculty expertise. Medill is the only school in the country with a faculty ranked as a standard-setter in teaching both journalism and integrated marketing communications (IMC). Its Media Management Center is world renowned for pioneering research on what motivates readers, viewers, and listeners to use news media and for its work with industry professionals and leaders. Building on these strengths, the Medill curriculum emphasizes journalism excellence, multimedia storytelling, ethics and professional behavior, audience understanding, research, quantitative literacy, visual literacy, and creativity.

The bachelor of science in journalism (BSJ) degree program develops well-rounded students who are broadly educated in the liberal arts and sciences, knowledgeable about diverse cultures and the world beyond the United States, and ready for careers in the news media. Core journalism courses make up 30 percent of the curriculum, with opportunities to take 2 to 4 journalism electives that develop specialized skills and knowledge.

During their junior or senior year, students participate in the Journalism Residency, an academic internship that gives them invaluable real-world experience and networking potential within a media company. They receive course credit for working alongside professional mentors in one of more than 100 newspapers, magazines, broadcast stations, or online news operations across the United States and selected locations abroad, including South Africa.

Medill also offers a 5-unit certificate program in integrated marketing communications in which students develop skills for understanding and analyzing consumers in traditional markets and evolving digital communities and networks. Learning about message creation and delivery through a wide variety of media channels, they obtain the basic qualitative and quantitative analytical skills necessary in this field.

In 2008 Northwestern opened a branch campus in Qatar, where programs in journalism and communication are offered. As these programs develop, journalism students in Evanston may be eligible to spend a semester in Qatar to take electives and courses at other universities. Journalism Residencies may also be arranged in the Persian Gulf as a result of Medill's presence in the region. (For more on Northwestern University in Qatar, see Campuses in The University section of this catalog.)

Many Medill students find jobs in print, broadcast, or online journalism, public relations, or related fields directly after graduation. Some pursue graduate programs in medicine, law, and other fields, including the graduate programs at Medill. Medill offers two graduate programs. The master of science in journalism program offers advanced study in specialized subject reporting (such as business, politics, or science) and in specialized techniques (such as magazine writing and editing, interactive media, and videography). The master of science in IMC program has specialized concentrations in consumer insight and analysis and stakeholder communications.

Medill graduates stand among the leaders of the journalism and IMC professions. The school's 950 students — 650 undergraduates and 300 graduate students representing nearly every one of the United States and many countries — take pride in its ranking as one of the nation's preeminent journalism centers. They continue to distinguish Medill by winning national awards such as the Hearst Foundation's Journalism Awards and the Scripps Howard Foundation's "Top Ten Scholars" competition.

For more information, see the school's web site at [www.medill.northwestern.edu](http://www.medill.northwestern.edu).

## ACADEMIC POLICIES

### Requirements for the Degree of Bachelor of Science in Journalism

- A minimum of 45 units must be completed on the college level.
- Students must take the final 23 units at Northwestern and must complete the last three quarters of work while enrolled at Medill. (Exceptions: Students who are enrolled in a study abroad program that has been approved in advance by Northwestern's Study Abroad Office and by Medill are exempt from this requirement. Credit for summer work taken at other colleges or

universities may be counted as part of the final 23 units if approved in advance by Medill.) In addition to and independent of the requirements set by Medill, all students must satisfy the Undergraduate Residence Requirement. (See the Undergraduate Education section of this catalog.)

- Of the 45 units, at least 31 must be earned in courses outside of Medill, and at least 12 must be earned in Medill courses. Students with more than 45 units may take additional journalism units.
- Exceptions to any degree requirements must be approved by Medill's senior director of undergraduate education and teaching excellence. Petitions and rules for filing petitions are available in the Medill Office of Student Life.
- No course may be counted in more than one requirement category. (Exception: Medill students completing a double major in Weinberg College may apply courses used to meet Medill's distribution requirements toward the second major. Courses used for Medill's three-unit social science concentration, however, cannot be applied to a Weinberg College major.)

## Grade Requirements

Students must achieve a minimum grade point average (GPA) of 2.00 in all nonjournalism courses taken for a letter grade and a minimum GPA of 2.25 in journalism courses. In addition, all journalism students are subject to the following grade requirements:

- The journalism GPA reflects the grades of all journalism courses attempted (including F's).
- All Y and X grades, unless made up satisfactorily by the end of the subsequent quarter, are counted as F's.
- A grade of F and/or N earned twice in the same required course is grounds for mandatory transfer out of Medill.
- Before starting the Journalism Residency, students must
  - earn a grade of C or better in JOUR 301 Enterprise Reporting in Diverse Communities and in the presentation and storytelling courses taken before the residency
  - have a minimum GPA of 2.25 in those three courses plus JOUR 201-1 Reporting and Writing and JOUR 201-2 Multimedia Storytelling
- Students may earn a grade of D or worse in no more than 2 units in journalism and 3 units overall. Exceeding these limits is grounds for mandatory transfer out of Medill.
- When journalism courses are repeated, both grades are computed in the journalism GPA but only 1 unit may be applied toward the 45 units required for the BSJ. (Exception: a second unit of JOUR 373 Investigative Journalism may be applied toward the 45-unit requirement with consent of the instructor.)
- Students who do not meet the minimum GPA

requirements are placed on academic probation.

Continued poor performance results in mandatory transfer to another school within Northwestern or dismissal from the University.

Medill undergraduates are required to take the following courses for letter grades (A, A-, B+, B, B-, C+, C, C-, D, F):

- all distribution requirements
- all courses in the social science concentration
- all journalism courses (except those offered by the faculty under the P/N option)
- all foreign language courses taken to meet the global and diverse cultures requirement

Other courses may be taken pass/no credit (P/N) if that option is available. No more than 3 courses taken P/N may be counted toward the 45 units required for graduation (excluding the Journalism Residency). Only 1 course per quarter may be taken P/N.

## Medill Integrity Code

All Medill students are required to uphold the Medill Integrity Code, which, among others things, requires adherence to principles of honesty, fairness, and integrity in academic efforts and related professional media, journalism, and marketing communications work, whether students are in school, on an internship or a job, or acting as volunteers in a professional or academic activity.

## ACADEMIC OPTIONS

### Accelerated Master's Program

Students who exhibit exceptional ability in undergraduate work may apply to Medill's graduate division for early admission to the graduate journalism program. This program allows students to earn bachelor of science in journalism and master of science in journalism degrees in less than five years, or 12 to 15 quarters of full-time study. Candidates apply during their junior year and are admitted after the Journalism Residency on the basis of academic excellence and promise of success in journalism. Interested students are encouraged to begin planning for this option early in their undergraduate careers. Information and admission materials are available from the Medill Office of Graduate Admissions and Financial Aid.

### Five-Year BSJ/BMus and BSJ/BAMus Program

Northwestern offers extremely talented students the opportunity to earn in five years both a BSJ from the Medill School of Journalism and a BMus or BAMus degree from the School of Music. The joint program is intended to prepare exceptional students for journalism careers emphasizing music and arts reporting. Prospective students typically apply to this joint program while applying for undergraduate admission to Northwestern.

## Integrated Marketing Communications Certificate Program

The 5-unit integrated marketing communications (IMC) certificate program focuses on effective marketing communications strategies, tactics, and tools for an increasingly consumer-controlled environment. It prepares students for entry-level marketing communications positions in such fields as advertising, public relations, corporate communications, and direct, database, e-commerce, and interactive marketing.

The program covers traditional and digital areas of marketing communications. Students develop skills for understanding and analyzing consumers in traditional markets and in newly forming communities and networks. They learn about message creation and delivery through a wide variety of media channels, and they obtain the basic qualitative and quantitative analytical skills necessary in this field.

All students are eligible to apply to the certificate program, but qualified BSJ students in Medill receive priority. Students apply through a process described on the Medill web site. Admission is granted by Medill and is conditional upon the successful completion of 3 prerequisite courses. Students with sophomore status may take the 2 core courses — IMC 300 and 301 — before applying. Students admitted to the program have enrollment access to IMC courses during preregistration. Non-Medill students must have junior status before taking IMC writing courses and electives.

Students accepted into the certificate program must earn a minimum grade of B in IMC 300 and 301 and a minimum GPA of 2.7 in their prerequisites and in IMC 300 and 301. To successfully complete the program, students must earn a minimum grade of B in each IMC course.

### Certificate Requirements

#### Prerequisites (3 units)

- ECON 202 and 260
- 1 course chosen from ANTHRO 211, 235, 389; BUS INST 390; COMM ST 205, 360, 363, 380; ECON 322, 330 350; IEMS 383; POL SCI 348, 375; PSYCH 204, 228, 316, 335, 351, 385; SOCIOL 302, 303, 315, 332, 345)

#### Certificate program (5 units)

- 2 core courses: IMC 300 Consumer Insight and Analysis and IMC 301 Introduction to Integrated Marketing Communications
- 1 writing course: IMC 305 Message Strategy and Writing for Persuasion or 306 Introduction to Public Relations Strategies and Tactics

- 2 electives chosen from the following:

IMC 302 Senior Immersion Project  
 IMC 303 Marketing Research  
 IMC 304 Media and Message Delivery for Interactive Communications  
 IMC 307 Direct, Database, and E-Commerce Marketing and Interactive Communications  
 IMC 308 Marketing Models  
 IMC 309 Introduction to Entertainment and Gaming for Marketers

## Medill Undergraduate Program in Washington, D.C.

A select group of Medill students may study for one quarter in Medill's Washington, D.C., news bureau. The 15 students in the program take 2 intensive journalism courses (a two-day reporting experience covering Capitol Hill and a one-day political reporting seminar) and a political science course approved by Weinberg College.

This interdisciplinary program exposes students to the challenging dynamics of Capitol Hill, political organizations, think tanks, and federal agencies. It is best suited to students interested in learning more about the political process and covering important national and global issues from the nation's capital in a rigorous, web-driven reporting environment.

## Internships, Field Studies, and Special Programs

Internship employment by newspapers, magazines, radio and television stations, online media, governmental agencies, and advertising and public relations agencies may be available to Medill students, particularly during the summer. Many employers look to Medill for talented young journalists who can be introduced to their organizations through internships. The school encourages these opportunities as a means of enriching students' education but gives academic credit only for the Journalism Residency.

Medill students also may seek internship or field study credit through other schools at Northwestern. If these experiences involve work in journalism (newspaper, magazine, radio, television), mass communications, public relations, advertising, and/or direct marketing, students must receive prior approval from Medill's senior director of undergraduate education and teaching excellence before applying internship or field study credit to the 45 units required for the BSJ degree.

## Other Undergraduate Programs

Students in the Medill School also may enroll in courses offered by the Center for the Writing Arts, the Undergraduate Leadership Program, and the international studies and legal studies adjunct majors, among other areas (see the Cross-School Programs and Weinberg College sections of this catalog).



## ROTC Course Credits

ROTC course credits may be used as a portion of the 45 units required for graduation. These units are considered elective courses.

## Early Graduation

Students who plan to graduate early must notify the school in writing at least three quarters before the expected date of graduation. These students also should check with the Office of the Registrar to make sure they have fulfilled the Undergraduate Residence Requirement (see Undergraduate Education section of this catalog).

## STUDENT RESOURCES

### Advising

A student entering Medill is assigned a faculty adviser. The adviser offers support and guidance and is a valuable source of information regarding Medill courses and career goals. First-year students are required to meet with their advisers three times and to spend one quarter in an adviser-led discussion section of JOUR 202 Introduction to 21st-Century Media.

Staff members in Medill's Office of Student Life help students make the most of their time at the University. They assist students with a variety of issues, including course planning, degree requirements, registration, study abroad, interschool transfers, petitions to graduate, and resources within and outside Medill.

Medill Career Services helps students with career advising and employment services. It works with academic departments and individual faculty members, student services, employers, alumni, and other constituencies to enhance student and alumni career development. Career Services staff members provide information on careers, jobs, and internships through e-mails, an interactive web site, presentations, various campus media, and outreach and orientation programs.

### Activities

Through student publications and broadcast media, professional organizations, and convocations, Medill students have many journalistically related opportunities outside of the classroom.

Students write, edit, and manage the *Daily Northwestern*, *North by Northwestern*, and a variety of other print and online campus publications during the academic year as well as during Summer Session, when they publish the *Summer Northwestern*, a weekly newspaper. Although the University awards no academic credit for work on student-run publications that have no formal connection with Medill, these publications do provide valuable real-world experience to complement course work, Journalism Residencies, and summer internships.

Radio station WNUR-FM provides another outlet for student reporters, sportscasters, editors, and commentators, as does Northwestern News Network, a student-produced news program aired on local and Chicago public access and cable television channels and online. Writing skills are helpful in other extracurricular activities such as student government, the Waa-Mu Show, student-planned colloquia, and various literary publications.

Professional organizations that promote high standards among journalists maintain chapters on campus, including the Society of Professional Journalists, the National Association of Black Journalists, the Asian American Journalists Association, the National Association of Hispanic Journalists, and the National Lesbian and Gay Journalists Association. Other organizations for students interested in journalism include Blackboard and the Communications Residential College. Top scholars in the senior and graduate classes are initiated into Kappa Tau Alpha, the national journalism honorary society.

## ACADEMIC PROGRAM

### Medill Curriculum Requirements

#### *Arts and Sciences (23 units)*

See the *Medill Undergraduate Handbook* for a complete list of courses that fulfill these requirements.

#### **Distribution requirements (14 units)**

- **Art or art history (1 unit)**
- **Economics (1 unit)**
- **History (3 units)**

at least 1 course must be in U.S. history and at least 1 course in non-U.S. history

- **Literature (3 units)**

3 courses chosen from any department in the University dealing with literature, either in English or in a foreign language

- **Political science (2 units)**

1 course in American government and 1 course in international relations or international studies

- **Religion, philosophy, or ethics (1 unit)**

1 course (not including courses in logic)

- **Science, mathematics, or logic (3 units)**

1 course in statistics chosen from ANTHRO 362;

BME 220; IEMS 201; MATH 202, 285; POLI SCI 310, 311, 315; PSYCH 201; SESP 210; SOCIOL 226, 303, 329

2 courses in astronomy, biological sciences, chemistry, computer science, electrical engineering and computer science, geological sciences, mathematics, or physics or from the list above or chosen from ANTHRO 213; CIV ENG 206; COG SCI 210; GEOG 211, 235, 313, 341; MAT SCI 101; PHIL 150, 250, 350, 351

**Social science concentration (3 units)**

Three courses in anthropology, economics, gender studies, history, political science, psychology, or sociology. No more than 1 unit may be at the 100 level; at least 1 unit must be at the 300 level. No more than 1 unit of field study or independent study credit and no AP credits may be applied toward the social science concentration. Students may not double-count economics, history, or political science courses toward both the distribution requirements and the social science concentration. Students should check with an adviser about whether the social science courses they have chosen also meet the global and diverse cultures requirement. Note: INTL ST 201-1,2 may be counted toward the social science concentration in political science.

**Elective concentration (6 units)**

Six courses in any Weinberg College department outside the area selected for the 3-unit social science concentration. No more than 1 unit may be at the 100 level; at least 2 units must be at the 300 level. (Exceptions: Exempt from these requirements are students concentrating in astronomy, biological sciences, chemistry, geological sciences, mathematics, physics, or a foreign language and students completing a minor or a second major in Weinberg College or an adjunct major in a cross-disciplinary area offered through Weinberg College, such as business institutions, international studies, gender studies, or legal studies. Permission to pursue a second or adjunct major must be secured from the appropriate Weinberg College department.) No more than 1 unit of field study or independent study credit and no AP credits may be applied toward the elective concentration. Students should check with an adviser about whether the courses they have chosen also meet the global and diverse cultures requirement.

**Electives (8–10 units)**

Students may take any non-Medill credit course to explore or extend their interests.

**Global and Diverse Cultures**

The Medill faculty believes that all students should understand and appreciate diverse cultures and the world beyond the United States. Consequently, 11 of the units chosen to meet the arts and sciences and elective requirements must be related to the study of global and diverse cultures.

Three of these units must be in a foreign language, unless students can demonstrate proficiency as defined by Weinberg College. The other 8 units must focus on one or more of the following themes: gender, race, age, class, ethnicity, religion, or disability. Students choose from a Medill-approved list of courses offered throughout the University but may appeal to Medill's senior director of undergraduate education and teaching excellence if they believe other courses qualify.

**Journalism (12–14 units)****Core (5 units)***Freshman year*

JOUR 201-1 Reporting and Writing  
JOUR 201-2 Multimedia Storytelling  
JOUR 202 Introduction to 21st-Century Media

*Sophomore year*

JOUR 301 Enterprise Reporting in Diverse Communities

*Junior year*

JOUR 370 Media Law and Ethics

**Journalism Residency (5 units)**

Students begin pursuing one of the following programs during late sophomore year or junior year:

*Newspaper/Online*

- JOUR 310 Media Presentation: Newspaper/Online
- 1 of the following:
  - JOUR 320 Storytelling: Interactive News
  - JOUR 321 Storytelling: Magazine and Feature Writing
  - JOUR 322 Storytelling: Videography and Broadcast
- 3 of the following:
  - JOUR 345 Journalism Residency in Newspaper/Online: Reporting (1 or 2 units)
  - JOUR 346 Journalism Residency in Newspaper/Online: Presentation (1 or 2 units)

*Magazine*

- JOUR 311 Media Presentation: Magazine
- 1 of the following:
  - JOUR 320 Storytelling: Interactive News
  - JOUR 321 Storytelling: Magazine and Feature Writing
  - JOUR 322 Storytelling: Videography and Broadcast
- 3 of the following:
  - JOUR 355 Journalism Residency in Magazine: Writing (1 or 2 units)
  - JOUR 356 Journalism Residency in Magazine: Presentation (1 or 2 units)

*Broadcast*

- JOUR 312 Media Presentation: Videography and Broadcast
- 1 of the following:
  - JOUR 320 Storytelling: Interactive News
  - JOUR 321 Storytelling: Magazine and Feature Writing
  - JOUR 322 Storytelling: Videography and Broadcast
- 3 of the following:
  - JOUR 365 Journalism Residency in Broadcast: Reporting (1 or 2 units)
  - JOUR 366 Journalism Residency in Broadcast: Production (1 or 2 units)

### Electives (2–4 units)

Students must take at least 2 journalism electives from as many of the following categories as their program allows. Electives may be taken as early as sophomore year — particularly if students take 4 electives — and may be chosen regardless of a student's Journalism Residency program. For example, a student pursuing a Journalism Residency in broadcast may take courses in magazine writing, newspaper reporting, investigative journalism, IMC, audio and video, or a combination.

#### *Elective Category I: Storytelling Techniques*

JOUR 310 Media Presentation: Newspaper/Online

JOUR 311 Media Presentation: Magazine

JOUR 312 Media Presentation: Videography and Broadcast

JOUR 320 Storytelling: Interactive News

JOUR 321 Storytelling: Magazine and Feature Writing

JOUR 322 Storytelling: Videography and Broadcast

JOUR 342 Advanced Online Storytelling

JOUR 368 Documentary

JOUR 371 Journalism of Empathy

JOUR 375 Literary Journalism

JOUR 376 Media Design

JOUR 378 Photojournalism

#### *Elective Category II: Subject Areas*

JOUR 372 International Journalism: South Africa

JOUR 373 Investigative Journalism

JOUR 380 Legal Reporting

JOUR 381 Business Reporting

JOUR 382 Environmental Reporting

JOUR 383 Health and Science Reporting

JOUR 384 Building Interactive Communities

JOUR 390 Special Topics

JOUR 399 Independent Study

#### *Elective Category III: Media Marketing Communications*

IMC 300 Consumer Insight and Analysis

IMC 301 Introduction to Integrated Marketing Communications

IMC 304 Media and Message Delivery for Interactive Communications

IMC 305 Message Strategy and Writing for Persuasion

IMC 306 Introduction to Public Relations Strategies and Tactics

## COURSES

### *Integrated Marketing Communications*

**IMC 300-0 Consumer Insight and Analysis** Introduces students to concepts and theories that explain and predict consumer behavior. Emphasizes customer-centric marketing and communications. Topics include understanding customer wants and needs and assessing and enhancing customer satisfaction. Prerequisites: JOUR 301; for non-Medill students, sophomore standing.

**IMC 301-0 Introduction to Integrated Marketing Communications** Engaging consumers in an increasingly customer-controlled environment through advertising, public relations, direct and digital marketing, and other forms of communication, such as packaging, “buzz,” and word-of-mouth marketing. The role of integrated marketing communications in the overall marketing process and in creating and maintaining a brand: positioning products, understanding communication theory and consumer behavior, measuring and evaluating the influence of advertising, thinking critically about new creative strategies, and developing appropriate media plans. Prerequisites: JOUR 301; for non-Medill students, sophomore standing.

**IMC 302-0 Senior Immersion Project** Students work with a real client/sponsor to develop a total marketing communications program. Final product consists of a research report that outlines the learning and insight that led to the strategic, creative, and marketing recommendations; a client presentation; and a project book detailing the research, analysis, and recommendations of the plan, including strategy, creative execution, media use, and other integrated communications activities. Prerequisites: IMC 300 and 301; 305 or 306; 303, 304, 307, 308, or 309; admission to IMC certificate program.

**IMC 303-0 Marketing Research** Applications of modern marketing research procedures to a variety of marketing problems. Students develop basic skills in conducting and evaluating marketing research projects. Emphasizes problem formulation, research design, methods of data collection (including qualitative, quantitative, primary, and secondary data-collection methods and instruments, sampling, and field operations), data-analysis techniques, and the presentation of results. Prerequisites: IMC 300, 301, and admission to IMC certificate program; for non-Medill students, junior standing as well.

**IMC 304-0 Media and Message Delivery for Interactive Communications** Focuses on engaging an audience and communicating effectively. Strategies for reaching and engaging affinity groups, audiences, and stakeholders; alternative media strategies to connect to the increasingly digital consumer; the economics and technologies of delivery. Prerequisites: IMC 300 or 301; for non-Medill students, IMC 300, 301, admission to IMC certificate program, and junior standing.

**IMC 305-0 Message Strategy and Writing for Persuasion** Writing and publishing skills for the corporate world: press releases for print and web, vodcasts and video packages, argumentation and advocacy pieces, executive summaries and speeches, corporate web pages, quarterly earnings reports, podcasts, viral video, blogs, open-source text, and metaverse (Second Life). Prerequisites: IMC 300 or 301; for non-Medill students, IMC 300, 301, admission to IMC certificate program, and junior standing.

**IMC 306-0 Introduction to Public Relations Strategies**

**and Tactics** The role of public relations, one of the fastest-growing professional fields within for-profit, not-for-profit, and government organizations. Emphasizes communications and management strategies to develop relationships with a wide range of stakeholders. Covers traditional and contemporary communication channels, including blogs, YouTube, podcasts, Second Life, social communities, newspapers, magazines, and broadcast outlets. Course consists of lecture and discussion sessions and a writing lab. Prerequisites: IMC 300 or 301; for non-Medill students, IMC 300, 301, admission to IMC certificate program, and junior standing.

