Introduction
August 2009

The University of Massachusetts is accredited by the New England Association of Schools and Colleges.

The Graduate School Bulletin is available online and updated annually. Information in this issue was as complete and accurate as possible as of a deadline of April 15, 2009.

Patricia Stowell, Assistant Graduate Dean

Non-discrimination Policy

The University of Massachusetts Amherst prohibits discrimination on the basis of race, color, religion, creed, sex, age, marital status, national origin, mental or physical disability, political belief or affiliation, veteran status, or sexual orientation and any other class of individuals protected from discrimination under state or federal law in any aspect of the access to, admission, or treatment of students in its programs and activities, or in employment and application for employment. Furthermore, University policy includes prohibitions of harassment of students and employees, i.e., racial harassment, sexual harassment, and retaliation for filing complaints of discrimination.

Affirmative Action in employment is required for women; racial and ethnic minorities; special disabled veterans, veterans of the Vietnam-era, disabled veterans, recently separated veterans, other protected veterans, Armed Forces service medal veterans, and any other veterans who served on active duty during a war or in a campaign or expedition for which a campaign badge had been authorized; and individuals with disabilities in order to address under-representation in the workforce.

Inquiries concerning applicable laws, regulations, and policies should be addressed to the Equal Opportunity and Diversity Office, 243 Lederle Graduate Research Center Lowrise, tel. and TTY (413) 545-3464; email address: eod@admin.umass.edu.

The Associate Vice Chancellor for Equal Opportunity and Diversity or designee, is also the Title VI, Title IX, Section 504 and Americans with Disabilities Act Coordinator for the campus. This person will provide information about the University’s obligations with respect to the provisions of nondiscrimination statutes including information about the requirement to provide program accessibility for persons with disabilities.

The University is committed to compliance with Title VI and Title VII of the Civil Rights Act of 1964, Title VI of the Civil Rights Act of 1968, Title I and Title II of the Civil Rights Act of 1991, the Equal Pay Act of 1963, Executive Order 11246 (1965), Title IX of the Education Amendments of 1972 and its regulations found at 34 C.F.R. part 106, Sections 503 and 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, the Vietnam-era Veterans Readjustment Act of 1974, the Age Discrimination in Employment Act of 1967, the Family and Medical Leave Act of 1993, and with Massachusetts General Laws, Chapters 151B, 151C, and Chapter 149, all as amended. Inquiries regarding federal laws may also be directed to: Office for Civil Rights, U.S. Department of Education, J.W. McCormack Bldg., Room 701,01-0061, Boston, MA 02109-4557; tel. (617) 223-9662; TTY: (617) 223-9695; and U.S. Equal Employment Opportunity Commission, John F. Kennedy Federal Building, 475 Government Center, Boston, MA 02203; tel. (617) 565-3200 or 1-800-669-4000; TTY: (617) 565-3204 or 1-800-669-6820. Inquiries regarding state laws may be directed to: Massachusetts Commission Against Discrimination, 436 Dwight Street, Suite 220, Springfield, MA 01103; tel. (413) 739-2145; TTY: (617) 994-9196.

The New England Association of Schools and Colleges

The University of Massachusetts Amherst is accredited by the New England Association of Schools and Colleges. The Association accredits schools and colleges in the six New England states. Membership in one of the six regional accrediting associations in the United States indicates that the school or college has been carefully evaluated and found to meet or exceed standards agreed upon by qualified educators.
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<td>Mon</td>
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<td>Wed</td>
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<td>Holiday — Veterans Day</td>
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<tr>
<td>Wed</td>
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<td>Thanksgiving recess begins after last class</td>
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<td>Sat</td>
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<td>Dec 21</td>
<td>Snow Day for exams; semester ends</td>
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<tr>
<td>Tue</td>
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<td>Classes begin</td>
</tr>
<tr>
<td>Sun</td>
<td>Feb 1</td>
<td>Latest application deadline for Summer/Fall 2010 admission</td>
</tr>
<tr>
<td>Mon</td>
<td>Feb 1</td>
<td>Last day to add courses or drop with no record</td>
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<tr>
<td>Mon</td>
<td>Feb 15</td>
<td>Holiday — Presidents Day</td>
</tr>
<tr>
<td>Mon</td>
<td>Mar 1</td>
<td>Last day to drop courses with DR</td>
</tr>
<tr>
<td>Sat</td>
<td>Mar 13</td>
<td>Spring recess begins after last class</td>
</tr>
<tr>
<td>Mon</td>
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<td>Classes resume</td>
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<td>Mon</td>
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<td>Last day of classes</td>
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<td>Final examinations begin</td>
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<tr>
<td>Sat</td>
<td>May 8</td>
<td>Reading Day</td>
</tr>
<tr>
<td>Mon</td>
<td>May 10</td>
<td>Final examinations resume</td>
</tr>
<tr>
<td>Thu</td>
<td>May 13</td>
<td>Final examinations end; semester ends</td>
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<tr>
<td>Fri</td>
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<td>Graduate School Commencement</td>
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<tr>
<td>Tue</td>
<td>Aug 31</td>
<td>Degree requirements deadline for September 1, 2010 degrees</td>
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</tbody>
</table>