**IMC 307-0 Direct, Database, and E-Commerce Marketing**

**and Interactive Communications** Planning direct-marketing programs; methods of acquiring customers through search, e-mail, direct mail, direct-response advertising, list management, and lead-generation programs; the economics of customer retention and lifetime value; retention strategies and tactics, including e-mail marketing, loyalty programs, and proactive and reactive contacts; customer databases and overlays; and testing for on- and off-line strategies and tactics. Prerequisites: IMC 300, 301, and admission to IMC certificate program; for non-Medill students, junior standing as well.

**IMC 308-0 Marketing Models** Explores the use of probabilistic models and customer databases to improve the design, management, and execution of marketing programs. Topics vary by instructor and may include predictive modeling, recommendation agents, segmentation methods, marketing-mix models, and customer lifetime-value models. Prerequisites: IMC 300, 301, admission to IMC certificate program, and 2 courses in statistics; for non-Medill students, junior standing as well.

**IMC 309-0 Introduction to Entertainment and Gaming for Marketers** The business and financial backgrounds of the entertainment industry, including the strategic and tactical use of entertainment and events in integrated marketing communication programs and evaluation of their success and financial return. Students explore the role that amusement and entertainment play in the lives of consumers. Prerequisites: IMC 300, 301, and admission to IMC certificate program; for non-Medill students, junior standing as well.

*Journalism*

**JOUR 201-1 Reporting and Writing** Introduction to the fundamentals of journalism necessary for any platform or storytelling format. Includes news and information gathering; story construction; using basic numbers and data to tell a story and assess information; editing and presentation; ethical issues while covering stories; and visual literacy. The course emphasizes drills and practice in basic reporting and writing skills and working on deadline.

**JOUR 201-2 Multimedia Storytelling** Introduction to multimedia skills and how to use them to create more effective web-based journalism. Skills include still photography, photo editing, audio recording, audio editing, audio slide-shows, video shooting, video editing, video storytelling, web page creation and design, and basic exposure to Flash.

**JOUR 202-0 Introduction to 21st-Century Media** Exposes students to the range of journalism genres and media in which they are practiced; how and why journalism practices and industries have evolved and continue to evolve in the digital age; how people access, use, and participate in news and information. Includes modules on ethical decision making and professional behavior. The course connects current trends with the history of journalism.

**JOUR 301-0 Enterprise Reporting in Diverse Communities**

Advanced-skills course on in-depth multimedia reporting and storytelling. By getting to know a specific audience within a Chicago neighborhood and experimenting with a variety of storytelling techniques, students produce cross-platform content for print, broadcast, and the web. The course also provides training in reporting for and about diverse audiences. Prerequisites: JOUR 201-1,2 and sophomore standing.

**JOUR 310-0 Media Presentation: Newspaper/Online** Essentials of newspaper editing and online production, including headlines, page layout and design, photo editing, information graphics, and appropriate electronic tools. Prerequisite: JOUR 301.

**JOUR 311-0 Media Presentation: Magazine** Fundamentals of editing magazine copy and graphics, with emphasis on precision, style, and structure for print and online products. Provides an overview of the magazine industry — both traditional and increasingly interactive — and the role of magazines in society. Prerequisite: JOUR 301.

**JOUR 312-0 Media Presentation: Videography and Broadcast** Writing and producing broadcasts for television, the web, and alternative digital platforms (such as PDAs) using the appropriate computer and editing equipment, news wires, and video feeds. Emphasis on the editorial decision-making process. Prerequisite: JOUR 301.

**JOUR 320-0 Storytelling: Interactive News** The craft of digital storytelling, with emphasis on creating compelling packages for the web and other digital platforms (such as PDAs) using a variety of narrative formats, interactive tools (such as Flash), and other digital content, including blogs, RSS feeds, and citizen journalism. Prerequisites: JOUR 301; JOUR 310, 311, or 312.

**JOUR 321-0 Storytelling: Magazine and Feature Writing**

The craft of magazine and feature writing, with emphasis on character, scene and theme development, story architecture, voice, alternative story forms, in-depth reporting, public service journalism, and marketing ideas for articles. Prerequisites: JOUR 301; JOUR 310, 311, or 312.

**JOUR 322-0 Storytelling: Videography and Broadcast**

The craft of audio-video storytelling for television and the web, including practice in field reporting and producing packages ranging from one- to three-minute television news pieces to longer alternative audio-video formats for the web and other digital platforms. Prerequisite: JOUR 301; JOUR 310, 311, or 312.

**JOUR 342-0 Advanced Online Storytelling** Students work in groups throughout the quarter on a single reporting project that incorporates video, audio, interactivity, and photography. The class discusses and critiques existing work from media professionals. Students must have experience with Adobe Flash and nonlinear digital video editing software. Prerequisite: 320.

**JOUR 345-0 Journalism Residency in Newspaper/Online: Reporting** (1 or 2 units) Hones reporting and newswriting skills in a newsroom through practical assignments, including multimedia opportunities whenever possible, under deadline pressure and close editorial supervision. Prerequisites: JOUR 310; JOUR 320, 321, or 322. Taken with JOUR 346.

**JOUR 346-0 Journalism Residency in Newspaper/Online: Presentation** (1 or 2 units) Hones skills in news editing, headline writing, page layout/design, and graphics for print and the web in a newsroom environment through practical assignments under deadline pressure and close editorial supervision. Prerequisites: JOUR 310; JOUR 320, 321, or 322. Taken with JOUR 345.

**JOUR 355-0 Journalism Residency in Magazine: Writing** (1 or 2 units) Exploration of aspects of magazine writing and reporting. Practical assignments, including print and web content whenever possible, in a magazine office with deadline pressure and close professional supervision. Prerequisites: JOUR 311; JOUR 320, 321, or 322. Taken with JOUR 356.

**JOUR 356-0 Journalism Residency in Magazine: Presentation** (1 or 2 units) Exploration of aspects of magazine editing, graphics, and publishing for print and/or online products. Practical assignments in a magazine office with deadline pressure and close professional supervision. Prerequisites: JOUR 351; JOUR 320, 321, or 322. Taken with JOUR 355.

**JOUR 365-0 Journalism Residency in Broadcast: Reporting** (1 or 2 units) Gathering television news in the field; writing scripts, readers, voiceovers, vosots, packages, and on-camera news for reporters and anchors. Practical assignments in a broadcast newsroom under close professional supervision. Prerequisites: JOUR 312; JOUR 320, 321, or 322. Taken with JOUR 366.

**JOUR 366-0 Journalism Residency in Broadcast: Production** (1 or 2 units) The television production process: working with the assignment desk; editing voiceovers, sound bites, and packages; possibly producing entire shows. Practical assignments in a broadcast newsroom under close

professional supervision. Prerequisites: JOUR 312; JOUR 320, 321, or 322. Taken with JOUR 365.

**JOUR 368-0 Documentary** Formats used in audio and video documentary production, with emphasis on transforming a major research effort into a radio or broadcast program or a multipart series. Prerequisites: JOUR 301.

**JOUR 370-0 Media Law and Ethics** The legal and ethical framework defining media freedoms and constraints in the United States, including copyright and trademark issues. Historical context and focus on the evolution of constitutional, statutory, judicial, and ethical standards. Prerequisite: JOUR 301.

**JOUR 371-0 Journalism of Empathy** Exploration of writing and reporting about people and places neglected and misunderstood by mainstream America. Prerequisite: senior standing.

**JOUR 372-0 International Journalism: South Africa** An introduction to South Africa, with a special focus on the country's newspapers, magazines, and broadcast outlets. Students compare and contrast various aspects of South African and U.S. life — especially the history of the HIV/AIDS pandemic — and explore historical, political, and cultural connections between the two countries. Required for South Africa Journalism Residency. Prerequisites: JOUR 301 and junior standing for Medill students; consent of instructor for others.

**JOUR 373-0 Investigative Journalism** The news media in their adversarial role in public affairs reporting, including field reporting of the legal system and possible miscarriages of justice; investigative and interpretative reporting and advocacy journalism; the impact of the news media on public opinion and policy making. Prerequisite: senior standing and consent of instructor. A second unit of 373 may be counted toward the 45 units required for the BSJ with consent of instructor.

**JOUR 373-1 Investigative Reporting** Examines the methods and techniques of investigative reporting through hands-on practice — brainstorming, framing the reporting, digging through documents, analyzing numbers, tracking down sources, writing, and rewriting. Prerequisite: JOUR 301.

**JOUR 375-0 Literary Journalism** A survey of the work of several print and broadcast journalists to explore the intersection of journalism and literature; analysis of the relationships between form and content within the historical contexts in which pieces were produced. Prerequisite: Journalism Residency completed.

**JOUR 376-0 Media Design** Advanced tools of layout, typographic contrast, and color theory, including creating infographics, with a focus on current approaches to newspaper, magazine, web, and newsletter design. Prerequisite: JOUR 310, 311, or 312.

**JOUR 378-0 Photojournalism** Advanced skills and practice in telling stories with photographs, photo slideshows, photo galleries, and audio slideshows. Ethics as it applies to photojournalism. Prerequisite: JOUR 301.



**JOUR 380-0 Legal Reporting** Students gain in-depth knowledge of legal issues while covering and writing stories related to the courts and the law. Students are encouraged to take this course in conjunction with a non-Medill course complementing the subject matter. Prerequisite: JOUR 301.

**JOUR 381-0 Business Reporting** Students gain in-depth knowledge of business and economic issues while covering and writing stories related to business. Students are encouraged to take this course in conjunction with a non-Medill course complementing the subject matter. Prerequisite: JOUR 301.

**JOUR 382-0 Environmental Reporting** Students gain in-depth knowledge of environmental issues while covering and writing stories related to the environment. Students are encouraged to take this course in conjunction with a non-Medill course complementing the subject matter. Prerequisite: JOUR 301.

**JOUR 383-0 Health and Science Reporting** Students gain in-depth knowledge of health and science issues while covering and writing stories related to health, science, and technology. Students are encouraged to take this course in conjunction with a non-Medill course complementing the subject matter. Prerequisite: JOUR 301.

**JOUR 384-0 Building Interactive Communities** Advanced course in creating digital “playgrounds,” including interactive web sites and games, for users to interact with one another. Managing a variety of community and “pull” content.

**JOUR 388-0 Internship** (0 units) Student-initiated internships in journalism. Supervised by Medill’s career services director. Prerequisites: sophomore standing and consent of Medill’s Director of Career Services.

**JOUR 388-1 Undergraduate Research** Student-initiated research projects, such as the Eric Lund Global Reporting and Research Grant projects.

**JOUR 390-0 Special Topics** Specialized, experimental courses offered from time to time by faculty. Prerequisites: vary depending on the course.

**JOUR 399-0 Independent Study** Academic work sponsored and supervised by a faculty member working one-on-one with a student. Prerequisite: consent of Medill’s senior director of undergraduate education and teaching excellence.

## Henry and Leigh Bienen School of Music

One of the oldest degree-granting music institutions in the United States, Northwestern University's Henry and Leigh Bienen School of Music combines a nationally ranked music program of conservatory-level intensity with the academic rigor and scholarly resources found only at a world-class private research university. The Bienen School of Music is a professional school within the University; students accepted into the school are also accepted into the University. Entering freshmen rank on average in the top 10 percent of their high school class and show highest-level achievement in academics as well as music. The school believes that by carefully developing this outstanding musicianship and keen intelligence while nurturing a curiosity about the world, we can best encourage the emergence of each student's unique creative voice.

All students at the Bienen School of Music are expected to grow as artists and as people. They are encouraged to explore in depth other areas of interest, drawing on the vast resources of Northwestern's other schools, and to develop the critical thinking and communication skills necessary for a successful career in music.

Key to all degree programs is intensive one-on-one training with a celebrated faculty that includes members of the Chicago Symphony and Lyric Opera of Chicago Orchestras, internationally acclaimed soloists, sought-after conductors, and distinguished scholars and clinicians. Students work in small classes with these dedicated teachers and musicians in a curriculum that comprises music history and theory, aural and piano skills, instrumental and voice lessons, and electives. Special programs include a five-year double-degree curriculum — enabling students to earn a degree in music as well as one in engineering, journalism, or arts and sciences — and the ad hoc (self-designed) degree, an option offered by no other major music school. Additionally, the world-class music making and other cultural resources of downtown Chicago provide exceptional opportunities for learning outside the classroom.

Performing and research opportunities abound at Northwestern. Students may participate in 16 ensembles and chamber groups and have access to more than 400 performances each year, including three critically acclaimed professional series as well as master classes given by such notables such as Richard Goode, Leon Fleisher, Renée Fleming, Renata Scotto, Oscar Ghiglia, and Janos Starker. In addition, the school sponsors the biennial Michael Ludwig Nemmers Prize in Music Composition and the Jean Gimbel Lane Prize in Piano Performance, which regularly

bring world-renowned composers and pianists to campus. The music collection in Deering Library comprises more than 142,000 books, scores, journals, and microfilms, and the Listening Center boasts 53,000 sound recordings. The library's collection of post-1945 music is considered the finest in the world and is frequently used by scholars from around the world.

A Bienen School of Music education provides students with skills and values — superb musicianship, a mastery of communication, a sense of discipline, a commitment to excellence — that prepare them for success wherever their interests may lead.

The Bienen School of Music is a founding member of the National Association of Schools of Music, which fully accredits all its degree programs.

For more information see [www.music.northwestern.edu](http://www.music.northwestern.edu).

## ACADEMIC POLICIES

### Programs of Study

The Bienen School of Music offers programs leading to the professional degrees of bachelor of music, master of music, graduate certificate in performance, and doctor of music. The school also offers a nonprofessional degree, the bachelor of arts in music.

The curriculum allows flexibility for students while providing an education that is basic for all musicians. Applicants in all areas who are accepted by the Bienen School of Music enter directly into a program of specialization that begins in the freshman year. The core studies, taken by all students, require the acquisition of minimum competencies and provide fundamental and essential experiences that complement the specialized studies in the declared major. Students are also required to complete studies in a number of allied subjects throughout the University and are given significant opportunities to explore other interests with free electives.

### *Bachelor of Music*

Courses of study leading to the bachelor of music degree include majors in piano, strings, voice, winds and percussion, jazz studies, music cognition, music composition, music education, musicology, music technology, music theory, and music academic studies. It is also possible to design an ad hoc major program that cuts across specializations to meet a particular student's needs and career ambitions. Ad hoc majors are designed in consultation

with faculty and area professionals with expertise in the particular area of interest; specializations have included areas such as arts administration, music criticism, music theater production, and popular musicology. For degree requirements for the bachelor of music, see next column.

### *Bachelor of Arts in Music*

The bachelor of arts in music is a nonperformance degree that offers a broad liberal arts education with a major in music. The requirements of this degree are essentially identical to those for the BA in the Weinberg College of Arts and Sciences. Within the degree's focus on music, there are a wide range of possibilities for study, from cultural musicology to cognitive studies of music and from music composition to advanced technology for music. This degree is an excellent stepping-stone to further education in music or to any career for which a knowledge of music brings depth and enrichment. The BA curriculum offers considerable latitude in designing a sequence of courses to suit the student's interests and goals. A key feature for the student is the planning and execution of a senior project. For degree requirements for the bachelor of arts in music, see next column.

### *Five-Year BA/BMus*

Students accepted into the combined Weinberg College of Arts and Sciences–Bienen School of Music program may simultaneously earn a BA degree from Weinberg College and a BMus degree from the Bienen School of Music. They must complete all Weinberg degree requirements, including at least 30 Weinberg courses, as well as all Bienen bachelor of music degree requirements, including at least 30 music courses. Fulfilling both school's requirements usually takes five years of full-time study, and the Undergraduate Residence Requirement of 15 quarters is obligatory (see Undergraduate Education).

Participants in this combined program must be accepted by both the Bienen School of Music and Weinberg College of Arts and Sciences. Interested students should consult with the associate dean for undergraduate studies in Weinberg College and the assistant dean for admission and student affairs in the Bienen School of Music.

### *Five-Year BS/BMus or BS/BAMus*

Students accepted into the combined McCormick School of Engineering and Applied Science–Bienen School of Music program may simultaneously earn a BS degree from the McCormick School and a BMus or BAMus degree from the Bienen School of Music. They must complete all McCormick School degree requirements, including at least 36 McCormick courses, as well as all Bienen School of Music bachelor of music or bachelor of arts in music degree requirements, including at least 30 courses. Fulfilling both music and engineering requirements usually takes five

years of full-time study, and the Undergraduate Residence Requirement of 15 quarters is obligatory (see Undergraduate Education).

Participants in this combined program must be accepted by both the Bienen School of Music and the McCormick School. Interested students should consult with the undergraduate engineering dean's office in the McCormick School and the assistant dean for admission and student affairs in the Bienen School of Music.

### *Five-Year BMus/BSJ or BAMus/BSJ*

Northwestern offers extremely talented students the opportunity to earn in five years both a BMus or BAMus degree from the Bienen School of Music and a BSJ degree from the Medill School of Journalism. The joint program is intended to prepare exceptional students for journalism careers emphasizing music and arts reporting. Prospective students typically apply to this joint program while applying for undergraduate admission to Northwestern.

## **Degree Requirements**

### *Bachelor of music (50–52.5 units)*

Candidates for the degree of bachelor of music must complete 50–52.5 units, depending on the minimum number of courses required for their major. The degree can usually be completed within four years. All students in the bachelor of music degree program take a core set of music requirements (19 units of credit) in addition to the requirements for the individual major.

- Music core requirements (19 units)
  - 2 years of music theory (3 units)
  - 2 years of aural skills (3 units)
  - 1 year of keyboard skills (1.5 units)
  - 6 courses in music history (6 units)
  - 1 course in conducting (1 unit)
  - 1 year of ensemble (1.5 units)
  - 1 year of 100-level performance study (3 units)
- General education (nonmusic) (12 units; 8 units for music education majors)
- Free electives (music or nonmusic) (0–3 units)
- Major studies requirement (16–27.5 units)

### *Bachelor of arts in music (45 units)*

Candidates for the degree of bachelor of arts in music must complete 45 units.

- Music core requirements (10 units)
  - 2 years of music theory (3 units)
  - 1 year of aural skills (1.5 units)
  - 4 courses in music history (4 units)
  - 1 year of ensemble (1.5 units)
- Additional music courses (10 units)
- General education (nonmusic) (13 units)
- Nonmusic electives (6 units)
- Foreign language (6 units)

### *Other Requirements*

All freshmen in the Bienen School of Music must participate in band, choir, or orchestra, as appropriate to their principal auditioned instrument. For their last 24 units, all students must be registered at Northwestern; for their last 12 units, they must be registered in the Bienen School of Music. Credit toward graduation is generally not granted for summer work taken at other colleges or universities as part of the last 24 units.

Music majors must earn a grade of C or above in all courses required in the major, including all core requirements and all specialization courses, in order to count those courses toward graduation requirements. A grade of D or above (including P grades for four-year students) may be used to fulfill distribution requirements and electives. If a student receives a D in a major course, then takes that course a second time and receives a C grade or above, the initial D grade remains on the permanent record and cannot count toward elective requirements. The second (improved) grade does not replace the first, and the same course cannot be counted twice in the degree. A maximum of 6 quarter-courses in nonmusic subjects taken under the P/N grade option may be counted toward the degree. Music students may not take music courses under the P/N grade option, except for those courses graded solely with P/N grades.

If students interrupt their program of study for an extended period of time and degree requirements are changed during this period, they will normally be held to the new requirements.

Every candidate for a degree must file an application for the degree one year in advance of the date of graduation.

Students coming to Northwestern University for a second undergraduate degree must transfer at least 9 units of credit in music, audition for admission at the 300 level, complete the general education distribution requirement with transfer credit, and comply with the 24-unit residency requirement.

In addition to and independent of the requirements set by the Bienen School of Music, all students must satisfy the Undergraduate Residence Requirement (see Undergraduate Education).

### **Music Performance Study**

The Bienen School of Music offers instruction for majors in piano, strings, voice, winds and percussion, and jazz studies. Students should consult their program coordinators for the assignment of an instructor. Consent of the instructor, program coordinator, and department chair as well as concurrent registration in ensemble are required. Elective performance study assignments are made by the appropriate program coordinator and department chair as space is available.

### **Attendance Policy**

Students are expected to attend all sessions of courses and ensembles for which they are registered. It is the responsibility of students enrolled in the Bienen School of Music to acquaint themselves and comply with the attendance policy of their departments, class instructors, and ensemble conductors. In addition, students who are absent from classes for three or more consecutive days because of illness are required to notify the Office of Student Affairs.

Outside professional opportunities may arise for music students. If such an opportunity directly interferes in any way with curricular responsibilities, students must first obtain permission from faculty of record for courses potentially affected, including classes, opera, and ensembles, along with the signature of the program coordinator and a signature from one of the cochairs of the Department of Music Performance.

Failure to comply with these regulations can be cause for failure in the courses or ensembles for which a student is registered during that quarter.

## **ACADEMIC OPTIONS**

### **Double Major**

Students may earn a double major in four years by fulfilling the requirements of both majors. Typically, the double major within the Bienen School of Music combines a specialization in a performance area with one in an academic area or composition, although double majors in two academic areas are also possible. A double major in two performance areas is generally not permitted. Four-year bachelor of music students may also complete a second major outside the music school but may earn only one bachelor's degree. Bienen School of Music students who choose to leave the school for another school at Northwestern may still complete a music major as a second major, although in these cases no degree from the Bienen School will be awarded.

Bachelor of arts in music candidates may double major with any major offered in the Weinberg College of Arts and Sciences but may earn only one bachelor of arts degree.

### **Minor Programs**

Bienen School of Music minor programs include a minimum of 6 and a maximum of 9 courses, of which a minimum of 5 courses are not double counted in the major. Students must receive a grade of C or above in all courses counted toward the minor; no P/N grades are allowed. Students who wish to complete a minor program should fill out a Minor Declaration Form, available in the Office of Student Affairs, and should fill out a minor petition form one year before graduation. Students may pursue more than one Bienen School of Music minor.

*Arts Administration (8 units)*

The minor in arts administration is open to music majors only.

- ECON 202 Introduction to Microeconomics
- MKTG 201 Marketing I: Principles of Marketing (School of Continuing Studies)
- ADVERT 203 Basic Advertising (School of Continuing Studies)
- ORG BEH 309 Human Resource Management (School of Continuing Studies)
- ORG BEH 367 Strategic Planning and Management (School of Continuing Studies)
- 2 business-related electives
- MUSIC 398 Internship

*Commercial Music (8 units)*

- JAZZ ST 330 Jazz Composition and Arranging (2 units)
- RTVF 383 Sound Production
- MUS COMP 311 Class Composition
- MUS COMP 314-1 Instrumentation
- 2 courses chosen from music technology
- 1 course in popular music

*Jazz Studies*

See the Bienen School of Music's Office of Student Affairs for current requirements.

*Music Cognition (9 units)*

- 3 units in music cognition
- 3 units in musical analysis and music technology
- 3 units in cognate areas (psychology, linguistics, and/or communication sciences and disorders)

*Music Composition (9 units)*

- MUS COMP 111 and 311 Class Composition (6 units)
- MUS COMP 314-1 Instrumentation or 314-2 Orchestration (1 unit)
- 1 elective chosen from 300-level music composition courses
- 1 elective in music technology
- MUS COMP 390 Composition Colloquium (6 quarters, 0 credit)

*Music Criticism (7 units)*

The minor in music criticism is open to music majors only.