Chapter 151C of the Massachusetts General Laws states: “Any student in an educational or vocational training institution, other than a religious or denominational educational or vocational training institution, who is unable, because of his religious beliefs, to attend classes or to participate in any examination, study or work requirement on a particular day shall be excused from any such examination or study or work requirement, and shall be provided with an opportunity to make up such examination, study, or work requirement which he may have missed because of such absence on any particular day; provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of his availing himself of the provisions of this section.”
Administrative Officers

University of Massachusetts

Jack M. Wilson, Ph.D.
President

Robert C. Holub, Ph.D.
Chancellor

James V. Staros, Ph.D.
Senior Vice Chancellor for Academic Affairs and Provost

Tom Milligan, M.B.A.
Executive Vice Chancellor for University Relations

Joyce M. Hatch, M.B.A.
Vice Chancellor for Administration and Finance

Jean Kim, Ph.D.
Vice Chancellor for Student Affairs and Campus Life

Michael F. Malone, Ph.D.
Vice Chancellor for Research and Engagement

Willie L. Hill, Jr., Ph.D.
Vice Provost for University Outreach and Continuing Education

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Dean of the Faculty of Humanities and Fine Arts

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Dean of the College of Natural Sciences

Robert S. Feldman
Dean of the College of Social and Behavioral Sciences

Christine B. McCormick, Ph.D.
Dean of the School of Education

Theodore E. Djaferis, Ph.D.
Dean of the College of Engineering

Mark A. Fuller, Ph.D.
Dean of the Isenberg School of Management

Jean E. Swinney, Ph.D.
Dean of the School of Nursing

C. Marjorie Aelion, Ph.D.
Dean of the School of Public Health and Health Sciences

Graduate School

John R. Mullin, Ph.D.
Dean of the Graduate School

Sandra L. Petersen, Ph.D.
Associate Graduate Dean

Patricia M. Stowell, B.S.
Assistant Graduate Dean

S. Josh Kroner, B.S.
Assistant Graduate Dean

Patrick S. Sullivan, Ph.D.
Associate Graduate Registrar and Associate Director of Graduate Admissions

Michael Alderman, M.Ed.
Director of Graduate Student Recruitment

University of Massachusetts

Boston

J. Keith Motley, Ph.D.
Chancellor

Dartmouth

Jean F. MacCormack, Ed.D.
Chancellor

Lowell

Martin T. Meehan, J.D.
Chancellor

Worcester

Michael F. Collins, M.D.
Interim Chancellor, University of Massachusetts Medical Center
General Information
The University

One of today’s leading centers of public higher education in the Northeast, the University of Massachusetts Amherst was established in 1863 under the original Land Grant Act. In recent decades it has achieved a growing reputation for excellence in an increasing number of disciplines, for the breadth of its academic offerings, and for the expansion of its historic roles in education, research, and outreach. A large number of faculty, especially in the physical sciences and engineering, actively engage in sponsored activities. Research expenditures in the past year totaled more than $142 million. An increase in applications has made enrollment more selective.

Within its 10 schools and colleges the university offers bachelor’s degrees in 88 areas, master’s degrees in 73, and the doctorate in 53. Ninety-four percent of the approximately 1,063 full-time faculty hold the highest degree in their fields. There are approximately 26,000 students, made up of nearly 20,100 undergraduates and 5,800 graduates, including part-time. The university prides itself on the diversity of its student body, and is committed to the principles of affirmative action, civility, equal opportunity, and the free exchange of ideas.