- EDIT 201-1 Reporting and Writing
- EDIT 201-2 Multimedia Storytelling
- EDIT 301 Enterprise Reporting in Diverse Communities (prerequisite: 201)
- EDIT 202 Introduction to 21st-Century Media or 370 Media Law and Ethics

- EDIT 310 Media Presentation: Newspaper/Online, 311 Media Presentation: Magazine, or 312 Media Presentation: Videography and Broadcast
- MUSIC 398 Internship or 399 Independent Study
- 1 300-level musicology course

*Musicology (6 units)*

The minor in musicology is open to music majors only.

- 6 units in musicology, at least one of which must be chosen from MUSICOL 323 or 326–329 (courses on music of the world's cultures) and at least one of which must be chosen from MUSICOL 350–355 (courses on historical art music). Students who wish to emphasize a particular concentration within the field of musicology should speak to the program coordinator or a musicology faculty member of their choosing.

*Music Technology (6 units)*

The 6 units required for the minor in music technology are to be chosen from the following list of courses.

- MUS TECH 259 Introduction to Music Technology or MUS TECH 262 Technology in the Music Classroom
- MUS TECH 321 Producing in the Virtual Studio
- MUS TECH 322 Recording and Basic Audio
- MUS TECH 335 Selected Topics in Music Technology
- MUS TECH 337 Multimedia for the Web
- MUS TECH 338 Programming
- MUS TECH 340 Composing with Computers
- MUS TECH 342 Computer Sound Synthesis
- MUS TECH 345 Technology-Based Performance
- MUS TECH 348 3-D Sound and Spatial Audio

*Music Theory (6 units)*

The minor in music theory is open to music majors only.

- 3 300-level music theory courses in music analysis
- 3 300-level courses in music cognition

*Music Theatre*

The Bienen School of Music and the School of Communication offer a joint certificate program in music theatre. For information, see the Cross-School Programs section of this catalog.

**Graduate Studies**

The Bienen School of Music offers programs of study leading to the master of music degree, the graduate certificate in performance, and the doctor of music degree. Information concerning these programs is available from the Office of Admission and Financial Aid in the Bienen School of Music. For information about the requirements for the doctor of philosophy degree in music, contact the Graduate School.



## RESOURCES

### Musical Organizations

As a part of their program of study, music majors are required to participate in music school ensembles. Students from all other schools of the University are encouraged to participate in any organizations for which they qualify.

#### *Symphony Orchestra*

This large ensemble provides experience in the concert presentation of representative symphonic repertoire as well as operas and concertos, emphasizing major works and striving for performance excellence through high standards of individual musicianship and advanced playing technique.

#### *Chamber Orchestra*

The Chamber Orchestra provides the experience of performing fundamental repertoire written for the orchestra until the early 19th century and repertoire specifically written for chamber orchestra since the early 19th century.

#### *Philharmonia*

The school's largest orchestra is open upon audition to interested and qualified students from any school in the University and performs a wide range of repertoire.

#### *Symphonic Wind Ensemble*

The Symphonic Wind Ensemble emphasizes major original works for band and strives for performance excellence through high standards of individual musicianship and advanced playing technique.

#### *Symphonic Band*

An ensemble of fine wind and percussion musicians who wish to perform the finest works available for large band or wind orchestra.

#### *Concert Band*

The Concert Band provides an excellent performing experience for interested and qualified students from any school in the University. The Concert Band performs fine literature, including both original and transcribed works.

#### *Wildcat Marching Band*

The Marching Band combines marching precision and exceptional playing ability to create a finely polished, spirited unit. The band performs at all Wildcat home football games and at one or more away games each season.

#### *University Brass Ensemble*

The University Brass Ensemble provides performance challenges and learning opportunities for serious brass players interested in literature for ensembles of various sizes and compositional styles.

#### *Jazz Groups*

The Jazz Orchestra and a variety of small combo groups enable students to gain experience in the jazz idiom and to improve improvisation skills. They also offer student composers and arrangers the chance to write for various jazz instrumental combinations.

#### *Percussion Ensemble*

The Percussion Ensemble offers students an opportunity to perform percussion chamber works representative of diverse musical styles from renaissance transcriptions through avant-garde theater pieces. The ensemble maintains an active performance schedule both on and off campus and is open to all percussion students.

#### *Contemporary Music Ensemble*

The Contemporary Music Ensemble provides experience for student performers and composers in the performance of contemporary works.

#### *University Chorale*

An ensemble of 40 to 46 voices, University Chorale is the most selective of the University's choral ensembles. The Chorale's membership is drawn from upper-level undergraduate and graduate students whose musicianship meets high performance standards. Choral literature from renaissance through the present day comprises the ensemble's repertoire. The Chorale also frequently collaborates with various instrumental ensembles to perform choral works calling for chamber orchestra and/or wind ensemble.

#### *University Singers*

University Singers, an ensemble of 40 to 50 voices, draws its membership primarily from the music school as well as from qualified singers throughout the University. The group performs music of various periods, both accompanied and unaccompanied, and often combines with other choral ensembles to perform larger works.

#### *University Chorus*

The University Chorus, the University's largest choral ensemble, includes students primarily from the music school as well as those from other schools of the University. The ensemble is also open to faculty and staff as well as residents of the off-campus community by audition. Numbering 90 to 100 singers, University Chorus primarily performs large, extended works from the oratorio and cantata repertoire.

#### *Alice Millar Chapel Choir*

A select ensemble of 50 to 60 voices, the Chapel Choir includes music majors and other qualified students. Repertoire includes a cappella and accompanied masterworks

from all periods and in many languages. Emphasis is placed on sight-reading and musicianship development.

#### *University Women's Chorus*

The Women's Chorus is primarily designed for nonmajor young women who are interested in continuing their singing experiences but with a less rigorous rehearsal commitment than that of other music school choruses. The ensemble performs one concert each quarter.

#### *Baroque Music Ensemble*

The Baroque Music Ensemble provides study and performance of music written before 1800, primarily from the baroque period, for select instrumentalists and vocalists. Performance-based activities focus on historically informed performance practices with occasional coachings and master classes from distinguished performers and scholars. Instruction on period-instrument techniques is a possible option. The ensemble is open to performers on modern instruments and period instruments and singers of every voice type. At least one performance is given each quarter.

#### *Guitar Ensemble*

The ensemble performs the chamber literature for guitar: guitar duos, trios, and quartets as well as chamber works with strings and music for flute and guitar, voice and guitar, and other instrumental combinations.

#### *Chamber Music Ensembles*

Chamber ensembles include piano trio; string trio, quartet, quintet, sextet, and octet; harp ensemble; brass quintet, choir, and band; woodwind quintet; trombone quartet and ensemble; and tuba, saxophone, mixed winds, trumpet, horn, and flute ensembles.

### **Facilities**

The Bienen School of Music occupies five buildings. The Music Administration Building houses administrative offices, classrooms, studios, and practice rooms. The faculties of the Department of Music Studies, Voice and Opera Program, and Piano Program have offices in this building. Regenstein Hall houses rehearsal facilities, practice rooms, a 200-seat lecture/recital room, the library and offices for the University bands, the Music Performance Department Office, and faculty studios for the Conducting and Ensembles, String Instruments, and Wind and Percussion Instruments Programs. Practice Hall (the "Beehive") contains 35 practice rooms. Lutkin Hall, seating 400, is used for student and faculty recitals and lecture classes. Pick-Staiger Concert Hall provides a 1,000-seat concert hall, rehearsal facilities, and offices and library for the University Symphony Orchestra. A new state-of-the-art building adjacent to Regenstein Hall of Music is scheduled to open in 2012. It will include a 400-seat recital hall as well as classrooms, labs, and rehearsal spaces.

### **Music Library**

Among the nation's largest music libraries, the Northwestern University Music Library supports all areas of musical study with a broad collection of books, scores, sound recordings, periodicals, and online resources. The facility, located in historic Deering Library, offers a reading room rich in reference materials, a music listening center, and a computer lab equipped with specialized music hardware and software. The Music Library is also distinguished internationally for its extensive collection of contemporary music, which includes one copy of nearly every score published since 1945 as well as many original manuscripts by prominent composers such as Pierre Boulez, John Cage, George Crumb, and Iannis Xenakis. The Music Library's collections and staff serve the Bienen School of Music, the entire Northwestern University community, and researchers from around the world. For more information see [www.library.northwestern.edu/music](http://www.library.northwestern.edu/music).

### **MUSIC STUDIES FOR NONMAJORS**

Students registered in other schools of the University are encouraged to continue their development as instrumentalists or vocalists through ensemble participation, class instruction, or private study. Ensembles and music performance instruction require an audition. For more information, visit the Office of Student Affairs for a brochure.

### **Concentration in Music**

The concentration in music is a program offered to students in any school at Northwestern outside the Bienen School of Music. The program requires a total of 6 units of credit and is focused on the academic study of music; no more than 2 credits of performance-related credits (nonmajor applied lessons and/or ensembles) may be counted toward the concentration. The program is limited to 20 students per year. For information, contact the Office of Student Affairs in the Bienen School of Music.

### **Private Lessons for Credit**

Nonmusic majors may take half-hour private music lessons for .5 course credit in GEN MUS 115 Applied Piano and Organ, 120 Applied Strings, and 125 Applied Winds/Percussion. A registration fee of \$250 (for 2008–09) is billed to the student's tuition and fees account. Nonmusic majors may take voice classes or private voice lessons, for up to .5 course credit (subject to instructor consent), in GEN MUS 131, 133, 134, 160, 231, 260, and 360. A registration fee of \$225 for voice classes, \$275 for beginning private voice lessons, or \$350 for intermediate or advanced private voice lessons (for 2008–09) is billed to the student's tuition and fees account. Students are accepted for private instrumental lessons and for vocal lessons and classes based on an audition and the availability of an instructor.

## Courses Open to Undergraduates

The following courses were designed to meet the needs of any students interested in studying music. Students with a basic music foundation are encouraged to register for 252 Harmony (a basic music theory course), followed by 253 Form and Analysis and/or Composition. The music literature sequence is designed to permit students with limited background to start with 170. For courses for which Weinberg students may earn distribution requirement credits, the distribution area is indicated in parentheses.

**GEN MUS 115-0 Applied Piano and Organ** (.5 units) Private lessons for nonmajors; audition required.

**GEN MUS 120-0 Applied Strings** (.5) Private lessons for nonmajors; audition required.

**GEN MUS 121-0 Beginning Nonmajor Guitar Class** (.5) Class instruction in classical guitar.

**GEN MUS 125-0 Applied Winds/Percussion** (.5) Private lessons for nonmajors; audition required.

**GEN MUS 131-0 Nonmajor Vocal Performance Seminar, Beginning** (.5) Must be concurrently registered for 133 or 160.

**GEN MUS 133-0 Nonmajor Class Voice, Beginning** (.5) Audition required.

**GEN MUS 134-0 Nonmajor Class Voice, Intermediate/Advanced** (.5) Audition required.

**GEN MUS 160-0 Nonmajor Private Voice, Beginning** (.5) Private lessons for nonmajors; audition required.

**GEN MUS 170-0 Introduction to Music** Principles of musical organization. Score study and recognition of what is heard in all music, including classic, jazz, rock, and popular. (VI. Literature and fine arts)

**GEN MUS 175-0 Selected Topics** Topics vary; announced before registration. May be repeated.

**GEN MUS 220-0 History of the Symphony** Study of music for the symphony orchestra from the 17th century to the modern period. (VI. Literature and fine arts)

**GEN MUS 230-0 Masterpieces of Opera** History of opera from its origins in Italy at the end of the 16th century to the modern period. (VI. Literature and fine arts)

**GEN MUS 231-0 Nonmajor Vocal Performance Seminar, Intermediate/Advanced** (.5) Must be concurrently registered for 134, 160, 260, or 360.

**GEN MUS 250-0 History of Rock** The basic elements of rock from its roots in pop, country and western, and rhythm and blues to the present. Prerequisite: consent of instructor. (VI. Literature and fine arts)

**GEN MUS 252-0 Harmony** A basic course in music theory fundamentals, including harmonic materials and tonal structures. Analysis of harmonic structures; harmonization of melodies. Prerequisite: 170 or consent of instructor. (II. Formal studies)

**GEN MUS 253-0 Form and Analysis** Nature of musical forms found in musical literature from renaissance to the present;

analysis of musical examples. Prerequisite: 252, or music-reading skills and some understanding of harmony.

**GEN MUS 260-0 Nonmajor Private Voice, Intermediate** (.5) Private lessons for nonmajors; audition required.

**GEN MUS 270-1 The Western Musical Tradition** Major genres and composers from 1600 to 1825. Primary emphasis on the generations of Bach and Handel, Haydn and Mozart, Beethoven and Schubert. Prerequisite: 170 or equivalent. (VI. Literature and fine arts)

**GEN MUS 270-2 The Western Musical Tradition** Major genres and composers from 1825 to the present. Prerequisite: 170 or equivalent. (VI. Literature and fine arts)

**GEN MUS 335-0 Selected Topics** Topics vary; announced before registration. May be repeated.

**GEN MUS 360-0 Nonmajor Private Voice, Advanced** (.5) Private lessons for nonmajors; audition required.

## INTERDEPARTMENTAL COURSES FOR MUSIC MAJORS

The music theory, musicology, aural skills, keyboard skills, and ensembles sequences are required for, and limited to, all undergraduates in the Bienen School of Music. Ensembles listed under Conducting and Ensembles are available by audition to all students in the University.

## Courses Open to Undergraduates

**MUSIC 101-1,2,3 Theory Skills Testing** (0) Skills tests taken in conjunction with MUSIC 111-1 (or 110-0) and 111-2,3.

**MUSIC 110-0 Introduction to Theory** (.5) Taken in place of MUSIC 111-1 as recommended by the coordinator of freshman theory and aural skills.

**MUSIC 111-1,2,3 Music Theory I, II, III** (.5) Music as sound in time. Analytical studies in forms, media, textures, and harmonic and melodic materials. Prerequisite: preceding quarters of 111 (or 110 for 111-2).

**MUSIC 126-1,2,3 Aural Skills I, II, III** (.5) Sight-singing and ear-training; drill in recognition of melodic, rhythmic, and harmonic patterns and aural analysis through listening and dictation. Progresses through six levels of proficiency.

**MUSIC 127-0 Keyboard Skills** (.5) Class instruction, in electronic piano classroom; six levels of proficiency.

**MUSIC 211-1,2,3 Music Theory IV, V, VI** (.5) Continuation of 111. Prerequisite: 111-1,2,3 or consent of instructor.

**MUSIC 213-0 Introduction to World Music Cultures** Introduction to both the world's musical variety and common issues related to music production worldwide.

**MUSIC 214-0 Music History I** Principles, materials, and concepts of the historical study of Western art traditions, from medieval through renaissance.

**MUSIC 215-0 Music History II** Continuation of 214, from baroque through early romantic.

**MUSIC 216-0 Music History III** Continuation of 215, from the middle of the romantic era through the present.

**MUSIC 226-1,2,3 Aural Skills IV, V, VI** (.5) Continuation of 126.

**MUSIC 227-0 Keyboard Skills (.5)** Continuation of 127.

**MUSIC 327-1 Advanced Keyboard Skills VII (.5)** Advanced score-reading. Reading various voice parts in combination and harmonically reducing four-part textures.

**MUSIC 327-2 Advanced Keyboard Skills VIII (.5)** Techniques of accompanying by reducing and rewriting accompaniments to make initial performances more effective.

**MUSIC 327-3 Advanced Keyboard Skills IX (.5)** Advanced accompanying. Adding accompaniments to a given vocal line. Improvising accompaniments in various styles, including “swing.” Transposition of individual lines.

**MUSIC 335-0 Selected Topics in Music** Topics vary; announced before registration. May be repeated.

**MUSIC 350-0 Alexander Technique (.5)** Methods of using the body efficiently to reduce unnecessary tension and stress in instrumental and vocal performance.

**MUSIC 397-0 Summer Internship (0)** Field experience as an intern.

**MUSIC 398-0 Internship (.5–4)** Field experience as an intern. Requirements include journal and final paper.

**MUSIC 399-0 Independent Study (.5–1)**

## MUSIC STUDIES

This department consists of the Music Composition, Music Education, Musicology, Music Technology, and Music Theory and Cognition Programs. Bachelor of music specializations are available in music cognition, music composition, music education, musicology, music technology, and music theory. These specializations are described on the following pages. An additional specialization option, music academic studies, requires 1 course from each of the five programs and 7 300-level courses selected from any of the Department of Music Studies offerings.

### *Music Composition*

Composition students pursue a course of study that develops analytical and creative skills and enjoy many opportunities to hear their works performed. Students have access to the electronic and computer music studios, which provide the latest technology for experimentation and experience with 21st-century compositional materials. Students intending to major in composition may substitute composition class for applied studies during their freshman and sophomore years.

### Major Studies Requirements

For a major in composition, 16 course units are required beyond the core degree requirements.

- 212 Composition (3 units; some credit may be given for applied instrument or voice lessons)
- 312 Composition (6 units)
- 314-1 Instrumentation (1 unit)
- 314-2 Orchestration (1 unit)
- MUS THRY 316 Renaissance Counterpoint (1 unit)
- MUS THRY 318 Baroque Counterpoint (1 unit)

- 335 Selected Topics (1 unit)
- Music theory courses in analysis (2 units; 1 unit must be in 20th-century analysis)
- 380 Senior Recital (0 units)
- 390 Composition Colloquium (0 units)

### Courses Open to Undergraduates

**MUS COMP 111-1,2,3 Class Composition** Class instruction in techniques of composition. Open to nonmusic majors.

**1.** Writing for solo instruments. **2.** Writing for two to four instruments. **3.** Writing for instruments and/or voices.

Prerequisite: preceding quarters of 111 or consent of instructor.

**MUS COMP 112-0 Composition** Original composition; individual instruction.

**MUS COMP 212-0 Composition** Original composition; individual instruction.

**MUS COMP 311-1,2,3 Class Composition** Class instruction in techniques of composition. Open to nonmusic majors.

**1.** Writing for solo instruments. **2.** Writing for two to four instruments. **3.** Writing for instruments and/or voices. Prerequisites: for 311-1, 111-3 or consent of instructor; for 311-2,3, preceding quarters of 311 or consent of instructor.

**MUS COMP 312-0 Composition** Original composition; individual instruction.

**MUS COMP 314-1 Instrumentation** Instruments of the orchestra; scoring techniques; analysis of instrumental combinations. Prerequisite: MUSIC 211-3 or consent of instructor.

**MUS COMP 314-2 Orchestration** Stylistic scoring projects; analysis of orchestral and chamber scores. Prerequisite: 314-1 or consent of instructor.

**MUS COMP 314-3 Advanced Orchestration** Contemporary scoring techniques; creative projects; analysis of orchestral and chamber scores. Prerequisite: 314-2, graduate standing, or consent of instructor.

**MUS COMP 335-0 Selected Topics in Music Composition** Topics vary; announced before registration. Writing projects; analysis of scores; 20th-century stylistic techniques, performers, and composers. Contemporary materials; in-class performances of original work. Prerequisite: preceding quarter of 335 or consent of instructor. May be repeated for credit.

**MUS COMP 336-1,2 Contemporary Repertoire I, II** Close study of specific recent compositional styles; modernism post-1945, music since 1975. Prerequisite: consent of instructor.

**MUS COMP 337-0 Topics in Contemporary Repertoire** Topics vary by quarter. Close study of specific recent compositional styles, which may include minimalism, complexity, music of the last decade, experimental music. Prerequisite: consent of instructor.

**MUS COMP 338-0 Composer Portraits** Composers vary by quarter. Portrait studies of the work of a major composer

or composers, e.g., Ferneyhough; Lutoslawski; Cage; Birtwistle and Maxwell Davies. Prerequisite: consent of instructor.

**MUS COMP 339-0 Compositional Concepts and Techniques**

Topics vary by quarter. Content, musical spaces, extended techniques, and spectralism. Prerequisite: consent of instructor.

**MUS COMP 340-0 Composition Workshop** Topics vary by quarter. Examples include Composer/Performer, Composing for Percussion, Composing for Dance, Composing for Solo Instrument. Prerequisite: consent of instructor.

**MUS COMP 380-0 Senior Recital (0)**

**MUS COMP 390-0 Composition Colloquium (0)** Discussion of contemporary compositional techniques.

**MUSIC COMP 399-0 Independent Study (.5–1)**

### *Music Education*

Graduates with a major in music education meet all requirements for teacher certification in the state of Illinois as well as most other states. Students take the professional program required of all music students, a structured sequence of courses in general education, a basic set of courses in music education, and special courses in the chosen music education specialization. The combination results in a program that prepares professionals with a broad understanding of music and education as well as the skills to be effective music teachers.

Students in the undergraduate music education program must take all the core studies in music and all the professional studies in music education plus the general education courses required for teacher certification. They must also choose one of the three specialization tracks — instrumental, choral, or general — and take the required courses for that track. All music education majors are required to complete 100 hours of clinical observation.

### **Major Studies Requirements**

For a major in music education, 26 to 28 course units are required beyond the core degree requirements.

- Additional private lessons (6 units)
- Additional keyboard skills (as needed by track) (1.5–3 units)
- Additional large ensemble (8 quarters) (4 units)
- 258 Philosophy of Music Education
- 260 The Music Teacher as Communicator
- 314 Music Education Rehearsal Practicum (11 quarters, 0 units)
- 368 Teaching Composition in the Schools
- 380–387 Student Teaching (3 units)
- 396 Student Teaching Colloquium (0 units)
- MUS TECH 262 Technology in the Music Classroom
- CONDUCT 340-1,2, or 3 Advanced Conducting

### **Instrumental Track (7.5 additional units)**

- 230 Flute Class (.5 unit)
- 232 Voice Class (.5 unit)

- 233 Clarinet and Saxophone Class (.5 unit)
- 234 Double Reeds Class (.5 unit)
- 235 High Brass Class (.5 unit)
- 236 Low Brass Class (.5 unit)
- 237 String Class I (.5 unit)
- 238 String Class II (.5 unit)
- 239 Percussion Class (.5 unit)
- 362 Teaching General Music II
- 364 Teaching Instrumental Music I
- 365 Teaching Instrumental Music II

### **Choral Track (6 additional units)**

- 231-1 Guitar Class I (.5 unit)
- 232 Voice Class (.5 unit)
- 240 Classroom Instruments (.5 unit)
- 361 Teaching General Music I
- 362 Teaching General Music II
- 366 Teaching Choral Music I
- 367 Teaching Choral Music II
- Instrumental techniques elective (.5 unit)
- VOICE 111-1,2,3 Phonetics and Diction (0 units)
- VOICE 311 Vocal Solo Class (9 quarters, 0 units)

### **General Track (5.5 additional units)**

- 231-1,2 Guitar Class I, II (.5 unit each)
- 232 Voice Class (.5 unit)
- 240 Classroom Instruments (.5 unit)
- 361 Teaching General Music I
- 362 Teaching General Music II
- 366 Teaching Choral Music I
- Instrumental techniques elective (.5 unit)

### **General Education (8 units)**

- ENGLISH 105 Expository Writing or 205 Intermediate Composition
- SESP 201 Human Development: Childhood and Adolescence or PSYCH 218 Developmental Psychology
- TEACH ED 327 Educating Exceptional Children or CSD 336 The Field of Special Education
- Weinberg distribution area I (natural sciences) (1 unit)
- Weinberg distribution area III (social and behavioral sciences) (2 units)
- Weinberg distribution area IV (historical studies) and/or V (ethics and values) (2 units)

### **Courses Open to Undergraduates**

**MUSIC ED 230-0 Flute Class (.5)**

**MUSIC ED 231-1,2 Guitar Class I, II (.5)**

**MUSIC ED 232-0 Voice Class (.5)**

**MUSIC ED 233-0 Clarinet and Saxophone Class (.5)**

**MUSIC ED 234-0 Double Reeds Class (.5)**

**MUSIC ED 235-0 High Brass Class (.5)**

**MUSIC ED 236-0 Low Brass Class (.5)**

**MUSIC ED 237-0 String Class I (.5)**

**MUSIC ED 238-0 String Class II (.5)**



**MUSIC ED 239-0 Percussion Class (.5)****MUSIC ED 240-0 Classroom Instruments (.5)****MUSIC ED 242-0 Recorder Class (.5)****MUSIC ED 258-0 Philosophy of Music Education**

Philosophical issues in music education relating to the teaching and learning of music in schools.

**MUSIC ED 260-0 The Music Teacher as Communicator**

Discussion and observation of school music programs and effective presentational skills.

**MUSIC ED 314-0 Music Education Rehearsal Practicum (0)**

Students rehearse their peers in a public school-level ensemble, learn public school repertoire, and gain practical experience on their secondary instruments.

**MUSIC ED 335-0 Selected Topics in Music Education** Topics vary; announced before registration. May be repeated.

**MUSIC ED 361-0 Teaching General Music I** For grades K–5, curriculum materials and strategies for developing musical growth. Laboratory experiences; developing creativity in the music classroom. Open only to music majors or with consent of instructor.

**MUSIC ED 362-0 Teaching General Music II** For grades 6–12, effective teaching of general music classes in middle and high school. Available curriculum materials; innovative approaches.

**MUSIC ED 363-0 Teaching High School Nonperformance Courses** Planning and teaching high school music, arts, humanities courses. Present practices; development of exemplary course plans.

**MUSIC ED 364-0 Teaching Instrumental Music I** Teaching and administrative principles for elementary and middle school instrumental music programs. Rehearsal dynamics, conducting, rehearsal room management, and pedagogy for school ensembles.

**MUSIC ED 365-0 Teaching Instrumental Music II** Teaching and administrative principles for secondary school instrumental music programs. Rehearsal dynamics, conducting, rehearsal room management, and pedagogy for school ensembles. Prerequisite: 364.

**MUSIC ED 366-0 Teaching Choral Music I** Development and application of skills, knowledge, and understandings for teaching choral music in elementary and middle school.

**MUSIC ED 367-0 Teaching Choral Music II** Continuation of 366. High school choral program, curriculum model, repertoire, sight-reading, rehearsal techniques, programming, administration.

**MUSIC ED 368-0 Teaching Composition in the Schools**

Practical and research literature in teaching composition; design of curricular materials for teaching composition and improvisation in school music programs.

**MUSIC ED 369-0 Research and Evaluation in Music Education** Procedures and issues in research and evaluation in music teaching. Practical application of research to decision making.

**MUSIC ED 396-0 Student Teaching Colloquium (0)****MUSIC ED 399-0 Independent Study (.5–1)****Student Teaching Courses**

Students are assigned to specific classes in cooperating schools under joint University/school supervision.

**MUSIC ED 380-0 Student Teaching in the Elementary School:**

**General Music (1–4)**

**MUSIC ED 381-0 Student Teaching in the Middle School/**

**Junior High School: General Music, Choral (1–4)**

**MUSIC ED 383-0 Student Teaching in the Senior High School: Choral and Nonperformance Courses (1–4)**

**MUSIC ED 385-0 Student Teaching in the Elementary School: Instrumental (1–4)**

**MUSIC ED 386-0 Student Teaching in the Middle School/ Junior High School: Instrumental (1–4)**

**MUSIC ED 387-0 Student Teaching in the Senior High School: Instrumental and Nonperformance Courses (1–4)**

*Musicology*

An undergraduate major in musicology is available within the bachelor of music degree or as a specialization within the bachelor of arts degree. The courses required for this specialization are selected from musicology, analysis, and the departmental core. As some of the courses are offered on a two-year alternating schedule, certain courses may not be available during a given year.

**Major Studies Requirements**

For a major in musicology, 16 course units are required beyond the core degree requirements.

*Historic Musicology Track*

- 350–355 history of music courses (6 units)
- Musicology electives or cognates (6 units)
- Applied lessons/performance experience (3 units)
- 385 Senior Project (1 unit)
- 395 Musicology Colloquium (12 quarters, 0 units)

*Ethnomusicology Track*

- Ethnomusicology courses (3 units)
- Area and topics courses (9 units)
- Applied lessons/performance experience (3 units)
- 385 Senior Project (1 unit)
- 395 Musicology Colloquium (12 quarters, 0 units)

**Courses Open to Undergraduates**

**MUSICOL 323-0 Proseminar in Ethnomusicology** Ethnomusicology; its history, bibliographical resources, methods, and theories.

**MUSICOL 326-0 Topics in World Music: Asia** The musical traditions of South Asia, East Asia, and Southeast Asia. Topics include characteristics of instruments and instrumental ensembles, sound structures, theatrical traditions, and vocal performance.

**MUSICOL 327-0 Topics in World Music: Africa** Introduces students to the diverse musics of Africa through the

multidisciplinary lens of ethnomusicology. Topics include music learning and transmission, aesthetics, musical styles and structures, performance practice, compositional process, musical change, and the role of music in society.

**MUSICOL 328-0 Topics in World Music: The Americas** An ethnomusicological perspective on music of the Americas as influenced by the European, African, Hispanic, and native American cultures. The socioeconomic impact of jazz, rock, gospel, and popular music; the role of music in the spiritual and social life of the Americas' diverse peoples.

**MUSICOL 329-0 Music and Islam** History, basic tenets, and aesthetic of Islam; the musics of Islamic cultures from North Africa, Spain, the Middle East, central Asia, and the Indian subcontinent. Methods of contextualizing musical cultures and critical methodology related to gender, post-colonial theory, and religion.

**MUSICOL 330-0 Russian Fairy Tale and Opera** Russian cultural and national identity through the study of folk tales and their musical counterparts in such operas as Glinka's *Ruslan and Ludmila*, Tchaikovsky's *The Sleepers*, and Rimsky-Korsakov's *The Snow Maiden*, *Sadko*, and *The Tale of Tsar Saltan*. Current critical theory, concepts related to the portrayal of women, the interplay of nationalism and gender, and the dichotomy between East and West.

**MUSICOL 331-0 Orientalism and Music** The imagery of the East in the music of the West expressed in musical genres of various historical periods; focus on romantic opera and contemporary musical culture. Orientalism as formulated by Edward Said and developed by John MacKenzie is defined and further clarified through references in literature and the visual arts.

**MUSICOL 335-0 Selected Topics in Musicology** Topics vary; announced before registration. May be repeated.

**MUSICOL 337-0 Improvisation and World Musicianship** Improvisation in Western art music, jazz, Indian, and African music; performance workshops in African drumming, Indian solfeggio, and rhythmic mnemonics.

**MUSICOL 338-0 African Mbira Music** The mbira, one of the most popular and ancient melodic instruments in black Africa. Construction; development of basic playing skills. Prerequisite: consent of instructor.

**MUSICOL 340-0 Music and Gender** The many intersections between music and ideas of gender; focus on issues of composition, characterization, patronage, and performance. Elite and popular forms of Western music from the Middle Ages to 2000 explored in relation to gender issues in musics of other cultures.

**MUSICOL 341-0 Music and the Visual Arts** The many ways in which the senses of sight and hearing interact in Western images of music and music making as well as in select musical works inspired by concurrent ideas or movements in the visual arts.

**MUSICOL 342-0 Authenticity** Focus on authenticity in music at the end of the 20th century and beginning of

the 21st century by examining the three music genres most closely associated with the cultural and philosophical considerations of the idea: early music, country music, and "world" or "ethnic" music.

**MUSICOL 343-0 Music and Shakespeare** An exploration of some of the many intersections between Shakespearean drama and music from the late 16th through early 21st centuries, including study of plays, opera, ballet, film, musical theater, art song, popular music, and the symphony.

**MUSICOL 350-0 Topics in Medieval Music** Gregorian and medieval chant, secular monophony, and the development of polyphony from the earliest records through the music of Ockeghem and Busnois.

**MUSICOL 351-0 Topics in 16th-Century Music** Middle and late renaissance and early manifestations of the baroque, from Josquin through the Gabriellis.

**MUSICOL 352-0 Topics in 17th-Century Music** The baroque from Monteverdi through Bach and Handel.

**MUSICOL 353-0 Topics in 18th-Century Music** Representative works and critical studies of European art music from the Arcadian reform of opera through the Napoleonic era.

**MUSICOL 354-0 Topics in 19th-Century Music** Representative works and critical studies of European art music from the Congress of Vienna to the death of Mahler.

**MUSICOL 355-0 Topics in 20th-Century Music** Representative works and critical studies of art music from Debussy to the present.

**MUSICOL 385-0 Senior Project**

**MUSICOL 395-0 Musicology Colloquium (0)**

**MUSICOL 399-0 Independent Study (.5–1)**

### *Music Technology*

The major in music technology offers a unique professional preparation for a career in the technological sectors of the musical world — from games and web-based multimedia to programming and composing for electronic media. Music technology students are engaged in creating music content for media as well as building technological tools for musical tasks. Students have access to the electronic and computer music studios, which provide the latest technology for experimentation and experience with 21st-century compositional materials.

### **Major Studies Requirements**

For a major in music technology, 16 course units are required beyond the core degree requirements.

- Required courses in music technology (6 units)
  - 338 Programming (1 unit)
  - 340 Composing with Computers (1 unit)
  - 342-1,2 Computer Sound Synthesis (2 units)
  - 384 Senior Project Development (2 quarters, .5 unit each)
  - 385 Senior Project (1 unit)
  - 393 Colloquium (6 quarters, 0 units)

- Electives in music technology and related areas (7 units), chosen from
  - 259 Introduction to Music Technology or
  - 262 Technology in the Music Classroom
  - 320 Physics of Sound
  - 321 Producing in the Virtual Studio
  - 322 Recording and Basic Audio
  - 335 Selected Topics in Music Technology
  - 337 Multimedia for the Web
  - 343 Sound Design for New Media
  - 344 Advanced Projects in Music Technology
  - 345 Technology-Based Performance
  - 348 3-D Sound and Spatial Audio
  - RTVF 383 Sound Production
  - RTVF 384 Foundations of Sound Design
- Applied lesson/performance experience (3 units)

### Courses Open to Undergraduates

#### **MUS TECH 259-0 Introduction to Music Technology**

Survey of music software and hardware for the professional musician. Topics include music notation, sequencing and MIDI, audio recording and editing, synthesis, multimedia, and web publishing. Assignments include projects demonstrating the practical use of software tools.

**MUS TECH 262-0 Technology in the Music Classroom** Survey of music software and hardware in the context of teaching. Topics include computer-aided instruction, music notation, sequencing and MIDI, multimedia, and web publishing. Assignments include projects related to teaching music. No prerequisite.

**MUS TECH 320-0 Physics of Sound** Principles of physical acoustics. Acoustics of musical instruments, the human voice, and concert halls. Fundamentals of psychoacoustics. Assignments include informal experiments.

**MUS TECH 321-0 Producing in the Virtual Studio** Techniques for creating and producing music in the context of a computer-based audio production environment. Topics include MIDI, audio editing, plug-ins, effects processing, mastering, and basic surround mixing. Assignments include creative projects. Prerequisites: 259, 262, or equivalent experience and consent of instructor.

**MUS TECH 322-0 Recording and Basic Audio** Microphone and placement techniques including stereo and close/distant miking of voices, acoustic instruments, and ensembles. Topics also include console design, signal flow, and dynamics processing. Projects include recording assignments. Prerequisites: 259, 262, or equivalent experience and consent of instructor.

**MUS TECH 335-0 Selected Topics in Music Technology** Topics vary; announced before registration. May be repeated with change of topic.

**MUS TECH 337-0 Multimedia for the Web** Advanced instruction in web design and programming with a focus on the design and maintenance of multimedia intended

for distribution via the Internet. Assignments include web-based projects. Prerequisite: consent of instructor.

**MUS TECH 338-0 Programming** Syntax of programming languages, program development, user interfaces, and music-specific algorithms. Techniques for creating musical applications. Prerequisite: 259, 262, or equivalent experience.

**MUS TECH 340-0 Composing with Computers** Foundational techniques of composition using music and audio software. Techniques of algorithmic composition, sound processing. Analysis of electroacoustic music. Assignments include student compositions. Prerequisite: 259, 262, or equivalent experience.

**MUS TECH 342-1,2 Computer Sound Synthesis** 1. Synthesis of musical sounds, including the characteristics of digital audio signals, wavetable synthesis, modulation, and sample-based synthesis. 2. Processing of audio signals, including digital filtering, reverberation, and effects processing; physical modeling synthesis. Assignments include sound synthesis programming. Prerequisite: 259, 262, or equivalent experience.

**MUS TECH 343-0 Sound Design for New Media** Creative projects for the web and DVD. Topics include philosophies and techniques of sound design, authoring for 5.1 surround sound, techniques of sound montage. Prerequisite: consent of instructor.

**MUS TECH 344-0 Advanced Projects in Music Technology** Individual instruction in projects related to music technology. Prerequisite: consent of instructor.

**MUS TECH 345-0 Technology-Based Performance** Creation, rehearsal, and performance of technology-based music in a group setting. Topics include real-time interaction, technological performance interfaces, application of algorithmic methods. Prerequisite: consent of instructor.

**MUS TECH 348-0 3-D Sound and Spatial Audio** Techniques and applications of 3-D sound and spatial audio. The physical acoustics and psychoacoustics of spatial hearing, simulating 3-D cues, stereo sound reproduction, multichannel audio formats, environmental acoustics, and environmental simulation. Prerequisite: fundamental knowledge of acoustics.

**MUS TECH 384-0 Senior Project Development** (.5)

**MUS TECH 385-0 Senior Project** Independent project in music technology. Prerequisite: permission of department.

**MUS TECH 393-0 Music Technology Colloquium** (0)

**MUS TECH 399-0 Independent Study** (.5–1)

### *Music Theory and Cognition*

Undergraduates majoring in theory or cognition receive a broad education in music and the cognitive sciences.

The emphasis is on cognitive musicology, whereby music is studied using the tools and insights of cognitive science and musicological research.

## Major Studies Requirements

For a major in music theory or in music cognition, 16 course units are required beyond the core degree requirements.

### *Music Theory*

- 300- and 400-level courses in music theory and cognition (4 units)
- Musicology (2 units)
- Music technology (1 unit)
- Cognate areas (3 units)
- Applied lessons/performance experience (3 units)
- 385 Senior Project (1 unit)

### *Music Cognition*

- 335 Selected Topics in Music Theory (courses in music cognition) (2 units)
- 351 Music Cognition (1 unit)
- PSYCH 201 Statistical Methods in Psychology (1 unit)
- PSYCH 205 Research Methods in Psychology (1 unit)
- Cognate areas (3 units)
- Electives (4 units)
- Applied lessons/performance experience (3 units)
- 385 Senior Project (1 unit)

## Courses Open to Undergraduates

**MUS THRY 316-0 Renaissance Counterpoint** Contrapuntal textures from two to four voices. Cadence and form, melodic line and motive, rhythm, simple and complex imitation, and treatment of dissonance in the sacred music of Lassus, Josquin, and Palestrina.

**MUS THRY 318-0 Baroque Counterpoint** Baroque dance suite, chorale prelude, invention, fugue, chiefly involving the music of J. S. Bach. Melodic, harmonic, structural characteristics; contrapuntal techniques.

**MUS THRY 321-0 Analytical Techniques** Detailed analysis of all parameters of selected musical examples; compositional procedures as a means of developing an intelligent rationale for interpretation. Prerequisite: MUSIC 211-1,2,3 or consent of instructor.

**MUS THRY 331-0 Analytical Studies** Extension and refinement of concepts and techniques acquired in MUSIC 111-1,2,3, MUSIC 211-1,2,3.

**MUS THRY 332-0 Rhythmic Analysis** Recent theoretical work on rhythm; analytical methodologies dealing with music primarily as a temporal process.

**MUS THRY 335-0 Selected Topics in Music Theory** Topics vary; announced before registration. May be repeated.

**MUS THRY 351-0 Music Cognition** Survey of issues and research methods in music cognition. Music listening, memory for music, development of skills.

**MUS THRY 352-0 Score Analysis Skills** Recognition of the character and succession of tonalities. Music listening, memory for music, development of skills.

**MUS THRY 355-0 Atonal Analysis** Techniques for analysis of atonal and nonfunctional tonal music, including serial,

set-theoretic, and parametric approaches. Emphasis on music of Schoenberg, Webern, Berg, Stravinsky, and Debussy. Selected readings in analytic literature. Prerequisite: MUSIC 211-1,2,3 or equivalent.

**MUS THRY 385-0 Senior Project** (1)

**MUS THRY 390-0 Music Theory Colloquium** (0) Discussion of current research in music theory and cognition.

**MUS THRY 394-0 Music Cognition Colloquium** (0)

**MUS THRY 399-0 Independent Study** (.5-1)

## MUSIC PERFORMANCE

This department consists of the Conducting and Ensembles, Jazz Studies, Piano, Strings, Voice and Opera, and Wind and Percussion Programs.

### *Conducting and Ensembles*

Courses in the Conducting and Ensembles Program are available to all majors.

### Courses Open to Undergraduates

**CONDUCT 323-0 Marching Band Techniques** Writing for marching and pep bands; rehearsing for the marching band.

**CONDUCT 326-0 Basic Conducting** Fundamentals in both instrumental and choral conducting; transpositions, ranges, and podium technique. Extensive laboratory experience with videotaped evaluation.

**CONDUCT 335-0 Selected Topics in Conducting** Topics relevant to the professional needs of conducting majors.

**CONDUCT 340-1,2,3 Advanced Conducting** Separate quarters of band, orchestral, and choral conducting that emphasize the techniques of score preparation and analysis, repertoire, and rehearsal methods. Prerequisite: 326 or equivalent. May be repeated for credit.

**CONDUCT 341-0 Choral Literature I** A comprehensive examination of choral music literature from 1600 to 1800.

**CONDUCT 342-0 Choral Literature II** A comprehensive examination of choral music literature from 1800 to the present.

**CONDUCT 345-0 Orchestral Bowing: Style and Function** (.5)

Designed for nonstring-playing conductors, teachers, and composers wishing to enhance their knowledge of bowing principles and practices as well as string players wishing to explore teaching concepts and in-depth bowing analyses. Topics include sound production principles, applied bowing techniques and pedagogy, performance practice, interpretation, and analysis. Final project includes a symphonic bowing analysis presented for group discussion.

**CONDUCT 364-0 Choral Organizations** University Chorale, University Singers, University Chorus, Alice Millar Chapel Choir, and Women's Chorus. Open to all qualified students.

**CONDUCT 374-0 Band Organizations** Marching Band, Concert Band, Symphonic Band, Symphonic Wind Ensemble. Open to all qualified students.

**CONDUCT 378-0 Contemporary Music Ensemble** (0–.5)

Membership by audition.

**CONDUCT 393-0 Orchestral Organizations** Membership by audition in Symphony Orchestra, Chamber Orchestra, or Philharmonia.

**CONDUCT 395-0 Baroque Music Ensemble** (0–.5)

Performance of choral, solo, and instrumental music of the Middle Ages through the early baroque.

**CONDUCT 399-0 Independent Study** (.5–1)*Jazz Studies*

The program in jazz studies offers courses in jazz improvisation, composition and arranging, history, and ensembles.

**Major Studies Requirements**

For a major in jazz studies performance, 25 course units are required beyond the core degree requirements. For jazz majors, the 19-unit core requirement for the bachelor of music degree is reduced to 15.5 units by the omission of one year of keyboard skills (1.5 units) and two music history courses (2 units). Those requirements are replaced by the jazz keyboard and jazz history requirements below.

- 210-1,2 Jazz History (2 units)
- 262 Jazz Performance (3 units)
- 330 Jazz Composition and Arranging (2 units)
- 336 Jazz Improvisation (3 units)
- 337 The Business of Jazz (.5 unit)
- 361 Jazz Keyboard (1 unit)
- 362 Jazz Performance (6 units)
- 377 Jazz Ensembles (4.5 units)
- 380 Senior Recital (0 units)
- 391 Jazz Combo (3 units)

**Courses Open to Undergraduates****JAZZ ST 162-0, 262-0, 362-0 Jazz Performance**

**JAZZ ST 210-1,2 Jazz History** The origins of jazz, its performers, and their contributions. Includes a look at contemporaneous social conditions during its development.

**JAZZ ST 305-0 Optional Recital** (0)

**JAZZ ST 330-0 Jazz Composition and Arranging** The techniques of composing and arranging for large and small ensembles in the jazz tradition. Study of scores by major composers and arrangers from throughout jazz history.

**JAZZ ST 333-0 Jazz Theory** (.5) Chord symbols, melodic and harmonic structures, and other analyses as applied to the language of jazz.

**JAZZ ST 335-0 Selected Topics in Jazz Studies** Topics vary. May be repeated for credit as topics change.

**JAZZ ST 336-0 Jazz Improvisation** (.5) The language of jazz. Focus is on melodic development and ear training via repertoire and solos of jazz's most influential figures.

**JAZZ ST 337-0 The Business of Jazz** (.5) A survey of the music industry as it pertains to jazz. Includes discussions on songwriting, music publishing, national and

international copyright law, music licensing, artist management, music production, and related topics.

**JAZZ ST 361-0 Jazz Keyboard** (.5) Basic keyboard skills, with an emphasis on jazz voicing, harmonization, and analysis.

**JAZZ ST 370-0 Junior Recital** (0)**JAZZ ST 377-0 Jazz Orchestra** (.5)**JAZZ ST 380-0 Senior Recital** (0)**JAZZ ST 391-0 Jazz Combo** (.5)**JAZZ ST 399-0 Independent Study** (.5–1)*Piano*

The Piano Program offers a major in piano performance that combines a strong musical basis for a professional career with the broad humanistic interests embodied in a liberal arts education. The course of instruction focuses on the studio and includes private lessons, studio classes, piano repertoire, piano pedagogy, and accompanying classes. Electives are available in chamber music and other areas, allowing students to tailor a program to their individual needs. Frequent performances as a soloist and as an assisting musician develop skills in public presentation. Solo recitals, required in both the junior and senior years, are considered an integral part of the program.