Located in the historic Pioneer Valley of Western Massachusetts, the 1,450-acre campus provides a rich cultural environment in a rural setting. The university is one of the founding members of the Five College cooperative program, offering reciprocal student access among the University, and Amherst, Hampshire, Mount Holyoke and Smith colleges.

The University of Massachusetts Amherst is the flagship campus of the Commonwealth’s university system. There are three other campuses that offer undergraduate and graduate programs at Boston, Dartmouth, and Lowell. The University’s Worcester Medical School includes the medical school and associated teaching hospital.

Activities at the five University campuses are complemented by outreach education, research, and service programs at sites throughout the Commonwealth, ranging from the Southeastern Massachusetts Agricultural Center in East Wareham to the Berkshire Medical Center in Pittsfield and the Small Business Development Center in Springfield.

The Graduate Dean, in collaboration with the University Graduate Council, exercises overall review and supervision of graduate programs conducted in the several colleges and provides guidance in the development of new programs as well as the maintenance of standards for existing programs. Each college of the university has developed its graduate programs in accordance with the highest national professional standards of the respective fields.

For information about University of Massachusetts Boston graduate programs, consult the University of Massachusetts Boston Bulletin.

For information about University of Massachusetts Dartmouth graduate programs, consult the University of Massachusetts Dartmouth Graduate School Degrees and Programs.

For information about University of Massachusetts Lowell graduate programs, consult the University of Massachusetts Lowell Graduate Catalog.

Information on graduate programs in medicine is found in the University of Massachusetts Worcester Medical Center Catalogue.

Academic Services

Director of Libraries: Jay Schafer, 545-0284
Hours: 545-0414
Reference and Information: 545-0150
Circulation Office: 545-2622
Integrated Sciences and Engineering Library: 545-1370
Image Collection Library: 545-3314
Music Reserve Lab: 577-2711
Website: www.library.umass.edu

Library System
The Library System provides support for graduate studies and research through collections in the W.E.B. Du Bois Library, Integrated Sciences and Engineering Library (ISEL), the Image Collection Library, Music Reserve Lab, and through extensive electronic collections available 24 hours a day, seven days a week at www.library.umass.edu.

The W.E.B. Du Bois Library is open around the clock from 11 a.m. on Sundays to 9 p.m. on Fridays and from 9 a.m. to 9 p.m. on Saturdays. It houses materials in the social sciences and the humanities, as well as the Government Documents, East Asian, Map, and Law Collections, and Special Collections and University Archives, where the W.E.B. Du Bois collection is located. Du Bois Library has well over 200 available computer workstations, including PCs and Macs, and more than 50 loaner laptops, and 400 ports for laptop access. Students can get garage tickets validated for an hour’s worth of parking at the Learning Commons Information Desk. The Integrated Sciences and Engineering Library, with collections focused on mathematics, the natural and physical sciences, and engineering, is located in the Lederle Graduate Research Center, Lowrise.

The Learning Commons (www.umass.edu/learningcommons/) in the Du Bois Library brings together library, technology, and other campus services in an environment that fosters informal, collaborative work and social interaction. In addition to personal computers, scanners, printers, group study rooms, flexible work stations, and comfortable furniture, the Learning Commons offers academic and career advising, technical support, peer tutoring, writing assistance, reference and research assistance, assistive technologies for people with disabilities, information desks, and a café. The second and third floors have designated quiet study areas.

The Reserve, Media and Microforms Department is located on the third floor and provides multifunctional scanning, saving, and printing equipment for microforms; laptops and digital camcorders available for loan; and a multi-media reserve collection. A reading room with current issues of 80 popular magazines and newspapers is on the fifth floor. Wireless connectivity is
The University of Massachusetts Amherst has a disability defined by the Americans with Disabilities Act and requires an accommodation such as scanning assistance, screen readers, text enhancements, and text enlargers.

**SPARK** is a Learning Management System used by many university faculty to make syllabi, calendars, grades, and other course content available online. To access SPARK, students need an OIT account and to be enrolled in a course that has a SPARK site associated with it.

**Web Hosting and Blogs** are available to all University of Massachusetts Amherst students. Personal websites and blogs are typically used in conjunction with courses and school-related events or for posting opinions and ideas.