**Major Studies Requirements**

For a major in piano performance, 17 course units are required beyond the core degree requirements.

- 261 Piano Performance (3 units)
- 361 Piano Performance (6 units)
- 313-1,2,3 Piano Repertoire (3 units)
- 315-1,2,3 Piano Pedagogy (3 units)
- 328 Beginning Collaborative Piano (1.5 units)
- 340 Piano Recital Hour (12 quarters, 0 units)
- 370 Junior Recital (0 units)
- 380 Senior Recital (0 units)
- 391 Chamber Music or 392 Chamber Music: Trios (.5 unit)

Students enrolled in a five-year double-degree program may substitute three 300-level musicology and/or music theory electives for the pedagogy requirement.

**Courses Open to Undergraduates****PIANO 161-0, 261-0, 361-0 Piano Performance****PIANO 255-0 Piano Sight-Reading** (0)**PIANO 305-0 Optional Recital** (0)

**PIANO 313-1,2,3 Piano Repertoire** Analytical and historical study of piano solo and concerto repertoire from early keyboard literature to the present.

**PIANO 315-1,2,3 Piano Pedagogy** Lecture/demonstration/laboratory course in piano teaching at all levels. Principles and techniques of group and individual instruction; survey of teaching materials. Seniors and graduate students.

**PIANO 328-0 Beginning Collaborative Piano** (.5) Piano students work with a singer and instrumentalist in the preparation and performance of mainstream recital repertoire.



**PIANO 335-0 Selected Topics in Piano** Topics vary; announced before registration. May be repeated.

**PIANO 340-0 Piano Recital Hour** (0)

**PIANO 358-0 Other Keyboard: Instruction in Harpsichord or Organ** (.5)

**PIANO 370-0 Junior Recital** (0)

**PIANO 380-0 Senior Recital** (0)

**PIANO 391-0 Chamber Music** (.5) For juniors and seniors.

**PIANO 392-0 Chamber Music: Trios** (.5)

**PIANO 399-0 Independent Study** (.5–1)

### *String Instruments*

Majors in string instruments prepare for professional performance and teaching as well as for advanced study. The curriculum is built around individual performance study and ensemble participation, including chamber music and orchestra, with orchestral studies and string pedagogy available to qualified juniors and seniors. A junior recital and a senior recital are required. Students in this program may major in violin, viola, cello, double bass, harp, or classical guitar.

### **Major Studies Requirements**

For a major in violin, viola, or cello, 19.5 course units are required beyond the core degree requirements.

#### *Violin, Viola, and Cello Performance*

- 200-level performance study (3 units)
- 300-level performance study (6 units)
- 300-level string pedagogy (1.5 units)
- 319-1,2,3 Orchestral Studies (1.5 units)
- 370 Junior Recital (0 units)
- 380 Senior Recital (0 units)
- 391 Chamber Music (3 units)
- CONDUCT 393 Orchestral Organizations (4.5 units)

For a major in double bass performance, 18 course units are required beyond the core degree requirements.

#### *Double Bass Performance*

- 200-level performance study (3 units)
- 300-level performance study (6 units)
- 300-level string pedagogy (1.5 units)
- 319-1,2,3 Orchestral Studies (1.5 units)
- 370 Junior Recital (0 units)
- 380 Senior Recital (0 units)
- 391 Chamber Music (1.5 units)
- CONDUCT 393 Orchestral Organizations (4.5 units)

For a major in harp or guitar performance, 16.5 course units are required beyond the core degree requirements.

### *Harp Performance*

- 200-level performance study (3 units)
- 300-level performance study (6 units)
- Large ensemble (4.5 units)
- 318-1,2,3 Harp Pedagogy and Maintenance (1.5 units)
- 319-1,2,3 Orchestral Studies (1.5 units)
- 380 Senior Recital (0 units)

### *Guitar Performance*

- 200-level performance study (3 units)
- 300-level performance study (6 units)
- 374 Guitar Ensemble (4.5 units)
- 375-1,2,3 Lute and Guitar Literature (1.5 units)
- 376-1,2,3 Guitar Pedagogy (1.5 units)
- 380 Senior Recital (0 units)

### **Courses Open to Undergraduates**

**STRINGS 141-0, 241-0, 341-0 Violin Performance**

**STRINGS 142-0, 242-0, 342-0 Viola Performance**

**STRINGS 143-0, 243-0, 343-0 Cello Performance**

**STRINGS 144-0, 244-0, 344-0 Double Bass Performance**

**STRINGS 151-0, 251-0, 351-0 Harp Performance**

**STRINGS 171-0, 271-0, 371-0 Classical Guitar Performance**

**STRINGS 305-0 Optional Recital** (0)

**STRINGS 311-0 Suzuki Pedagogy** (.5) Fundamental principles of Suzuki philosophy and materials. Available to violin, viola, cello, and double bass players with emphasis on application to violin.

**STRINGS 312-0 String Class Pedagogy** (.5) Group teaching strategies, program administration, materials and techniques, and pedagogy for violin, viola, cello, and double bass. For performance and pedagogy majors; secondary instruments and pedagogical applications to school settings and/or college-level techniques classes.

**STRINGS 313-0 History of String Pedagogy** (.5) Historical survey of the major violin, viola, cello, and double bass pedagogues from the early baroque through the 20th century; study of publications and contributions of contemporary schools. Lecture and seminar format.

**STRINGS 314-0 Comprehensive String Pedagogy** (.5)

Comparative study and application of the principles of successful string teaching. Communication skills, observations, comparison of contemporary approaches of Suzuki, Rolland, Havas, et al. Lecture, discussion, and demonstration format. Open to all string players.

**STRINGS 315-1,2,3 Beginning Violin and Viola Pedagogy** (.5) Developmental approach to individual and group teaching of elementary-level violin and viola students. Includes Rolland and Suzuki approaches, apprenticeship teaching, and observations. Open to all string players.

**STRINGS 316-1,2,3 Beginning Cello and Double Bass Pedagogy** (.5) Developmental approach to individual and group teaching of elementary-level cello and double bass students. Open to all string players.

**STRINGS 317-0 Principles of Advanced/College-Level Studio Teaching (.5)** In-depth analysis of individual instrument pedagogy for violin, viola, cello, or double bass according to major instrument. Observation of artist faculty. Open to all string players.

**STRINGS 318-1,2,3 Harp Pedagogy and Maintenance (.5)**

1. Guests and master classes related to playing and teaching. 2. Instrument maintenance and repair clinic with hands-on experience in routine maintenance and common repairs. 3. Pedagogical instruction and demonstration of teaching techniques for all levels and ages.

**STRINGS 319-1,2,3 Orchestral Studies (Violin, Viola, Cello, Double Bass, Harp) (.5)**

**STRINGS 335-0 Selected Topics in Strings** Topics vary; announced before registration. May be repeated.

**STRINGS 370-0 Junior Recital (0)**

**STRINGS 374-0 Guitar Ensemble** Performance of the chamber literature for guitar: guitar duos, trios, and quartets; flute and guitar; voice and guitar; chamber works with strings; other instrumental combinations.

**STRINGS 375-1,2,3 Lute and Guitar Literature** Analytical and historical survey of the literature for plucked instruments from the 16th through the 20th centuries. The study of tablatures, instrument construction and tuning, performance practice, and style.

**STRINGS 376-1,2,3 Guitar Pedagogy** Principles of individual and group study. Survey of development of right- and left-hand technique from 16th-century lute and vihuela tutors through modern classical guitar methods. Interaction between musical texture and technical innovations; influence of fingering on stylistic inflection and ornamentation.

**STRINGS 380-0 Senior Recital (0)**

**STRINGS 391-0 Chamber Music (.5)** Performance of chamber ensemble literature for violin, viola, cello, double bass, and harp.

**STRINGS 399-0 Independent Study (.5–1)**

### *Voice and Opera*

Students majoring in voice take a concentrated program of courses designed to prepare them for professional performance. In addition to individual instruction, students take courses in musicology, vocal pedagogy, conducting, opera workshop, repertoire, and diction. A senior recital is required, and students are urged to take advantage of the numerous other performance opportunities offered by the school.

The Northwestern Opera Center is supported by a generous endowment in memory of the famous American soprano Edith Mason Ragland. The internationally acclaimed Edith Mason and William E. Ragland Opera Theater presents three opera productions each year.

### Major Studies Requirements

For a major in voice performance, 17 course units are required beyond the core degree requirements.

- 111-1,2,3 Phonetics and Diction (0 units)
- 210 Voice Performance (3 units)
- 211 Sophomore Practicum (0 units)
- 212 Opera Crew (0 units)
- 310 Voice Performance (6 units)
- 311 Vocal Solo Class (12 quarters, 0 units)
- 323 Study of the Vocal Mechanism (.5 unit)
- 351-1,2,3 Opera Workshop for Juniors (1.5 units)
- 352-1,2,3 Opera Workshop for Seniors (1.5 units)
- 380 Senior Recital (0 units)
- CONDUCT 364 Choral Organizations (4.5 units)

It is recommended that voice performance majors take 3 units of one foreign language and achieve a level-five competency in Keyboard Skills. See the voice program coordinator concerning the honors program in voice performance.

### Courses Open to Undergraduates

**VOICE 102-0 Beginning Voice** Class instruction for Music Theatre Certificate students. Basic music skills required. Prerequisite: admission to the Music Theatre Program.

**VOICE 110-0, 210-0, 310-0 Voice Performance** Lessons consist of private instruction, with each student receiving the equivalent of 50 minutes of instruction weekly.

**VOICE 111-1,2,3 Phonetics and Diction (0)** Required of freshman and transfer students majoring in voice. Three quarters: Italian, German, French.

**VOICE 202-0 Intermediate Voice** Private instruction for Music Theatre Certificate students. Prerequisites: admission to the Music Theatre Program and 102 or equivalent.

**VOICE 211-0 Sophomore Practicum (0)**

**VOICE 212-0 Opera Crew (0)** One quarter required for voice majors. Students work crew for one opera production during sophomore year.

**VOICE 305-0 Optional Recital (0)**

**VOICE 311-0 Vocal Solo Class (0)** Weekly recital hour.

Required for any student registered for full-credit private voice lessons.

**VOICE 323-0 Study of the Vocal Mechanism (.5)** Lectures, readings, discussions, and demonstrations of basic vocal physiology, common vocal problems, and use of exercises and songs for vocal improvement. Prerequisite: major in voice with junior or senior standing, or consent of instructor.

**VOICE 335-0 Selected Topics in Voice** Topics vary; announced before registration. May include chanson, recitative, and non-English languages. May be repeated.

**VOICE 351-1,2,3 Opera Workshop for Juniors (.5)** Advanced techniques for the performance of arias; methods of text and character analysis; audition techniques; study of opera scenes. Must be taken sequentially.

**VOICE 352-1,2,3 Opera Workshop for Seniors (.5)** Specialty seminars (stage makeup, combat, etc.); audition techniques, opera scene work and performance. Prerequisites: 351-1,2,3. Must be taken sequentially.

**VOICE 357-0 The German Lied (.5)** A performance class for singers and pianists that explores the *Lieder* repertoire by Schubert, Schumann, Brahms, Wolf, Mahler, and Strauss.

**VOICE 363-0 Chanson (.5)** A performance class for singers and pianists that explores the *mélodie* repertoire by Fauré, Duparc, Chausson, Hahn, Debussy, Ravel, and Poulenc.

**VOICE 370-0 Junior Recital (0)**

**VOICE 380-0 Senior Recital (0)**

**VOICE 399-0 Independent Study (.5–1)** Permission of instructor and department required.

### *Wind and Percussion Instruments*

Designed to prepare students for professional performance and teaching as well as for advanced study, the major in wind and percussion instruments offers a concentrated curriculum emphasizing performance studies, frequent master classes, required participation in large and small ensembles, and a required senior recital. Students anticipating graduate study in wind or percussion performance are advised to elect additional courses in 300-level theory and history.

### Major Studies Requirements

For a major in wind and percussion performance, 16.5 course units are required beyond the core degree requirements.

- 200-level performance study (3 units)
- 300-level performance study (6 units)
- Large ensemble (4.5 units)
- 380 Senior Recital (0 units)
- 391 Chamber Music (3 units)
- CONDUCT 374 Band Organizations or  
CONDUCT 393 Orchestral Organizations (4.5 units)

### Courses Open to Undergraduates

**WIND PER 111-0, 211-0, 311-0 Flute Performance**

**WIND PER 112-0, 212-0, 312-0 Oboe Performance**

**WIND PER 113-0, 213-0, 313-0 Clarinet Performance**

**WIND PER 114-0, 214-0, 314-0 Saxophone Performance**

**WIND PER 115-0, 215-0, 315-0 Bassoon Performance**

**WIND PER 121-0, 221-0, 321-0 Trumpet Performance**

**WIND PER 122-0, 222-0, 322-0 French Horn Performance**

**WIND PER 123-0, 223-0, 323-0 Euphonium Performance**

**WIND PER 124-0, 224-0, 324-0 Trombone Performance**

**WIND PER 125-0, 225-0, 325-0 Tuba Performance**

**WIND PER 131-0, 231-0, 331-0 Percussion Performance**

**WIND PER 305-0 Optional Recital (0)**

**WIND PER 335-0 Selected Topics in Winds and Percussion**

Topics vary; announced before registration. May be repeated.

**WIND PER 336-0 Woodwind Orchestral Repertoire (.5)** Wind section performance practices and performance techniques in the standard orchestra literature.

**WIND PER 338-0 Brass Orchestral Repertoire (.5)** Study of brass section performance practice and performance techniques in the 19th- and 20th-century orchestral repertoire. Limited to junior, senior, and graduate students. May be repeated once.

**WIND PER 339-0 Performance Practices and Criticism**

Performance and criticism of woodwind, brass, and percussion repertoire in a master class setting. Team-taught.

**WIND PER 340-0 Brass Choir (.5)**

**WIND PER 341-0 Woodwind Instrument Repertoire (.5)**

Survey of woodwind literature and performance practices; solos and chamber music for various performance levels.

**WIND PER 342-0 Brass Instrument Repertoire (.5)** Brass literature and performance practices; solos, pedagogical materials, and chamber music for various levels of performance.

**WIND PER 347-0 Percussion Pedagogy and Performance**

Methods, materials, and writings related to percussion playing and teaching. Prerequisite: 300-level standing in percussion performance or consent of instructor.

**WIND PER 352-0 Preparing for an Audition (.5)**

**WIND PER 354-0 Woodwind Instrument Repair (.5)**

**WIND PER 357-0 Reedmaking for Single Reed Instruments (.5)**

**WIND PER 359-0 Teaching Techniques (.5)**

**WIND PER 360-0 Bass Clarinet (.5)**

**WIND PER 364-0 Baroque Flute (.5)**

**WIND PER 370-0 Junior Recital (0)**

**WIND PER 380-0 Senior Recital (0)**

**WIND PER 391-0 Chamber Music (.5)**

**WIND PER 392-0 Studio Ensembles (0–.5)**

**WIND PER 395-0 Saxophone Ensemble (.5)**

**WIND PER 399-0 Independent Study (.5–1)**

## Administration and Faculty

### UNIVERSITY ADMINISTRATION

#### University Officials

Henry S. Bienen, PhD, *President of the University*

Daniel I. Linzer, PhD, *Provost*

Eugene S. Sunshine, MPA, *Senior Vice President for Business and Finance*

William J. Banis, PhD, *Vice President for Student Affairs*

Thomas G. Cline, JD, *Vice President and General Counsel*

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J. Larry Jameson, MD, PhD, *Vice President for Medical Affairs and Lewis Landsberg Dean of the Feinberg School of Medicine*

Marilyn McCoy, MPP, *Vice President for Administration and Planning*

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Eugene Y. Lowe Jr., PhD, *Assistant to the President*

Ronald R. Braeutigam, PhD, *Associate Provost for Undergraduate Education*

Jake Julia, PhD, *Associate Provost for Academic Initiatives and Associate Provost for Change Management*

Michael E. Mills, MA, *Associate Provost for University Enrollment*

Jean E. Shedd, MBA, *Associate Provost for Budget, Facilities, and Analysis*

James B. Young, PhD, *Associate Provost for Faculty Affairs*

#### Office of the Vice President for Student Affairs

Mary K. Desler, PhD, *Associate Vice President for Student Affairs and Dean of Students*

Burgwell J. Howard, MEd, *Assistant to the Vice President for Student Affairs*

Carretta Cooke, MEd, *Executive Director, Multicultural Student Affairs*

Richard R. Thomas, MSA, *Executive Director, Norris University Center*

Shawna Cooper-Gibson, MEd, *Director, African American Student Affairs*

Sheila Driscoll, GSBA, *Director, Business and Finance*

John Dunkle, PhD, *Director, Counseling and Psychological Services*

Lonnie J. Dunlap, PhD, *Director, University Career Services*

Mary G. Goldenberg, MEd, *Director, University Residential Life*

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James R. Neumeister, JD, *Director, Judicial Affairs*

Marc Skjervem, MA, *Director, Orientation and Parent Programs*

Helen N. Wood, MS, *Director, Center for Student Involvement; Associate Director, Norris University Center*

Tausak Vanadilok, MA, *Director, Asian/Asian American Student Affairs*

Christian Yanez, MA, *Director, Hispanic/Latino Student Affairs*

Sebastian Contreras Jr., MS, *Associate Director, Norris University Center*

Mark D'Arienzo, MS, *Associate Director, University Housing and Food Services*

Dianne Siekmann, MA, *Associate Director, University Career Services*

Dannee Polomsky, MS, *Manager, Services for Students with Disabilities (Chicago)*

Margaret Roe, MEd, *Manager, Services for Students with Disabilities (Evanston)*

Timothy S. Stevens, PhD, *University Chaplain*

Erica L. Brown, MDiv, *Assistant University Chaplain*

#### Office of the Associate Provost for University Enrollment

##### Office of the Registrar

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Nedra W. Hardy, BS, *Senior Assistant Registrar for Course Teacher Evaluation*

Maria S. Munoz, BPhC, *Senior Assistant Registrar for Academic Advisement and Security Administration*

William R. Berry, *Assistant Registrar for Systems*  
 Oralia G. Gomez, *Assistant Registrar for Transcripts, Grading, and Verification Services*  
 Jacquelyn F. C. Rivera, BA, *Assistant Registrar for Scheduling and Registration*  
 Jason Compton, *Manager, Academic Report Services*

### **Financial Aid Office**

Carolyn V. Lindley, MA, *University Aid Director*  
 Adina Andrews, MS, *Director, Student Financial Services*  
 Angela Yang, MS, *Director, Financial Aid Operations*  
 Allen V. Lentino, PhD, *Senior Associate Director, Admission and Financial Aid*  
 Brian Drabik, BA, *Associate Director*  
 Mary Stonis, BA, *Senior Assistant Director*  
 Maggie Bleeker, BS, *Assistant Director*  
 Peggy Bryant, *Assistant Director*  
 Michael Frechette, MA, *Assistant Director*  
 Susanna Kwan, BA, *Assistant Director*  
 David Musser, BA, *Assistant Director*  
 Anne Horne, BA, *Coordinator, Federal Work-Study Program*

### **Undergraduate Admission Office**

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 Allen V. Lentino, PhD, *Senior Associate Director, Admission and Financial Aid*  
 F. Sheppard Shanley, MAT, *Senior Associate Director, Admission*  
 Onis Cheatham, MA, *Associate Director*  
 William N. Haarlow, PhD, *Director, College-Admission Relations, Weinberg College*  
 Sophie Kaulas, MSJ, *Manager of Publications and Content Editor*  
 Margaret Miranda, MA, *Senior Assistant Director*  
 Lindsey Cheney, MA, *Assistant Director*  
 Jaime A. Garcia, BS, *Assistant Director*  
 Josiah Jenkins, BA, *Assistant Director*  
 Shannon Kennedy, MEd, *Assistant Director*  
 Anne Kremer, BS, *Assistant Director*  
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 Laura A. Robinson, MS, *Assistant Director*  
 Tamara Stewart-Hadaway, BA, *Assistant Director*  
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 Barb Bamburg, BA, *Operations Manager for Admission Services*  
 Robert S. Henkins, BS, *Senior Systems Analyst/Programmer*

### **University Library**

Sarah M. Pritchard, MALS, *University Librarian and Charles Deering McCormick Distinguished Chair of Research Librarianship*  
 Stu Baker, BA, *Interim Assistant University Librarian for Information Technology*  
 Jeffrey Garrett, MLIS, *Assistant University Librarian for Special Libraries*  
 Robert C. Michaelson, MALS, *Interim Assistant University Librarian for Public Services*  
 Roxanne J. Sellberg, MLS, *Assistant University Librarian for Technical Services and Resource Management*

## **UNDERGRADUATE SCHOOLS**

The following lists of the respective administration and faculty of the undergraduate schools were current as of summer 2008. In the administration lists the administrative title precedes the academic rank. In the department lists faculty rank within the department is given first; an administrative assignment, joint appointment in another department, or affiliation with a University center, if any, follows. The highest academic or professional degree and the institution granting the degree are shown. *University* and *College* are usually omitted; familiar abbreviations and short forms are used when appropriate. The department chair is designated when the appointment was known at the time the catalog went to press.

### **Judd A. and Marjorie Weinberg College of Arts and Sciences**

#### **Administration**

Sarah Mangelsdorf, PhD, *Dean of Weinberg College and Professor of Psychology*  
 Steven L. Bates, PhD, *Associate Dean and Lecturer in English*  
 Craig Bina, PhD, *Associate Dean and Wayne V. Jones II Professor of Earth and Planetary Sciences*  
 Mary E. Finn, PhD, *Associate Dean and Distinguished Senior Lecturer in English*  
 Marie Thourson Jones, PhD, *Associate Dean and Lecturer in Political Science*  
 Marvin J. Lofquist, PhD, *Associate Dean and Senior Lecturer in Chemistry*



John McLane, PhD, *Associate Dean and Professor Emeritus of History*

Lane Fenrich, PhD, *Assistant Dean for Freshmen and Charles Deering McCormick University Distinguished Senior Lecturer in History*

Mark Sheldon, PhD, *Assistant Dean and Distinguished Senior Lecturer in Philosophy*

Richard P. Weimer, MA, *Assistant Dean*

Steven W. Cole, PhD, *Director of Faculty Evaluation and Lecturer in Asian and Middle East Studies*

William N. Haarlow, PhD, *Director of College-Admission Relations and Undergraduate Research and Lecturer in American Studies; also Undergraduate Admission*

Joan A. W. Linsenmeier, PhD, *Director of Curricular Projects and Senior Lecturer in Psychology*

Christine Bell, PhD, *College Adviser and Lecturer in Art History*

Jaime Dominguez, PhD, *College Adviser and Lecturer in Political Science*

Sheila Donohue, MFA, *College Adviser and Senior Lecturer in English*

Angela Grant, PhD, *College Adviser and Lecturer in Mathematics*

Michael Kramer, PhD, *College Adviser and Lecturer in History and American Studies*

Hilarie H. Lieb, PhD, *College Adviser and Senior Lecturer in Economics*

James O'Laughlin, MA, *College Adviser and Senior Lecturer in Writing Program*

Laura J. Panko, PhD, *College Adviser and Lecturer in Biological Sciences*

Jeanne R. Ravid, MA, *College Adviser and Senior Lecturer in Classics*

Jeffrey Rice, MSc, *College Adviser and Senior Lecturer in History*

Andrew Rivers, PhD, *College Adviser and Senior Lecturer in Physics*

Monica Russell Rodriguez, PhD, *College Adviser and Senior Lecturer in Anthropology*

William Savage, PhD, *College Adviser and Senior Lecturer in English*

Elizabeth Fekete Trubey, PhD, *College Adviser and Senior Lecturer in English*

### ***African American Studies***

Darlene Clark Hine (PhD Kent State) *Board of Trustees Professor and Chair; also History*

Ana Aparicio (PhD CUNY) *Assistant Professor; also Anthropology, Latina/o Studies*

Henry C. Binford (PhD Harvard) *Associate Professor; also History*

Martha Biondi (PhD Columbia) *Associate Professor; also History, Political Science*

Victoria DeFrancesco Soto (PhD Duke) *Assistant Professor; also Political Science, Institute for Policy Research*

Jennifer DeVere Brody (PhD Pennsylvania) *Professor; also English, Performance Studies*

Sherwin Bryant (PhD Ohio State) *Assistant Professor; also History*

Traci R. Burch (PhD Harvard) *Assistant Professor; also Political Science*

Huey G. Copeland (PhD UC Berkeley) *Assistant Professor; also Art History*

Dilip P. Gaonkar (PhD Pittsburgh) *Associate Professor; also Communication Studies*

Doris L. Garraway (PhD Duke) *Associate Professor; also French and Italian*

Geraldine Henderson (PhD Northwestern) *Associate Professor; also Journalism*

Barnor Hesse (PhD Essex) *Associate Professor; also Political Science, Sociology*

Richard J. Iton (PhD Johns Hopkins) *Associate Professor; also Political Science*

E. Patrick Johnson (PhD Louisiana State) *Professor; also Performance Studies*

John Keene (MFA NYU) *Associate Professor; also English*

Carol D. Lee (PhD Chicago) *Professor; also Education and Social Policy*

Nancy K. MacLean (PhD Wisconsin) *Professor; also History*

D. Soyini Madison (PhD Northwestern) *Associate Professor; also Performance Studies*

John Marquez (PhD UC San Diego) *Assistant Professor; also Latina/o Studies*

Kate Masur (PhD Michigan) *Assistant Professor; also History*

Charles Mills (PhD Toronto) *Professor; John Evans Professor in Philosophy (Philosophy)*

Toni-Marie Montgomery (PhD Michigan) *Professor; Dean and Professor, Bienen School of Music*

Aldon D. Morris (PhD SUNY Stony Brook) *Leon Forrest Professor; also Sociology*

Larry Murphy (PhD Graduate Theological Union) *Professor; also Garrett-Evangelical Theological Seminary*

Mary Pattillo (PhD Chicago) *Professor; also Sociology*

Dylan Penningroth (PhD Johns Hopkins) *Associate Professor; also Wayne V. Jones II Research Professor (History)*

Sandra L. Richards (PhD Stanford) *Professor*;  
*also Performance Studies, Theatre*

Jennifer Richeson (PhD Harvard) *Associate Professor*;  
*also Psychology, Institute for Policy Research*

Dorothy Roberts (JD Harvard) *Professor*; *Kirkland & Ellis*  
*Professor of Law*; *also Institute for Policy Research*

Reuel R. Rogers (PhD Princeton) *Associate Professor*;  
*also Political Science*

Juan Onésimo Sandoval (PhD UC Berkeley) *Assistant*  
*Professor*; *also Sociology, Transportation Center*

Nitasha Sharma (PhD UC Santa Barbara) *Assistant*  
*Professor*; *also Asian American Studies*

Jacqueline Stewart (PhD Chicago) *Associate Professor*;  
*also Radio/Television/Film*

Krista A. Thompson (PhD Emory) *Assistant Professor*;  
*also Art History*

Tracy Vaughn (PhD Massachusetts) *Lecturer*

Celeste Watkins-Hayes (PhD Harvard) *Assistant Professor*;  
*also Sociology, Institute for Policy Research*

Alexander G. Weheliye (PhD Rutgers) *Associate Professor*;  
*also English, German*

Harvey Young (PhD Cornell) *Assistant Professor*; *also*  
*Performance Studies, Radio/Television/Film, Theatre*

### ***African and Asian Languages***

Licheng Gu (PhD Oregon) *Distinguished Senior Lecturer*  
*and Director*

Kagan Arik (PhD Chicago) *Lecturer*

Mika Changet (MA Illinois Chicago) *Lecturer*

Edna G. Grad (PhD Texas) *Distinguished Senior Lecturer*

Hong Jiang (MEd Cincinnati, MA Zhongshan)  
*Distinguished Senior Lecturer*

Bruce Knickerbocker (MA Wisconsin) *Lecturer*

Eunmi Lee (MA Indiana) *Senior Lecturer*

Richard Lepine (PhD Wisconsin) *Senior Lecturer*

Hsiu-ling Lin (EdD Massachusetts) *Senior Lecturer*

Phyllis I. Lyons (PhD Chicago) *Associate Professor*

Rami Nair (PhD Northwestern) *Senior Lecturer*

Junko Sato (MEd Massachusetts) *Senior Lecturer*

Yumi Shiojima (MEd Pennsylvania) *Senior Lecturer*

Jili Sun (PhD Sorbonne Nouvelle) *Lecturer*

Noriko Taira (MEd Massachusetts) *Distinguished Senior*  
*Lecturer*

Lynn Whitcomb (PhD Northwestern) *Senior Lecturer*

Judith Wilks (PhD Chicago) *Lecturer*

Guofang Yuan (PhD Cleveland State) *Lecturer*

### ***Anthropology***

William R. Leonard (PhD Michigan) *Professor and Chair*;  
*also Neurobiology and Physiology*

Ana Aparicio (PhD CUNY) *Assistant Professor*; *also African*  
*American Studies, Latina/Latino Studies*

Caroline H. Bledsoe (PhD Stanford) *Melville J. Herskovits*  
*Professor of African Studies*

James A. Brown (PhD Chicago) *Professor*

Elizabeth M. Brumfiel (PhD Michigan) *Professor*

Micaela di Leonardo (PhD UC Berkeley) *Professor*;  
*also Performance Studies*

Timothy Earle (PhD Michigan) *Professor*

Karen Tranberg Hansen (PhD Washington) *Professor*

Katherine E. Hoffman (PhD Columbia) *Associate Professor*

John C. Hudson (PhD Iowa) *Professor*

William Irons (PhD Michigan) *Professor*

Christopher Kuzawa (PhD Emory) *Associate Professor*;  
*also Institute for Policy Research*

Robert G. Launay (PhD Cambridge) *Professor*

Thomas McDade (PhD Emory) *Associate Professor*;  
*Weinberg College Board of Visitors Research and Teaching*  
*Professor*; *also Education and Social Policy, Institute for*  
*Policy Research*

Cynthia Robin (PhD Pennsylvania) *Associate Professor*

Monica Russel y Rodriguez (PhD UCLA) *Senior Lecturer*  
*and College Adviser*

Helen B. Schwartzman (PhD Northwestern) *Professor*

Shalini Shankar (PhD NYU) *Assistant Professor*

Kearsley Stewart (PhD Florida) *Senior Lecturer*

Mary J. Weismantel (PhD Illinois) *Professor*; *also Spanish*  
*and Portuguese*

### ***Art History***

Claudia Swan (PhD Columbia) *Associate Professor and Chair*

Christine Bell (PhD Northwestern) *Lecturer and*  
*College Adviser*

S. Hollis Clayson (PhD UCLA) *Bergen Evans Professor in*  
*the Humanities*; *also History*

Huey G. Copeland (PhD UC Berkeley) *Assistant Professor*;  
*also African American Studies*

Stephen F. Eisenman (PhD Princeton) *Professor*

Hannah Feldman (PhD Columbia) *Assistant Professor*

Bernadette Fort (PhD Sorbonne) *Professor*; *also French*  
*and Italian*

Sarah E. Fraser (PhD UC Berkeley) *Associate Professor*

Cecily Hilsdale (PhD Chicago) *Assistant Professor*

Christina Kiaer (PhD UC Berkeley) *Associate Professor*

Hamid Naficy (PhD UCLA) *Professor*; *also Radio/Television/*  
*Film*

Christopher Pinney (PhD London School of Economics)  
*Mary Jane Crowe Professor*

Marco Ruffini (PhD UC Berkeley) *Assistant Professor;*  
*also French and Italian*

David Alan Robertson (PhD Pennsylvania) *Lecturer;*  
*Ellen Philips Katz Director; Mary and Leigh Block*  
*Museum of Art*

Sarah E. Teasley (PhD Tokyo) *Assistant Professor*

Krista A. Thompson (PhD Emory) *Assistant Professor;*  
*also African American Studies*

David T. Van Zanten (PhD Harvard) *Mary Jane Crowe*  
*Professor of Art and Architecture*

### ***Art Theory and Practice***

Jeanne Dunning (MFA Art Institute Chicago) *Professor*  
*and Chair*

Pamela Bannos (MFA Illinois) *Senior Lecturer*

Kelly Kaczynski (MFA Bard) *Assistant Professor*

Judy Ledgerwood (MFA Art Institute Chicago)  
*Associate Professor*

Marlena Novak (MFA Northwestern) *Lecturer*

Robert A. Pruitt (MFA Texas) *Lecturer*

Michael Rakowitz (MS MIT) *Associate Professor*

Steve Reinke (MFA Nova Scotia) *Associate Professor*

Lane Relyea (PhD Texas) *Assistant Professor*

### ***Biochemistry, Molecular Biology, and Cell Biology***

Kelly E. Mayo (PhD Washington) *Professor and Chair;*  
*also Neurobiology and Physiology*

Ravi Allada (MD Michigan) *Associate Professor; also*  
*Neurobiology and Physiology, Pathology*

Gregory J. Beitel (PhD MIT) *Associate Professor*

Jason Brickner (PhD Stanford) *Assistant Professor*

Richard Carthew (PhD MIT) *Owen L. Coon Professor of*  
*Molecular Biology*

Andrew Dudley (PhD Harvard) *Assistant Professor*

Lawrence B. Dumas (PhD Wisconsin) *Professor*

Heike Fölsch (PhD Ludwig-Maximilians) *Assistant*  
*Professor*

Richard F. Gaber (PhD Wisconsin) *Professor;*  
*also Biological Sciences*

Erwin Goldberg (PhD Iowa) *Professor*

Linda Hicke (PhD UC Berkeley) *Professor*

Brian M. Hoffman (PhD Caltech) *Professor; also C. E. and*  
*E. H. Morrison Professor (Chemistry)*

Robert A. Holmgren (PhD Harvard) *Professor and Associate*  
*Chair; also Neurobiology and Physiology*

Curt Horvath (PhD Northwestern) *Professor; also Medicine*

Carole LaBonne (PhD Harvard) *Associate Professor and*  
*Soretta and Henry Shapiro Professor*

Laimonis Laimins (PhD Chicago) *Professor; also*  
*Microbiology and Immunology*

Robert A. Lamb (PhD Cambridge) *John Evans Professor*  
*in Molecular and Cellular Biology and Howard Hughes*  
*Medical Investigator*

Daniel I. Linzer (PhD Princeton) *Professor; Provost,*  
*Northwestern University*

Paul A. Loach (PhD Yale) *Professor; also Chemistry*

John Marko (PhD UC Berkeley) *Professor; also Physics*  
*and Astronomy*

Andreas Matouschek (PhD Cambridge) *Professor*

Michele McDonough (PhD SUNY Stony Brook) *Lecturer*  
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Thomas J. Meade (PhD Ohio State) *Eileen Foell Professor;*  
*also Chemistry, Neurobiology and Physiology, Radiology*

Alfonso Mondragón (PhD Chicago) *Professor*

Richard I. Morimoto (PhD Chicago) *Bill A. and Gayle*  
*Cook Professor in Biological Sciences*

Thomas V. O'Halloran (PhD Columbia) *Charles E. and*  
*Emma H. Morrison Professor; also Chemistry*

Heather Pinkett (PhD Pennsylvania) *Assistant Professor*

Ishwar Radhakrishnan (PhD Columbia) *Associate Professor*

Amy Rosenzweig (PhD MIT) *Professor; also Chemistry*

Richard B. Silverman (PhD Harvard) *Professor; also John*  
*Evans Professor (Chemistry)*

Erik Sontheimer (PhD Yale) *Associate Professor; Irving M.*  
*Klotz Research Professor in Chemistry (Chemistry)*

Olke Uhlenbeck (PhD Harvard) *Professor; also Chemistry*

Xiaozhong (Alec) Wang (PhD NYU School of Medicine)  
*Assistant Professor*

Eric Weiss (PhD Colorado) *Assistant Professor*

Jonathan Widom (PhD Stanford) *William Deering Professor*  
*in Biological Science; also Chemistry*

Teresa Woodruff (PhD Northwestern) *Professor;*  
*also Obstetrics and Gynecology*

Tai Te Wu (PhD Harvard) *Professor; also Biomedical*  
*Engineering*

### ***Biological Sciences, Program in***

Richard F. Gaber (PhD Wisconsin) *Professor and Director;*  
*also Biochemistry, Molecular Biology, and Cell Biology*

Roberta W. Ellington (BA Barat) *Lecturer*

Gary J. Galbreath (PhD Chicago) *Distinguished Senior*  
*Lecturer and Associate Director*

Tracy M. Hodgson (PhD Pittsburgh) *Lecturer*

Teresa H. Horton (PhD Utah) *Lecturer*

John C. Mordacq (PhD Northwestern) *Distinguished Senior Lecturer and Director of Undergraduate Laboratories*

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Christina T. Russin (PhD Wisconsin) *Senior Lecturer*

David W. Taylor (PhD Michigan) *Lecturer*

Joseph Walsh (PhD Chicago) *Lecturer*

## **Chemistry**

Joseph T. Hupp (PhD Michigan State) *Charles E. and Emma H. Morrison Professor and Chair*

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Lin Chen (PhD Chicago) *Professor*

Barry A. Coddens (PhD Wayne State) *Senior Lecturer*

Theresa A. Collins (PhD Vermont) *Lecturer and Assistant Chair*

Peter Doan (PhD Illinois) *Research Professor*

Donald E. Ellis (PhD MIT) *Professor; also Physics and Astronomy*

Antonio F. Facchetti (PhD Milan) *Research Assistant Professor*

Franz F. Geiger (PhD Georgetown) *Associate Professor*

Bartosz A. Grzybowski (PhD Harvard) *Professor; also Chemical and Biological Engineering*

Shelby L. Hatch (PhD Rochester) *Lecturer*

Mark C. Hersam (PhD Illinois) *Professor; also Materials Science and Engineering*

Brian M. Hoffman (PhD Caltech) *Charles E. and Emma H. Morrison Professor; also Biochemistry, Molecular Biology, and Cell Biology*

James A. Ibers (PhD Caltech) *Charles E. and Emma H. Morrison Professor*

Mercouri G. Kanatzidis (PhD Iowa) *Charles E. and Emma H. Morrison Professor*

Joseph B. Lambert (PhD Caltech) *Clare Hamilton Hall Professor*

Frederick D. Lewis (PhD Rochester) *Professor*

Paul A. Loach (PhD Yale) *Professor; also Biochemistry, Molecular Biology, and Cell Biology*

Marvin J. Lofquist (PhD Northwestern) *Senior Lecturer; Associate Dean, Weinberg College*

Tobin J. Marks (PhD MIT) *Vladimir Ipatieff Research Professor in Organic Chemistry; also Materials Science and Engineering*

Thomas J. Meade (PhD Ohio State) *Eileen Foell Professor; also Biochemistry, Molecular Biology, and Cell Biology, Neurobiology and Physiology, Radiology*

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SonBinh T. Nguyen (PhD Caltech) *Professor*

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Monica Olvera de la Cruz (PhD Cambridge) *Professor; also Chemical and Biological Engineering, Materials Science and Engineering*

Andrew Ott (PhD Colorado) *Research Professor*

Thomas V. O'Halloran (PhD Columbia) *Charles E. and Emma H. Morrison Professor; also Biochemistry, Molecular Biology, and Cell Biology*

Michael Pellin (PhD Illinois) *Professor*

Kenneth R. Poeppelmeier (PhD Iowa State) *Professor*

Owen P. Priest (PhD Minnesota) *Distinguished Senior Lecturer*

Mark A. Ratner (PhD Northwestern) *Lawrence B. Dumas Distinguished University Chair*

Amy Rosenzweig (PhD MIT) *Professor; also Biochemistry, Molecular Biology, and Cell Biology*

George C. Schatz (PhD Caltech) *Charles E. and Emma H. Morrison Professor*

Karl A. Scheidt (PhD Indiana) *Associate Professor and Irving M. Klotz Research Professor*

Tamar Seideman (PhD Weizmann Institute) *Professor; also Physics and Astronomy*

Richard B. Silverman (PhD Harvard) *John Evans Professor; also Biochemistry, Molecular Biology, and Cell Biology*

Erik Sontheimer (PhD Yale) *Associate Professor; also Biochemistry, Molecular Biology, and Cell Biology*

Kenneth G. Spears (PhD Chicago) *Professor; also Biomedical Engineering*

Peter C. Stair (PhD UC Berkeley) *Professor; Director, Center for Catalysis and Surface Science*

J. Fraser Stoddart (PhD Edinburgh) *Board of Trustees Professor*

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Igal Szleifer (PhD Hebrew Jerusalem) *Professor; also Christina Enroth-Cugell Professor (Biomedical Engineering)*

Regan J. Thomson (PhD Australian National) *Assistant Professor*

Larry S. Trzupek (PhD MIT) *Senior Lecturer*  
 Olke Uhlenbeck (PhD Harvard) *Professor; also Biochemistry, Molecular Biology, and Cell Biology*  
 Richard P. Van Duyne (PhD North Carolina) *Charles E. and Emma H. Morrison Professor*  
 Michael R. Wasielewski (PhD Chicago) *Professor*  
 Emily Weiss (PhD Northwestern) *Assistant Professor*  
 Eric Weitz (PhD Columbia) *Professor*  
 Jonathan Widom (PhD Stanford) *William Deering Professor in Biological Science; also Biochemistry, Molecular Biology, and Cell Biology*

### **Classics**

S. Sara Monoson (PhD Princeton) *Associate Professor and Chair; also Political Science*  
 Kathryn Boshier (PhD Michigan) *Assistant Professor*  
 Daniel H. Garrison (PhD UC Berkeley) *Professor*  
 Reginald Gibbons (PhD Stanford) *Professor; also English, Spanish and Portuguese*  
 Marianne Hopman (PhD Harvard, Sorbonne) *Assistant Professor*  
 Richard Kraut (PhD Princeton) *Charles E. and Emma H. Morrison Professor in the Humanities; also Philosophy*  
 Martin Mueller (PhD Indiana) *Professor; also English*  
 Helmut Müller-Sievers (PhD Stanford) *Professor; also German*  
 Barbara J. Newman (PhD Yale) *Dorothy Ann and Clarence L. Ver Steeg Distinguished Research Fellow; John Evans Professor in the Latin Language and Literature; also English, Religion*  
 Jeanne R. Ravid (MA Northwestern) *Senior Lecturer and College Adviser*  
 Francesca Tataranni (PhD Pisa) *Lecturer*  
 William Tortorelli (MA Brown) *Lecturer*  
 Robert W. Wallace (PhD Harvard) *Professor*  
 John Wynne (PhD Cornell) *Assistant Professor*

### **Earth and Planetary Sciences**

Bradley B. Sageman (PhD Colorado) *Professor and Chair*  
 Craig R. Bina (PhD Northwestern) *Wayne V. Jones II Professor of Earth and Planetary Sciences; Associate Dean, Weinberg College*  
 Neal Blair (PhD Stanford) *Professor; also Civil and Environmental Engineering*  
 Jean-François Gaillard (DSc Paris) *Associate Professor; also Civil and Environmental Engineering*  
 Youngsook Huh (PhD MIT) *Adjunct Associate Professor*  
 Matthew T. Hurtgen (PhD Penn State) *Assistant Professor*  
 Steven D. Jacobsen (PhD Colorado) *Assistant Professor*

Andrew D. Jacobson (PhD Michigan) *Assistant Professor*  
 Donna M. Jurdy (PhD Michigan) *Professor*  
 Abraham Lerman (PhD Harvard) *Professor*  
 Emile André Okal (PhD Caltech) *Professor*  
 Francesca A. Smith (PhD Chicago) *Assistant Professor*  
 Seth A. Stein (PhD Caltech) *William Deering Professor of Earth and Planetary Sciences*  
 Suzan Van der Lee (PhD Princeton) *Associate Professor*

### **Economics**

Charles F. Manski (PhD MIT) *Board of Trustees Professor and Chair; also Statistics, Institute for Policy Research*  
 Lori A. Beaman (PhD Yale) *Assistant Professor; also Institute for Policy Research*  
 Ronald R. Braeutigam (PhD Stanford) *Harvey Kapnick Professor of Business Institutions; Associate Provost for Undergraduate Education, Northwestern University*  
 Ivan Canay (PhD Wisconsin) *Assistant Professor*  
 Jannet Chang (PhD Illinois) *Lecturer*  
 Lawrence J. Christiano (PhD Columbia) *Alfred W. Chase Professor of Business Institutions*  
 Eddie Dekel (PhD Harvard) *William R. Kenan Jr. Professor*  
 Matthias Doepke (PhD Chicago) *Associate Professor*  
 Martin Eichenbaum (PhD Minnesota) *Ethel and John Lindgren Professor*  
 Jeffrey C. Ely (PhD UC Berkeley) *Professor*  
 Joseph P. Ferrie (PhD Chicago) *Professor*  
 Robert J. Gordon (PhD MIT) *Stanley G. Harris Professor in the Social Sciences*  
 Steffen Habermalz (PhD Wisconsin Milwaukee) *Lecturer*  
 David Haddock (PhD Chicago) *Professor; also School of Law*  
 Igal Hendel (PhD Harvard) *Professor*  
 James Hornsten (PhD Northwestern) *Senior Lecturer*  
 Joel Horowitz (PhD Cornell) *Charles E. and Emma H. Morrison Professor in Market Economics*  
 Lynne Kiesling (PhD Northwestern) *Senior Lecturer*  
 Hilarie H. Lieb (PhD Northwestern) *Senior Lecturer and College Adviser*  
 Kiminori Matsuyama (PhD Harvard) *Professor*  
 Joel Mokyr (PhD Yale) *Robert H. Strotz Professor of Arts and Sciences; also History*  
 Chiaki Moriguchi (PhD Stanford) *Assistant Professor*  
 Dale T. Mortensen (PhD Carnegie Mellon) *Ida C. Cook Professor of Consumer Economics*  
 Éva Nagypál (PhD Stanford) *Assistant Professor; also Institute for Policy Research*  
 Aviv Nevo (PhD Harvard) *Professor*