**UDrive** is a Web-based file storage and sharing system that allows students to access their files from anywhere they have an Internet connection, thus eliminating the need for CD-ROMs, floppy or zip disks, and USB drives.

**Computing support** is available from OIT Help Services. The OIT Help Desk is the first point of contact for students with computer-related questions or problems. Hardware Support provides repair, maintenance, and installation services for campus computers and peripheral equipment. Software Support provides assistance with select Windows and Macintosh software applications and operating systems, and oversees the distribution of free and discounted software. To contact the OIT Help Desk, call (413) 545-9400 or visit www.oit.umass.edu/help.html.

**Translation Center**
The Translation Center provides a full range of translation and interpretation services for students, staff, faculty, and members of the community.

The University of Massachusetts Amherst has many scholars with diverse language and cross-cultural communication skills. The Center locates translators with expertise in the field in question, whether it is business, law, medicine, science, computers, politics or literature. Services include translation into over fifty languages, simultaneous and consecutive interpretation, multilingual wordprocessing and design, summaries of foreign language articles, tours, and workshops on international communication.

Documents translated include diplomas, transcripts, letters, faxes, medical records, operation manuals, newspaper articles, government documents, videos, academic essays, and books. Translation services are provided to businesses, hospitals, social service organizations, law firms, media services, governments, and courts, as well as educational institutions. Fees for translation services are $0.15-.20 per word for West European languages; $0.17-.22 per word for Slavic and Nordic languages; $0.19-.24 per word for Chinese, Japanese, Korean, Arabic, and Hebrew; and $0.25-.43 per word for lesser-known languages.
languages. Fees for interpretation services are $40-$100 per hour (with a two-hour minimum) for all languages. There are surcharges for technical texts, lesser known languages, advertisements, graphic design, camera-ready copy, and rush service.

For more information, contact Edwin Gentzler, Director, The Translation Center, 19 Herter Hall, tel. (413) 545-2203; fax: (413) 577-3400; email: transcen@hfa.umass.edu; URL: www.umassedu/transcen/.

Departments of Military Leadership and Aerospace Studies
Graduate students with two years of academic study remaining who are interested in becoming commissioned officers in the United States Army or United States Air Force may apply to the Department of Military Leadership or the Department of Aerospace Studies, respectively, for a two-year commissioning program. Selected students receive a monthly stipend for qualified applicants, two-year scholarships for tuition, required fees, flat rate fees, and books are available. Those interested should consult the head of either department prior to the beginning of their final two years at the university. Early application is necessary for administrative processing. Candidates must pass an aptitude test, a physical examination, and attend a six-week summer camp. Veterans are given constructive credit for previous military service and instruction. Air Force officers will go on active duty upon completing graduate degree requirements. Army officers will go on either active or reserve duty. Further information on Military Leadership is available by calling Captain James Laudato, tel. (413) 545-5364, and on Aerospace Studies by calling Captain Kyle Bate, tel. 545-2437.

Continuing & Professional Education
Continuing & Professional Education (CPE) meets the educational needs of more than 20,000 people per year with a variety of programs including evening credit courses during the fall and spring semesters, university summer and winter session courses, access to specialized on- and off-campus and online undergraduate and graduate degree programs, professional development programs and workshops, certificate programs, independent study courses and internships, highly specialized courses, noncredit workshops (in the areas of personal enrichment and career development), and online and blended courses. Many categorical waivers, including senior citizen waivers, are not applicable to CPE courses. For more information, students should contact the CPE business office.

In collaboration with the university’s schools and colleges, the following part-time graduate degree programs are offered through CPE: M.M./Music Education; M.B.A. professional programs offered in Pittsfield, Holyoke, Shrewsbury, and online; M.S. in Accounting; Doctor of Nursing Practice; M.S. Nursing, Clinical Nurse Leader; Master of Public Health program in Worcester; Master of Public Health—Public Health Practice (online); M.S. in Labor Studies; and M.S. in Plant, Soil, and Insect Sciences.

CPE offers these master of education programs: 180 Days in Springfield, Integrated Day Off Campus, Collaborative Teacher Education Program, Master of Education for Science Teachers, Science Education Online, Bridges to the Future CTEP, Bridges to the Future STEP, Post B.A. Teacher Licensure Program, ACELLA program, and Springfield Project Lead. Many of these programs also offer a Certificate of Advanced Graduate Study (C.A.G.S.). Most of these programs hold classes off campus in convenient locations in Springfield, South Hadley, Athol, and Montague.