Wojciech Olszewski (PhD Warsaw and Princeton)  
*Professor*

Alessandro Pavan (PhD Toulouse) *Associate Professor*

Robert H. Porter (PhD Princeton) *William R. Kenan Jr.  
Professor*

Giorgio Primiceri (PhD Princeton) *Assistant Professor*

William P. Rogerson (PhD Caltech) *Professor*

Todd D. Sarver (PhD Boston) *Assistant Professor*

Ian P. Savage (PhD Leeds) *Distinguished Senior Lecturer  
and Associate Chair; Director, Transportation and Logistics  
Program*

Eric G. Schulz (PhD Northwestern) *Distinguished Senior  
Lecturer and Charles Deering McCormick University  
Distinguished Lecturer*

Ron Siegel (PhD Stanford) *Assistant Professor*

Marciano Siniscalchi (PhD Stanford) *Associate Professor*

Bruno Strulovici (PhD Stanford) *Assistant Professor*

Elie Tamer (PhD Northwestern) *HSBC Professor*

Sergio Urzúa (PhD Chicago) *Assistant Professor; also  
Institute for Policy Research*

Richard Walker (PhD London School of Economics)  
*Lecturer*

Burton Weisbrod (PhD Northwestern) *John Evans  
Professor; also Institute for Policy Research*

Michael Whinston (PhD MIT) *Robert E. and Emily King  
Professor in Business Institutions*

Mirko Wiederholt (PhD European University Institute)  
*Assistant Professor*

Mark P. Witte (PhD Northwestern) *Distinguished Senior  
Lecturer; Director, Business Institutions Program*

Asher Wolinsky (PhD Stanford) *Gordon Scott Fulcher  
Professor in Decision Making*

Martin Zelder (PhD Chicago) *Senior Lecturer*

### **English**

Susan A. Manning (PhD Columbia) *Professor; also  
Performance Studies, Theatre*

Steven L. Bates (PhD Princeton) *Lecturer in English;  
Associate Dean, Weinberg College*

Brian Bouldrey (MFA Warren Wilson) *Senior Lecturer*

Katharine H. Breen (PhD UC Berkeley) *Assistant Professor*

Paul Breslin (PhD Virginia) *Professor*

Jennifer DeVere Brody (PhD Pennsylvania) *Professor; also  
African American Studies, Performance Studies*

John Alba Cutler (PhD UCLA) *College Fellow*

Nicholas Davis (PhD Cornell) *Assistant Professor;  
also Gender Studies*

Tracy Davis (PhD Warwick) *Professor; Ethel M. Barber  
Professor of Performing Arts (Performance Studies);  
Director, Interdisciplinary PhD Program in Theatre and  
Drama; also Spanish and Portuguese, Theatre*

Sheila Donohue (MFA North Carolina Greensboro)  
*Senior Lecturer and College Adviser*

Stuart Dybek (MFA Iowa) *Distinguished Writer in Residence*

Brian T. Edwards (PhD Yale) *Associate Professor*

Betsy Erkkila (PhD UC Berkeley) *Henry Sanborn Noyes  
Professor in English Literature*

Kathryn (Kasey) Evans (PhD UC Berkeley) *Assistant  
Professor*

Mary E. Finn (PhD Bryn Mawr) *Distinguished Senior  
Lecturer; Associate Dean, Weinberg College*

Christine Froula (PhD Chicago) *Professor*

Reginald Gibbons (PhD Stanford) *Professor; also Classics,  
Spanish and Portuguese*

Susannah Gottlieb (PhD Chicago) *Associate Professor*

Wendy Griswold (PhD Harvard) *Bergen Evans Professor in  
the Humanities; also Sociology*

Jay A. Grossman (PhD Pennsylvania) *Associate Professor*

Christopher C. Herbert (PhD Yale) *Chester D. Tripp  
Professor in the Humanities*

John Keene (MFA NYU) *Associate Professor; also African  
American Studies*

Mary Kinzie (PhD Johns Hopkins) *Professor*

Christopher Lane (PhD London) *Herman and Beulah  
Pearce Miller Research Professor in Literature*

Jules David Law (PhD Johns Hopkins) *Associate Professor;  
Charles Deering McCormick Professor of Teaching  
Excellence*

John D. Margolis (PhD Princeton) *Professor; Dean,  
Northwestern University in Qatar*

Jeffrey Masten (PhD Pennsylvania) *Associate Professor;  
Charles Deering McCormick Professor of Teaching  
Excellence*

Martin Mueller (PhD Indiana) *Professor; also Classics*

Evan Mwangi (PhD Nairobi) *Assistant Professor*

Barbara J. Newman (PhD Yale) *Dorothy Ann and  
Clarence L. Ver Steeg Distinguished Research Fellow;  
Professor; John Evans Professor in the Latin Language  
and Literature (Classics); also Religion*

Susan E. Phillips (PhD Harvard) *Associate Professor*

William Savage (PhD Northwestern) *Senior Lecturer and  
College Adviser*

Regina M. Schwartz (PhD Virginia) *Professor; also Religion*

Laurie Shannon (PhD Chicago) *Associate Professor and  
Wender-Lewis Research and Teaching Professor*

Carl S. Smith (PhD Yale) *Franklyn Bliss Snyder Professor in English Literature; also History*  
 Vivasvan Soni (PhD Duke) *Assistant Professor*  
 Regina M. Schwartz (PhD Virginia) *Professor; also Religion*  
 Julia Stern (PhD Columbia) *Associate Professor and Charles Deering McCormick Professor of Teaching Excellence*  
 Helen F. Thompson (PhD Duke) *Associate Professor*  
 Elizabeth Fekete Trubey (PhD Northwestern) *Senior Lecturer and College Adviser*  
 Wendy Wall (PhD Pennsylvania) *Professor*  
 Alexander G. Weheliye (PhD Rutgers) *Associate Professor; also African American Studies, German*  
 William N. West (PhD Michigan) *Associate Professor*  
 Ivy Wilson (PhD Yale) *Assistant Professor*

### **French and Italian**

Jane Winston (PhD Duke) *Associate Professor and Chair; also Gender Studies*  
 Christopher P. Bush (PhD UCLA) *Assistant Professor*  
 Marie-Thérèse Cunningham (MA Grenoble III) *Senior Lecturer*  
 Margaret Mary Dempster (PhD Indiana) *Lecturer*  
 Scott Durham (PhD Yale) *Associate Professor*  
 Bernadette Fort (PhD Sorbonne) *Professor; also Art History*  
 Doris L. Garraway (PhD Duke) *Associate Professor; also African American Studies*  
 Michal P. Ginsburg (PhD Yale) *Professor*  
 Giulia Guidotti (MEd American) *Senior Lecturer*  
 Phyllis Horn-Liparini (MA Northwestern) *Senior Lecturer*  
 Paola Morgavi (Laurea in Lettere Genoa) *Senior Lecturer*  
 Edward W. Muir (PhD Rutgers) *Professor; Clarence L. Ver Steeg Professor in the Arts and Sciences; Charles Deering McCormick Professor of Teaching Excellence; also History*  
 William D. Paden (PhD Yale) *Professor*  
 Marie-Simone Pavlovich (PhD Northwestern) *Senior Lecturer*  
 Nasrin Qader (PhD Wisconsin) *Assistant Professor*  
 Aude Raymond (MA Illinois) *Lecturer*  
 Christiane Rey (Licence en Droit Liège) *Senior Lecturer*  
 Sylvie Romanowski (PhD Yale) *Professor*  
 Marco Ruffini (PhD UC Berkeley) *Assistant Professor; also Art History*  
 Thomas H. Simpson (PhD Chicago) *Distinguished Senior Lecturer*  
 Margaret Sinclair (PhD UC Berkeley) *Distinguished Senior Lecturer*

Janine W. Spencer (PhD Northwestern) *Distinguished Senior Lecturer*  
 Domietta Torlasco (PhD UC Berkeley) *Assistant Professor*  
 Samuel Weber (PhD Cornell) *Avalon Foundation Professor in the Humanities; also German*  
 Melissa Wittmeier (PhD Stanford) *Lecturer*

### **Gender Studies**

Ann S. Orloff (PhD Princeton) *Professor and Director; also Political Science, Sociology*  
 Nicola K. Beisel (PhD Michigan) *Associate Professor; also Sociology*  
 Nicholas Davis (PhD Cornell) *Assistant Professor; also English*  
 Mary G. Dietz (PhD UC Berkeley) *Board of Lady Managers of the Columbian Exposition Chair; also Political Science*  
 Jillana Enteen (PhD Rutgers) *Senior Lecturer*  
 Tessie P. Liu (PhD Michigan) *Associate Professor; also History*  
 Alexandra Owen (PhD Sussex) *Professor; also History*  
 Frances Freeman Paden (PhD Northwestern) *College Lecturer; also Writing Program*  
 Jeffrey Masten (PhD Pennsylvania) *Associate Professor; Charles Deering McCormick Professor of Teaching Excellence; also English*  
 Helen Thompson (PhD Duke) *Associate Professor; also English*  
 Jane Winston (PhD Duke) *Associate Professor; also French and Italian*

### **German**

Franziska B. Lys (PhD Northwestern) *Associate Professor and Chair; Alumnae of Northwestern Teaching Professor*  
 Peter D. Fenves (PhD Johns Hopkins) *Joan E. and Sarepta Harrison Professor in Rhetorical Composition; also Philosophy, Political Science*  
 Jeffrey B. Garrett (MLIS UC Berkeley) *Lecturer; Assistant University Librarian for Collection Management*  
 Peter F. Hayes (PhD Yale) *Charles Deering McCormick Professor of Teaching Excellence; also Theodore Z. Weiss Professor in Holocaust Studies (History)*  
 Christine Helmer (PhD Yale) *Professor; also Religion*  
 Martina Kerlova (MA Charles University Prague) *Lecturer*  
 Jörg Kreienbrock (PhD NYU) *Assistant Professor*  
 Denise M. Meuser (MA Indiana) *Distinguished Senior Lecturer*  
 Marcus Moseley (PhD Oxford) *Associate Professor*

Helmut Müller-Sievers (PhD Stanford) *Professor;*  
also *Classics*

John Paluch (MA Illinois) *Distinguished Senior Lecturer*

Rainer Rumold (PhD Stanford) *Professor*

Kristine Thorsen (PhD Northwestern) *Adjunct Lecturer*

Katrin Völkner (PhD Duke) *Lecturer*

Samuel Weber (PhD Cornell) *Avalon Foundation Professor*  
in the *Humanities*; also *French and Italian*

Alexander G. Weheliye (PhD Rutgers) *Associate Professor;*  
also *African American Studies, English*

Ingrid Zeller (MA Columbia) *Senior Lecturer*

### **History**

Sarah C. Maza (PhD Princeton) *Jane Long Professor in the*  
*Humanities and Chair*

Kenneth L. Alder (PhD Harvard) *Milton H. Wilson*  
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Michael Allen (PhD Northwestern) *Assistant Professor*

Josef J. Barton (PhD Michigan) *Associate Professor*

Henry C. Binford (PhD Harvard) *Associate Professor;*  
also *African American Studies*

Martha Biondi (PhD Columbia) *Associate Professor;*  
also *African American Studies, Political Science*

Francesca Bordogna (PhD Chicago) *Associate Professor*

Timothy H. Breen (PhD Yale) *William Smith Mason*  
*Professor of American History*

Sherwin Bryant (PhD Ohio State) *Assistant Professor;*  
also *African American Studies*

John S. Bushnell (PhD Indiana) *Professor*

Geraldo Cadava (PhD Yale) *Assistant Professor*

Peter J. Carroll (PhD Yale) *Associate Professor*

S. Hollis Clayson (PhD UCLA) *Bergen Evans Professor in*  
*the Humanities*; also *Art History*

Dyan Elliott (PhD Toronto) *Peter Ritzma Professor in the*  
*Humanities*

Lane Fenrich (PhD Northwestern) *Distinguished Senior*  
*Lecturer and Charles Deering McCormick University*  
*Distinguished Lecturer; Assistant Dean for Freshmen,*  
*Weinberg College*

Brodwyn Fischer (PhD Harvard) *Associate Professor*

Benjamin Frommer (PhD Harvard) *Associate Professor*

Regina Grafe (PhD London School of Economics)  
*Assistant Professor*

Jonathon P. Glassman (PhD Wisconsin) *Associate Professor*

Peter F. Hayes (PhD Yale) *Theodore Z. Weiss Professor in*  
*Holocaust Studies; Charles Deering McCormick Professor*  
*of Teaching Excellence*; also *German*

Laura E. Hein (PhD Wisconsin) *Professor*

Darlene Clark Hine (PhD Kent State) *Professor;*  
also *Board of Trustees Professor in African American*  
*Studies (African American Studies)*

Richard Kieckhefer (PhD Texas) *Professor;*  
also *John Evans Professor in Religion (Religion)*

Rajeev K. Kinra (PhD Chicago) *Assistant Professor*

Michael Kramer (PhD North Carolina) *Lecturer and*  
*College Adviser*

Henri Lauzière (PhD Georgetown) *Assistant Professor*

Jennifer S. Light (PhD Harvard) *Associate Professor*; also  
*Communication Studies, Sociology*

Tessie P. Liu (PhD Michigan) *Associate Professor;*  
also *Gender Studies*

Melissa Macauley (PhD UC Berkeley) *Associate Professor;*  
*Charles Deering McCormick Professor of Teaching Excellence*

Nancy K. MacLean (PhD Wisconsin) *Professor*; also  
*African American Studies*

Kate Masur (PhD Michigan) *Assistant Professor;*  
also *African American Studies*

Joel Mokyr (PhD Yale) *Professor*; also *Robert H. Strotz*  
*Professor of Arts and Sciences (Economics)*

Edward W. Muir (PhD Rutgers) *Professor*; *Clarence L. Ver*  
*Steeg Professor in the Arts and Sciences; Charles Deering*  
*McCormick Professor of Teaching Excellence*; also *French*  
*and Italian*

Robert Orsi (PhD Yale) *Professor*; also *Grace Craddock Nagle*  
*Professor in Catholic Studies (Religion)*

Alexandra Owen (PhD Sussex) *Professor*; also *Gender Studies*

Sarah Pearsall (PhD Harvard) *Assistant Professor*

Susan Pearson (PhD North Carolina) *Assistant Professor*

Dylan Penningroth (PhD Johns Hopkins) *Associate*  
*Professor and Wayne V. Jones II Research Professor*; also  
*African American Studies*

Yohanan Petrovsky-Shtern (PhD Brandeis)  
*Assistant Professor*

Carl F. Petry (PhD Michigan) *Professor*

Claire Priest (PhD Yale) *Associate Professor*; also *Law*

Jeffrey Rice (MSc Edinburgh) *Senior Lecturer and*  
*College Adviser*

Frank R. Safford (PhD Columbia) *Professor*

David L. Schoenbrun (PhD UCLA) *Associate Professor*

Michael S. Sherry (PhD Yale) *Richard W. Leopold Professor*  
*and Associate Chair*

Carl S. Smith (PhD Yale) *Professor*; also *Franklyn Bliss*  
*Snyder Professor in English Literature (English)*

Amy Stanley (PhD Harvard) *Assistant Professor*

Kristin Stilt (PhD Harvard) *Associate Professor*; also *Law*

Ji-Yeon Yuh (PhD Princeton) *Associate Professor*

**Linguistics**

Ann R. Bradlow (PhD Cornell) *Professor and Chair*  
 Brady Clark (PhD Stanford) *Assistant Professor*  
 Matthew A. Goldrick (PhD Johns Hopkins) *Assistant Professor*  
 Robert A. Gundlach (PhD Northwestern) *Professor; also Director, Writing Program*  
 Stefan Kaufmann (PhD Stanford) *Associate Professor*  
 Julia Moore (PhD Northwestern) *Lecturer*  
 Janet B. Pierrehumbert (PhD MIT) *Professor*  
 Gregory Ward (PhD Pennsylvania) *Professor*  
 Masaya Yoshida (PhD Maryland) *Assistant Professor*

**Mathematics**

John M. Franks (PhD UC Berkeley) *Noyes Professor and Chair*  
 Martina Bode (PhD Brandeis) *Senior Lecturer*  
 Keith H. Burns (PhD Warwick) *Professor*  
 Frank Calegari (PhD UC Berkeley) *Assistant Professor*  
 Gui-Qiang Chen (PhD Academia Sinica) *Professor*  
 Kevin Costello (PhD Cambridge) *Associate Professor*  
 Matthew J. Emerton (PhD Harvard) *Professor*  
 Stephen D. Fisher (PhD Wisconsin) *Professor*  
 Ezra Getzler (PhD Harvard) *Professor*  
 Paul G. Goerss (PhD MIT) *Professor*  
 Angela Grant (PhD Maryland) *Lecturer; College Adviser*  
 Elton Pei Hsu (PhD Stanford) *Professor*  
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 Bryna Kra (PhD Stanford) *Professor*  
 Yuri I. Manin (PhD Steklov Institute) *Board of Trustees Professor*  
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 Mark A. Pinsky (PhD MIT) *Professor*  
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 Michael R. Stein (PhD Columbia) *Professor*  
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 Dmitry Tamarkin (PhD Penn State) *Associate Professor*  
 Boris Tsygan (PhD Moscow State) *Professor*  
 Kari K. Vilonen (PhD Brown) *Professor*  
 Amie Wilkinson (PhD UC Berkeley) *Professor*  
 Jared Wunsch (PhD Harvard) *Associate Professor*  
 Zhihong Jeff Xia (PhD Northwestern) *Arthur and Gladys Pancoe Professor*  
 Sandy L. Zabell (PhD Harvard) *Professor; also Statistics*  
 Eric Zaslow (PhD Harvard) *Professor*

**Neurobiology and Physiology**

David L. Ferster (PhD Harvard) *Professor and Chair*  
 Ravi Allada (MD Michigan) *Associate Professor; also Biochemistry, Molecular Biology, and Cell Biology, Pathology*  
 Joe Bass (MD, PhD Medical College of Pennsylvania) *Assistant Professor*  
 Thomas Bozza (PhD Tufts) *Assistant Professor*  
 Jianhua Cang (PhD Virginia) *Assistant Professor*  
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 Robert A. Holmgren (PhD Harvard) *Professor; also Biochemistry, Molecular Biology, and Cell Biology*  
 William L. Kath (PhD Caltech) *Professor; also Engineering Sciences and Applied Mathematics*  
 William L. Klein (PhD UCLA) *Professor*  
 Nina Kraus (PhD Northwestern) *Professor; Hugh Knowles Professor in Audiology and Hearing Sciences (Communication Sciences and Disorders); also Otolaryngology*  
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 Robert A. Linsenmeier (PhD Northwestern) *Professor; also Biomedical Engineering, Ophthalmology*  
 Malcolm A. MacIver (PhD Illinois) *Assistant Professor; also Biomedical Engineering, Mechanical Engineering*  
 Kelly E. Mayo (PhD Washington) *Professor; also Biochemistry, Molecular Biology, and Cell Biology*  
 Thomas J. Meade (PhD Ohio State) *Eileen Foell Professor; also Biochemistry, Molecular Biology, and Cell Biology, Chemistry, Radiology*  
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 Indira Raman (PhD Wisconsin) *Associate Professor*  
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 Nelson Spruston (PhD Baylor) *Professor*  
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also *Anesthesiology*

Phyllis C. Zee (MD, PhD Chicago Medical) *Professor*;  
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Sean Ebels Duggan (PhD UC Irvine) *Assistant Professor*

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Baron Reed (PhD Brown) *Assistant Professor*

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Lecturer*; *Assistant Dean, Weinberg College*; also *Feinberg  
School of Medicine*

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Brook Ziporyn (PhD Michigan) *Associate Professor*;  
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Rachel Zuckert (PhD Chicago) *Associate Professor*

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André de Gouvêa (PhD UC Berkeley) *Assistant Professor*

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- Traci R. Burch (PhD Harvard) *Assistant Professor; also African American Studies*
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- Peter D. Fenves (PhD Johns Hopkins) *Professor; Joan E. and Sarepta Harrison Professor in Rhetorical Composition (German); also Philosophy*
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- Richard Joseph (DPhil Oxford) *John Evans Professor*
- Andrew Koppelman (PhD, JD Yale) *Professor; also Law*
- Michael M. Loriaux (PhD Princeton) *Professor*
- James Mahoney (PhD UC Berkeley) *Professor; also Sociology*
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- Jason Seawright (PhD UC Berkeley) *Assistant Professor*
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- Kathleen A. Thelen (PhD UC Berkeley) *Payson S. Wild Professor; also Institute for Policy Research*
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- Yael Wolinsky (PhD Chicago) *Senior Lecturer*
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- Psychology**
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- J. Michael Bailey (PhD Texas) *Professor*
- Galen Bodenhausen (PhD Illinois) *Lawyer Taylor Professor*
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- James R. Booth (PhD Maryland) *Associate Professor; JoAnn G. and Peter F. Dolle Associate Professor of Learning Disabilities (Communication Sciences and Disorders)*
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Joan Chiao (PhD Harvard) *Assistant Professor*

Thomas D. Cook (PhD Stanford) *Professor; Joan E. and Sarepta Harrison Professor in Ethics and Justice (Sociology); also Education and Social Policy, Institute for Policy Research*

Amy Cuddy (PhD Princeton) *Assistant Professor; also Management and Organizations*

Shari Diamond (PhD Northwestern) *Professor; Howard J. Trienens Professor of Law (Law)*

John F. Disterhoft (PhD Fordham) *Professor; also Physiology (Medicine)*

C. Emily Durbin (PhD SUNY Stony Brook) *Assistant Professor; also Kovler Scholar of the Family Institute*

Renee Engeln-Maddox (PhD Loyola Chicago) *Lecturer*

Eli J. Finkel (PhD North Carolina) *Associate Professor*

Steven Franconeri (PhD Harvard) *Assistant Professor*

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Wendi Gardner (PhD Ohio State) *Associate Professor*

Dedre Gentner (PhD UC San Diego) *Alice Gabrielle Twight Professor; also Education and Social Policy*

Jay A. Gottfried (PhD, MD NYU) *Assistant Professor; also Neurology*

Marcia Grabowecy (PhD UC Berkeley) *Lecturer and Research Assistant Professor*

Linda Liu Hand (PhD Northwestern) *Research Assistant Professor*

Susan J. Hespos (PhD Emory) *Assistant Professor*

William Sidney Horton (PhD Chicago) *Assistant Professor*

Mark Jung-Beeman (PhD Oregon) *Associate Professor*

Angela Y. Lee (PhD Toronto) *Professor; PepsiCo Professor of International Marketing (Marketing)*

Joan A. W. Linsenmeier (PhD Northwestern) *Senior Lecturer; Director of Curricular Projects, Weinberg College*

Sarah Mangelsdorf (PhD Minnesota) *Professor; Dean, Weinberg College*

Viorica Marian (PhD Cornell) *Associate Professor; also Communication Sciences and Disorders*

Dan P. McAdams (PhD Harvard) *Professor; also Education and Social Policy; Director, Foley Center for the Study of Lives*

Douglas L. Medin (PhD South Dakota) *Louis W. Menk Professor; also Education and Social Policy*

Marsel Mesulam (PhD Harvard) *Professor; Ruth and Evelyn Dunbar Professor of Neurology and Psychiatry (Medicine)*

Susan Mineka (PhD Pennsylvania) *Professor; also Psychiatry and Behavioral Sciences, Family Institute*

Daniel C. Molden (PhD Columbia) *Assistant Professor*

Donald A. Norman (PhD Pennsylvania) *Professor; also Cognitive Science, Electrical Engineering and Computer Science; also Professor Emeritus University of California, San Diego*

Andrew Ortony (PhD London) *Professor; also Education and Social Policy, Electrical Engineering and Computer Science*

Ken A. Paller (PhD UC San Diego) *Professor*

David Rapp (PhD SUNY Stony Brook) *Assistant Professor; also Education and Social Policy*

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William R. Revelle (PhD Michigan) *Professor*

Jennifer Richeson (PhD Harvard) *Associate Professor;*

*also African American Studies, Institute for Policy Research*

Lance J. Rips (PhD Stanford) *Professor*

J. Peter Rosenfeld (PhD Iowa) *Professor*

Aryeh Routtenberg (PhD Michigan) *Professor; also Neurobiology and Physiology*

Alan R. Sanders (MD Baylor) *Associate Professor; also Psychiatry and Behavioral Sciences*

H. David Smith (PhD Virginia Commonwealth) *Senior Lecturer*

Satoru Suzuki (PhD Harvard) *Associate Professor*

Leigh Thompson (PhD Northwestern) *Professor; J. Jay Gerber Professor in Dispute Resolution and Organizational Behavior (Management and Organizations)*

Fred W. Turek (PhD Stanford) *Professor; Charles E. and Emma H. Morrison Professor (Neurobiology and Physiology); also Psychiatry and Neurology*

David H. Uttal (PhD Michigan) *Associate Professor; also Education and Social Policy*

Sandra R. Waxman (PhD Pennsylvania) *Professor; also Education and Social Policy*

Richard E. Zinbarg (PhD Northwestern) *Professor; Patricia M. Nielsen Research Professor of the Family Institute; also Psychiatry and Behavioral Sciences*

## **Religion**

George D. Bond (PhD Northwestern) *Professor and Chair*

Christine Helmer (PhD Yale) *Professor; also German*

Richard Kieckhefer (PhD Texas) *John Evans Professor; also History*

Eugene Y. Lowe Jr. (PhD Union Theological) *Senior Lecturer; Assistant to the President, Northwestern University*

J. Michelle Molina (PhD Chicago) *Assistant Professor*

Beverly Mortensen (PhD Northwestern) *Adjunct Lecturer*

Barbara J. Newman (PhD Yale) *Professor; Dorothy Ann and Clarence L. Ver Steeg Distinguished Research Fellow; John Evans Professor in the Latin Language and Literature (Classics); also English*

Robert Orsi (PhD Yale) *Grace Craddock Nagle Professor in Catholic Studies; also History*

Stuart Sarbacker (PhD Wisconsin) *Senior Lecturer*

Regina M. Schwartz (PhD Virginia) *Professor; also English*

Rüdiger Seesemann (PhD Mainz) *Assistant Professor*

Sarah M. Taylor (PhD UC Santa Barbara) *Associate Professor*

Cristina L. H. Traina (PhD Chicago) *Associate Professor*

Muhammad Sani Umar (PhD Northwestern) *Associate Professor*

Sara A. Vaux (PhD Rice) *Lecturer*

Barry Wimpfheimer (PhD Columbia) *Assistant Professor; also Law*

Brook Ziporyn (PhD Michigan) *Associate Professor; also Philosophy*

Laurie Zoloth (PhD Graduate Theological Union) *Professor; also Feinberg School of Medicine*

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Gary Saul Morson (PhD Yale) *Frances Hooper Professor of the Arts and Humanities and Chair*

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Elisabeth Elliott (PhD Toronto) *Senior Lecturer*

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Ilya Kutik (PhD Stockholm) *Associate Professor*

Susan McReynolds Oddo (PhD Harvard) *Associate Professor*

Natalia Moriakova (MA Moscow State) *Lecturer*

Seamas O'Driscoll (PhD Harvard) *Assistant Professor*

Andrew Wachtel (PhD UC Berkeley) *Bertha and Max Dressler Professor in the Humanities; Dean, the Graduate School*

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Nicola K. Beisel (PhD Michigan) *Associate Professor; also Gender Studies*

Charles Camic (PhD Chicago) *John Evans Professor*

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Carolyn Chen (PhD UC Berkeley) *Assistant Professor; also Asian American Studies*

Thomas D. Cook (PhD Stanford) *Joan E. and Sarepta Harrison Professor in Ethics and Justice; also Education and Social Policy, Psychology, Institute for Policy Research*

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Thomas Durkin (PhD Chicago) *Lecturer*

Wendy N. Espeland (PhD Chicago) *Associate Professor*

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Eszter Hargittai (PhD Princeton) *Assistant Professor; also Communication Studies*

Carol A. Heimer (PhD Chicago) *Professor*

Barnor Hesse (PhD Essex) *Associate Professor; also African American Studies, Political Science*

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Monica Prasad (PhD Chicago) *Assistant Professor; also Institute for Policy Research*

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 Denise Bouras (MA Chicago) *Lecturer*  
 Nathalie Bouzaglo (PhD NYU) *Assistant Professor*  
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 Heather L. Colburn (PhD North Carolina) *Senior Lecturer*  
 Joel Colom-Mena (MA Loyola Chicago) *Lecturer*  
 Rifka Cook (MA Pedagógica Libertador) *Senior Lecturer*  
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 Wenxin Jiang (PhD Cornell) *Professor*  
 Charles F. Manski (PhD MIT) *Professor; also Economics, Institute for Policy Research*  
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 Thomas Severini (PhD Chicago) *Professor*  
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 Marcia B. Gealy (PhD Ohio State) *Distinguished Senior Lecturer; also Jewish Studies*  
 Jeanne Herrick (PhD Illinois Chicago) *Senior Lecturer*  
 Penny L. Hirsch (PhD Northwestern) *Distinguished Senior Lecturer; also McCormick School*  
 Phyllis Lassner (PhD Wayne State) *Distinguished Senior Lecturer; also Jewish Studies*  
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 Ellen F. Wright (PhD Indiana) *Distinguished Senior Lecturer*  
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 Jane L. Rankin, PhD, *Associate Dean for Research and Graduate Programs and Senior Lecturer in Communication Sciences and Disorders*



Mini White, PhD, *Senior Associate Dean for the Communication Program, Northwestern University in Qatar; and Professor of Radio/Television/Film*

Susan Dun, PhD, *Associate Dean for Admissions and Student Affairs, Northwestern University in Qatar, and Senior Lecturer in Communication Studies*

Sally Ewing, PhD, *Assistant Dean for Undergraduate Advising and Student Affairs and Lecturer*

Jennifer Baker, *Adviser and Lecturer in Radio/Television/Film*

Gaye Markov, *Assistant Dean, Business and Finance*

Harold E. Gulley, PhD, *Adviser and Lecturer in Communication Studies*

Lynn Kelso, MFA, *Adviser and Lecturer in Theatre*

Roberta Stack, MA, *Adviser and Lecturer in Radio/Television/Film; Director of Undergraduate Programs*

Debra Webster, MA, *Adviser and Lecturer in Communication Studies; Coordinator of Undergraduate Studies*

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Margaret M. Beeman (PhD Northwestern) *Senior Lecturer*

Frances K. Block (MA Northwestern) *Senior Lecturer*

Amy E. Booth (PhD Pittsburgh) *Assistant Professor; also Psychology*

James R. Booth (PhD Maryland) *JoAnn G. and Peter F. Dolle Associate Professor of Learning Disabilities; also Psychology*

Peter Dallos (PhD Northwestern) *Professor; John Evans Professor in Neuroscience (Neurobiology and Physiology); also Biomedical Engineering, Otolaryngology*

Sumitrajit Dhar (PhD Purdue) *Associate Professor*

Jill Eltanal (MS Arizona State) *Lecturer*

Kristine E. Erickson (AuD Central Michigan) *Lecturer*

Susan F. Erler (PhD Northwestern) *Associate Professor*

Rebecca Field (MS Rush) *Lecturer*

Kimberly Fisher (PhD Oklahoma) *Associate Professor*

Dean C. Garstecki (PhD Illinois) *Professor; also Otolaryngology*

Belma Hadziselimovic (MS Columbia) *Lecturer*

Tracy Hagan (MA Michigan State) *Lecturer*

Kathy Harper (MA Northwestern) *Lecturer*

Nina Kraus (PhD Northwestern) *Hugh Knowles Professor; also Neurobiology and Physiology, Otolaryngology*

Kristin A. Larsen (MA Northwestern) *Lecturer*

Jerilyn Logemann (PhD Northwestern) *Ralph and Jean Sundin Professor; also Neurology, Otolaryngology*

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Jessica Maye (PhD Rochester) *Assistant Professor*

Lowery A. Mayo (AuD Florida) *Lecturer*

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Gregory T. Makoul (PhD Northwestern) *Assistant Professor; also Medicine*

Maria Mastronardi (PhD Illinois) *Associate Professor*

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Jennifer DeVere Brody (PhD Pennsylvania) *Associate Professor; also African American Studies, English*

Tracy Davis (PhD Warwick) *Ethel M. Barber Professor of Performing Arts; Director, Interdisciplinary PhD Program in Theatre and Drama (Theatre); also English, Spanish and Portuguese*

Micaela di Leonardo (PhD UC Berkeley) *Professor; also Anthropology*

Margaret Thompson Drewal (PhD NYU) *Associate Professor*

Paul Edwards (PhD Texas) *Associate Professor; also African American Studies*

D. Soyini Madison (PhD Northwestern) *Associate Professor; also African American Studies*

Susan A. Manning (PhD Columbia) *Professor; also English, Theatre*

Sandra L. Richards (PhD Stanford) *Professor; also African American Studies, Theatre*

Ramon H. Rivera-Servera (PhD Texas) *Assistant Professor*

Jeffrey Sconce (PhD Wisconsin) *Associate Professor; also Radio/Television/Film*

Carol Simpson Stern (PhD Northwestern) *Professor*

Harvey Young (PhD Cornell) *Assistant Professor; also African American Studies, Performance Studies, Radio/Television/Film, Theatre*

Mary Zimmerman (PhD Northwestern) *Jaharis Family Professor*

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Jason Betke (MFA Columbia Chicago) *Lecturer*

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M. Scott Curtis (PhD Iowa) *Assistant Professor*

Rebecca Gilman (MFA Iowa) *Assistant Professor*

Dana H. Hodgdon (MA Northwestern) *Associate Professor*

Laura Kipnis (MFA Nova Scotia College of Art and Design) *Professor*

Chuck Kleinhans (PhD Indiana) *Associate Professor*

Lawrence W. Lichty (PhD Ohio State) *Professor*

Rick Morris (JD Kansas, LLM NYU) *Associate Professor; also Communication Studies; Associate Dean for Finance and Administration*

Hamid Naficy (PhD UCLA) *John Evans Professor in Communication*

Eric Patrick (MFA California Institute of Arts) *Assistant Professor*

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Daniel Cantor (MFA American Conservatory Theater) *Assistant Professor*

Tracy Davis (PhD Warwick) *Ethel M. Barber Professor of Performing Arts and Director, Interdisciplinary PhD Program in Theatre and Drama; also English, Performance Studies, Spanish and Portuguese*

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Shawn Douglass (MFA Missouri) *Lecturer*

Linda Gates (MA NYU) *Senior Lecturer*

Henry Godinez (MFA Wisconsin) *Associate Professor*

Cindy Gold (MFA Alabama) *Associate Professor*

Lynn Kelso (MFA Northwestern) *Lecturer and Adviser*

Craig D. Kinzer (MFA NYU) *Associate Professor*

Ana Kuzmanic (MFA Northwestern) *Assistant Professor*

Susan A. Lee (PhD Northwestern) *Professor, Dance Program; also Education and Social Policy*

Susan A. Manning (PhD Columbia) *Professor; also English, Performance Studies*

Sandra Marquez (MFA Illinois) *Adjunct Lecturer*

Dominic E. Missimi (MA Wayne State) *Professor and Donald G. Robertson Director in Music Theatre*

Dawn Mora (MA San Diego State) *Senior Lecturer*

Dan Ostling (MFA Northwestern) *Associate Professor*

Penny Penniston (BS Northwestern) *Adjunct Lecturer*

Mary Poole (PhD Northwestern) *Senior Lecturer*

Ana Puga (DFA Yale) *Assistant Professor*

Sandra L. Richards (PhD Stanford) *Professor; also African American Studies, Performance Studies*

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Michael Rohd (MFA Virginia Tech) *Visiting Assistant Professor*

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Billy Siegenfeld (MA NYU) *Professor*

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Barton J. Hirsch (PhD Oregon) *Professor*

Kemi Jona (PhD Northwestern) *Research Associate Professor*

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Samuel Kwon (PhD Northwestern) *Research Assistant Professor*

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Carol D. Lee (PhD Chicago) *Professor; also African American Studies*

Seon-Young Lee (PhD Georgia) *Research Assistant Professor*

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David Rapp (PhD SUNY Stony Brook) *Associate Professor; also Psychology*

Michelle Reininger (PhD Stanford) *Assistant Professor; also Institute for Policy Research*

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Kimberly Scott (PhD Ohio State) *Assistant Professor; Director, MSLOC Program*

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Alice Kelley, *Director of Administration and Planning*

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Timothy J. Carroll (PhD Illinois) *Assistant Professor; also Radiology*

Peter Dallos (PhD Northwestern) *Professor; John Evans Professor in Neuroscience (Neurobiology and Physiology); also Communication Sciences and Disorders, Otolaryngology*

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Mitra J. Hartmann (PhD Caltech) *Assistant Professor; also Mechanical Engineering*

Dean Ho (PhD UCLA) *Assistant Professor; also Mechanical Engineering*

James C. Houk (PhD Harvard) *Professor; also Physiology*

Mark A. Johnson (PhD MIT) *Associate Professor*

David M. Kelso (PhD Northwestern) *Associate Professor*

Francis J. Klocke (MD SUNY Buffalo) *Professor*

Debiao Li (PhD Virginia) *Professor; also Radiology*

Xu Li (PhD Wisconsin) *Assistant Professor; also Electrical Engineering and Computer Science*

Robert A. Linsenmeier (PhD Northwestern) *Professor; also Neurobiology and Physiology, Ophthalmology*

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*also Biomedical Engineering, Materials Science and Engineering; Associate Dean for Undergraduate Engineering*  
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*also Civil and Environmental Engineering*  
 Bartosz A. Grzybowski (PhD Harvard) *Associate Professor*;  
*also Chemistry*  
 Michael Jewett (PhD Stanford) *Assistant Professor*  
 Harold H. Kung (PhD Northwestern) *Professor*  
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 Justin Notestein (PhD UC Berkeley) *Assistant Professor*  
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*also Materials Science and Engineering*  
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*also Biomedical Engineering*  
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 Neal Blair (PhD Stanford) *Professor; also Earth and Planetary Sciences*  
 Isaac M. Daniel (PhD IIT) *Walter P. Murphy Professor; Director, Center for Intelligent Processing of Composites*  
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 Richard J. Finno (PhD Stanford) *Professor*  
 Joseph A. FitzPatrick (PhD Harvard) *Associate Professor*  
 Jean-François Gaillard (DSc Paris) *Associate Professor; also Earth and Planetary Sciences*

Kimberly A. Gray (PhD Johns Hopkins) *Professor*;  
*also Chemical and Biological Engineering*  
 Yonggang Huang (PhD Harvard) *Joseph Cummings Professor; also Mechanical Engineering*  
 Hamlin M. Jennings (PhD Brown) *Professor; also Materials Science and Engineering*  
 Leon M. Keer (PhD Minnesota) *Walter P. Murphy Professor; also Mechanical Engineering*  
 Raymond J. Krizek (PhD Northwestern) *Stanley F. Pepper Professor in Engineering; Director, Master of Project Management Program*  
 Wing Kam Liu (PhD Caltech) *Walter P. Murphy Professor; also Mechanical Engineering*  
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 Yu (Marco) Nie (PhD UC Davis) *Assistant Professor and Louis Berger Junior Professor; also Transportation Center*  
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 John W. Rudnicki (PhD Brown) *Professor; also Mechanical Engineering*  
 Joseph L. Schofer (PhD Northwestern) *Professor; also Transportation Center; Associate Dean for Faculty Affairs*  
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 Robert P. Dick (PhD Princeton) *Assistant Professor*  
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 Kenneth D. Forbus (PhD MIT) *Walter P. Murphy Professor; also Education and Social Policy*  
 Lance Fortnow (PhD MIT) *Professor*



Randy A. Freeman (PhD UC Santa Barbara) *Associate Professor*

Louis M. Gomez (PhD UC Berkeley) *Professor; also Education and Social Policy*

Matthew A. Grayson (PhD Princeton) *Assistant Professor*

Dongning Guo (PhD Princeton) *Assistant Professor*

Abraham H. Haddad (PhD Princeton) *Henry and Isabelle Dever Professor; Director, Master of Information Technology Program; Director, Council on Dynamic Systems and Control*

Kristian J. Hammond (PhD Yale) *Professor; also Education and Social Policy*

Jason Hartline (PhD Washington) *Assistant Professor*

Lawrence J. Henschen (PhD Illinois) *Professor; Charles Deering McCormick Professor of Teaching Excellence; Associate Dean of Student Services, the Graduate School*

Seng-Tiong Ho (PhD MIT) *Professor*

Michael L. Honig (PhD UC Berkeley) *Professor*

Ian D. Horswill (PhD MIT) *Associate Professor*

Nicole Immorlica (PhD MIT) *Assistant Professor*

Yehea Ismail (PhD Rochester) *Associate Professor*

Russell E. Joseph (PhD Princeton) *Assistant Professor*

Ming-Yang Kao (PhD Yale) *Professor; also Computational Biology and Bioinformatics*

Aggelos K. Katsaggelos (PhD Georgia Tech) *AT&T Professor of Information Technology; Director, Motorola Center for Seamless Communications; Director, Image and Video Processing Laboratory*

John B. Ketterson (PhD Chicago) *Professor; also Fayerweather Professor in Physics (Physics and Astronomy)*

Prem Kumar (PhD SUNY Buffalo) *AT&T Professor of Information Technology; also Physics and Astronomy; Director, Center for Photonic Communication and Computing*

Aleksandar Kuzmanovic (PhD Rice) *Assistant Professor*

Chung-Chieh Lee (PhD Princeton) *Professor*

Xu Li (PhD Wisconsin) *Assistant Professor; also Biomedical Engineering*

Wei-Chung Lin (PhD Purdue) *Associate Professor*

ChangLui (PhD Caltech) *Professor*

Gokhan Memik (PhD UCLA) *Assistant Professor and Lisa Wissner-Slicka and Benjamin Slivka Junior Professor in Computer Science; also Computational Biology and Bioinformatics*

Seda Ogrenci Memik (PhD UCLA) *Assistant Professor*

Hooman Mohseni (PhD Northwestern) *Assistant Professor*

Jorge Nocedal (PhD Rice) *Professor; Director, Optimization Technology Center; Director, Computational Science Institute; also Industrial Engineering and Management Sciences*

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Thrasyvoulos Pappas (PhD MIT) *Associate Professor*

Bryan Pardo (PhD Michigan) *Assistant Professor*

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## For More Information

### **Undergraduate Study**

*Full-time, freshmen and transfers*

Office of Undergraduate Admission

Northwestern University

Evanston, Illinois 60208-1260

847-491-7271

[www.ugadm.northwestern.edu](http://www.ugadm.northwestern.edu)

### **Graduate Study**

Office of Admissions

Graduate School

Northwestern University

Evanston, Illinois 60208-1113

847-491-7271

[www.tgs.northwestern.edu](http://www.tgs.northwestern.edu)

### **Graduate Management Study**

*Full-time, day*

Office of Admissions

J. L. Kellogg School of Management

Northwestern University

Evanston, Illinois 60208-2003

847-491-3308

[www.kellogg.northwestern.edu/admissions](http://www.kellogg.northwestern.edu/admissions)

*Part-time, evening*

Office of Admissions

Managers' Program

J. L. Kellogg School of Management

Northwestern University

339 East Chicago Avenue

Chicago, Illinois 60611-3008

312/503-8385

[www.kellogg.northwestern.edu/admissions](http://www.kellogg.northwestern.edu/admissions)

### **Law Study**

Office of Admissions

Northwestern University School of Law

357 East Chicago Avenue

Chicago, Illinois 60611-3069

312-503-8465

[www.law.northwestern.edu](http://www.law.northwestern.edu)

### **Medical Study**

Office of Admissions

Feinberg School of Medicine

303 East Chicago Avenue

Chicago, Illinois 60611-3008

312-503-8206

[www.medschool.northwestern.edu](http://www.medschool.northwestern.edu)

### **Continuing Education**

*Part-time, evening and weekend*

Office of the Dean

School of Continuing Studies

Northwestern University

339 East Chicago Avenue

Chicago, Illinois 60611-3008

312-503-6950

[www.scs.northwestern.edu](http://www.scs.northwestern.edu)

### **Summer Study**

Office of the Director

Summer Session

Northwestern University

405 Church Street

Evanston, Illinois 60208-4220

847-491-5250

[www.scs.northwestern.edu/summernu](http://www.scs.northwestern.edu/summernu)

### **Precollege Programs**

National High School Institute

Northwestern University

Evanston, Illinois 60208-4165

847-491-3026

[www.northwestern.edu/nhsi](http://www.northwestern.edu/nhsi)

College Preparation Program

Northwestern University

Evanston, Illinois 60208-2650

847-491-5250

[www.scs.northwestern.edu/collegeprep](http://www.scs.northwestern.edu/collegeprep)

## Northwestern on the Web

**[www.northwestern.edu](http://www.northwestern.edu)**

The University's home page

**[www.registrar.northwestern.edu/nucatalog](http://www.registrar.northwestern.edu/nucatalog)**

The latest version of the *Undergraduate Catalog*

**[www.registrar.northwestern.edu](http://www.registrar.northwestern.edu)**

Information about services of the Office of the Registrar

**[www.northwestern.edu/caesar](http://www.northwestern.edu/caesar)**

CAESAR, students' gateway to web-based registration and personal academic information

**[www.northwestern.edu/studentaffairs](http://www.northwestern.edu/studentaffairs)**

The Office of Student Affairs, providing programs and services for Northwestern's diverse students

**<http://nulink.northwestern.edu>**

NULink, the student home page

**[www.planitpurple.northwestern.edu](http://www.planitpurple.northwestern.edu)**

The University's online calendar of events

**[www.ugadm.northwestern.edu](http://www.ugadm.northwestern.edu)**

The Office of Undergraduate Admission

**[www.northwestern.edu/sfs](http://www.northwestern.edu/sfs)**

Student Financial Services, where students access their personal accounts along with general financial information

E-mail [webmaster@northwestern.edu](mailto:webmaster@northwestern.edu) with questions about the Northwestern web site.

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