Additional programs include a Postbacca laureate Pre-clinical Program in Communication Disorders (offered for those who have a bachelor’s degree in a field other than Communication Disorders but who would like to pursue a graduate degree in either Speech Pathology or Audiology), professional development courses for teachers/educators, and for professionals in soil science and related fields.

Online Graduate Degree Programs
Several completely online graduate degree programs are offered through CPE. Courses are taught by university faculty, meet the same academic requirements as traditional on-campus courses, and are located at the university’s virtual campus: www.umassonline.net.

The Master of Business Administration degree program is fully accredited by the American Assembly of Collegiate Schools of Business (AACSB). This accelerated M.B.A. is designed for professionals who wish to continue their education in the management field.

A Master of Education degree and a Certificate of Advanced Graduate Study in science education for elementary and middle school teachers are offered online. This program enhances knowledge of both science pedagogy and science content and has been approved by the Massachusetts Department of Education for professional licensure in certain areas.

The Master of Public Health—Public Health Practice degree prepares graduate education for practicing professionals with relevant experience in public health.

The fully online Master of Public Health in Nutrition—the only one of its kind in the nation—has no residency requirements. It allows students to earn their credentials at their own pace, from anywhere in the world, without interrupting their careers.

The Master of Science degree in Nursing, Clinical Nurse Leader (CNL) concentration prepares students for advanced practice in a variety of healthcare settings and lays a foundation for doctoral education.

The Doctor of Nursing Practice degree prepares advanced-practice nurses at the highest level and offers two specialty areas: Primary Care Family Nurse Practitioner and Public Health Nurse Leader. The preparation includes advanced coursework in leadership, research translation, and clinical knowledge and skills.

For further information on programs, contact CPE, tel. (413) 545-0530 or visit www.umass ulearn.net.

University of Massachusetts Abroad
The International Programs Office, through its University of Massachusetts Abroad program, offers a wide variety of international exchange and overseas study programs. Those listed below are structured opportunities for graduate students. In addition, there are many overseas programs which may assist graduate students in fulfilling foreign language requirements. Graduate students may also pursue research abroad as part of their degree programs.

International Programs, William S. Clark International Center, tel. (413) 545-2710, may be consulted for all specific information on these and other overseas study and research options. Programs listed below may be suspended under exceptional circumstances due to conditions in the host country.

Baden-Württemberg Program
The University of Massachusetts exchange program with Germany, established in 1964, was expanded in 1983 to include all nine universities in the state of Baden-Württemberg: Freiburg, Heidelberg, Hohenheim, Karlsruhe, Konstanz, Mannheim, Stuttgart, Tübingen, and Ulm. Among the universities virtually all academic disciplines are available, including humanities and social sciences, engineering, business, natural science, and agriculture.

Both graduate and upper-division undergraduate students with a GPA of at least 2.500 are eligible to apply for the academic year or semester. Proficiency in German is not essential for graduate studies, especially in the sciences and engineering. Internships and work placements can be arranged through the program. Scholarships are available through the exchange and the German Academic Exchange Service (DAAD).

For applications and additional information contact the Baden-Württemberg Program Director at International Programs, tel. (413) 545-2710.
University of Uppsala
Founded in 1477, Uppsala is the oldest university in Scandinavia and a well-known international research center. The population of the city of Uppsala, located 45 miles north of Stockholm, is about 200,000.

Courses in English are available in many subjects, including natural sciences and mathematics; social studies; political science and government; East European studies; economics; psychology; education; computing science; international media and communication studies; peace and conflict studies; social and economic geography; international business; Swedish culture and society; history; and the history, philosophy and social science of religion.

Applicants should demonstrate general academic strength. Students entering the English-taught program do not need any knowledge of Swedish but will benefit culturally from Swedish-language training.

For more information and an application, contact the International Programs Office, tel. (413) 545-2710.

University of Copenhagen Exchange
The University of Copenhagen, founded in 1479, has nearly 35,000 students and is Denmark’s largest institution of research and education. It is also a major force in the Øresund University, a cooperative venture of Swedish and Danish institutions of higher learning.

The University of Copenhagen has the academic structure of a traditional European university, with six main areas of study: Humanities, Social Sciences, Theology, Science, Health Sciences, and Law.

Each semester the University of Copenhagen offers a wide range of undergraduate and graduate courses in English and fluency in Danish is not required. The University of Massachusetts Exchange Program accepts students for either a semester or a full academic year. Graduate students should inquire with the program coordinator for specific information on graduate program fees.

For more information and an application, contact the International Programs Office, tel. (413) 545-2710.

Year and Semester Program in China
The Chinese University of Hong Kong offers courses in a wide variety of fields such as Asian Studies, English, International Business and Architecture taught in English as well as beginning and intermediate courses in Mandarin and Cantonese. Semester and year options are available and students can earn approximately 15 undergraduate credits per semester. To apply, contact the Associate Director for Asia, International Programs Office, tel. (413) 545-2710.

Beijing Foreign Studies University offers intermediate and advanced Mandarin language courses which include speaking/listening, reading, composition, and newspaper/magazine reading as well as some other culture courses. Semester and year options are available at this campus located in the Haidian District of northwestern Beijing. Students can earn approximately fifteen undergraduate credits per semester. To apply, contact the Associate Director for Asia, International Programs Office, tel. (413) 545-2710.

Year and Semester Program in Japan
Doshisha Women’s College of Liberal Arts situated between Kyoto and Nara offers graduate students the opportunity to study and conduct research for periods of a semester or a year. Graduate students must demonstrate ability to handle course work and research work in Japanese language in order to be eligible. To apply, contact the Associate Director for Asia, International Programs Office, tel. (413) 545-2710.

Year and Semester Program in Taiwan
Located in Taichung, Taiwan, the University of Massachusetts Tunghai University exchange program offers coursework at intermediate and advanced levels in Chinese. Both undergraduate and non-degree graduates are eligible to apply, and up to 30 undergraduate credits may be earned. Applicants should have a minimum of one year of college-level Mandarin Chinese by the program start. To apply, contact the Associate Director for Asia, International Programs Office, tel. (413) 545-2710.

European Field Studies Program in Anthropology
The Department of Anthropology offers a three-semester program the centerpiece of which is a semester-long research project in Europe, conducted under the guidance of a department faculty member with extensive field experience in Europe. The program is directed primarily to graduate students, but on occasion, highly qualified undergraduate students may participate.

In the fall semester, students enroll in a preparatory seminar (Anthropology 660), in which each develops a unique research project, and presents it orally and in writing as a formal research proposal. Assuming it is accepted by a jury of department faculty, each student then receives a department stipend (currently $3,500) and joins other students for the spring semester in Europe. Each student then undertakes an individual research project in a particular locale, while enrolling in the Anthropology 685 seminar to analyze research results and prepare final reports.

The program is designed to provide students with an initial research experience early in their graduate careers to form a necessary foundation for later, more profound research projects. For further information, contact the European Program Director, Department of Anthropology, Machmer Hall, tel. (413) 545-2869.

Summer Program at Oxford
A six-week summer program at Trinity College, Oxford, takes place from July to mid-August, offering courses in British literature, art and architecture, politics, history, and law. All courses are taught by British faculty, and the Bodleian Library is available for research. Evening lectures, theater trips to Stratford to see Royal Shakespeare Company performances, and field trips supplement course offerings. Enrollment is open to students inside and outside the University. Admission is competitive. The program seeks motivated students willing to apply themselves seriously to tutorial instruction. University of Massachusetts students are eligible to apply for scholarships. To apply, contact the Director, Oxford Summer Seminar, English Department, Bartlett Hall, (413) 545-1914. Email address: oxford@english.umass.edu.

Summer Program at Salamanca
The Spanish Department sponsors one four-week summer program in July at the Colegio Hispano Continental in Salamanca, Spain. Instruction is by University of Massachusetts faculty, the staff of the Colegio, and visiting faculty. Graduate course offerings include Hispanic Literature, Linguistics, Culture, and the teaching of Spanish. Six University of Massachusetts graduate credits can be earned in the graduate and advanced undergraduate programs, and nine in the language program.

Students may elect to live either with families or in dormitories. For an application, contact the Director, Summer Program in Spain, Department of Spanish and Portuguese, Herter Hall.

Summer Program in Beijing and Shanghai, China and Taichung, Taiwan
The Department of Asian Languages and Literatures sponsors an eight-week, 10-credit summer course in Chinese language at Tunghai University in Taichung, Taiwan. Although only undergraduate credit is granted, graduates are eligible to apply. Minimum requirements for admission are good academic standing and one year of college-level Mandarin Chinese. Courses are taught by the staff of Tunghai University. To apply, contact the Associate Director for Asia, International Programs Office, tel. (413) 545-2710.
Application Procedures for Admission and Readmission

Holders of bachelor’s degrees, from this University or from other institutions having substantially the same requirements for the bachelor’s degree, are eligible to apply for admission to a program of graduate studies. (A very limited number of applications will also be considered from exceptionally qualified applicants who do not hold the bachelor’s degree but who can demonstrate a comparable level of educational achievement. Such applicants should identify themselves when requesting application material; they will receive special instructions for applying.)

An application and fee payment can be submitted online using the Graduate School’s website: www.umass.edu/gradschool. Applicants unable to submit the online application may download a paper application from the website, or write to the Graduate Admissions Office, Goodell Building, University of Massachusetts, Amherst, MA 01003.

The deadline for submitting applications for admission, complete with all supporting credentials, for the summer/fall entrance cycle, varies by program (December 1 through February 1). Refer to the Graduate Application form or the Graduate Programs and Degrees Offered listing on the website for specific deadlines. For those graduate programs which offer spring entrance, the deadline is October 1.

Admission is only for the semester requested and cannot be guaranteed for a later date, except by permission of the Dean of the Graduate School. Applicants can be admitted to the Graduate School in one of the following categories:

Degree Status
Students admitted as fully qualified to undertake a program toward a graduate degree are termed degree-status students.

Provisional Status
Students admitted on a probational basis to a program are on provisional status. Students may enroll for a maximum of 12 credits or two consecutive enrollment periods (including Summer Session), whichever comes first. This status may not be renewed beyond the credit/time limitation regulation as stated above. At the conclusion of the provisional status period students are either admitted to degree status or terminated depending upon the evaluation and recommendation by the graduate program and subject to the Graduate Dean’s approval.

Special Admissions
The special admission procedures have been designed for the rare applicant who lacks an undergraduate degree but who considers himself or herself as having the appropriate qualifications for applying to a graduate program of the University of Massachusetts Amherst. These would be very special circumstances that are unlikely to appear repeatedly in applicants to any graduate program of the university; therefore, standard criteria cannot be established and each case has to be considered on its merit. This procedure is not intended as substitution for any current university program that addresses degree equivalencies from other institutions, or that evaluates prior life experiences which could lead to an undergraduate degree.

Non-Degree Status
Students who have a bachelor’s degree and wish to take graduate courses are admitted on a limited basis. Enrollment in any course is subject to space availability and may require instructor’s approval. Applications for this status do not require the supporting documentation specified above for degree and provisional status. Upon recommendation by the graduate program director and approval by the Graduate School, up to six graduate credits may be applied toward a graduate degree if a student is later admitted to degree status.

Requirements for Admission

1. Completion of the application form, including the Residency Statement. The forms can be submitted online, downloaded from the website, or are available in printed form and from the Graduate School.
2. Payment of the required Application Fee. Waivers of the fee are available only to those applicants who are United States citizens and who receive a waiver of the Graduate Record Examination or Graduate Management Admission Test fee through their undergraduate financial aid office. A statement from a college or university official attesting to receipt of or eligibility for the fee waiver must accompany the application.
3. A minimum undergraduate cumulative grade point average of 2.750 on a 4.000 grading scale.
4. A bachelor’s degree or the equivalent from any college or university of recognized standing.
5. Two official transcripts of all previous college work (undergraduate and graduate). An applicant must request the registrar of all colleges previously attended to send two copies of the transcript directly to the Graduate Admissions Office. A final transcript showing that the bachelor’s degree has been awarded must be received before the applicant can enroll in the Graduate School.
6. Two or three letters of recommendation from persons in the field of the applicant’s academic major at the institution most recently attended. In some cases, particularly in management, letters of recommendation from other persons may be more appropriate to the proposed field of study.
7. The Graduate Record Examination (GRE) General Test (required of most applicants, including international students). For a list of those graduate programs requiring the GRE General Test or a GRE Subject Test refer to the Application Form or the Graduate Programs and Degrees Offered listing on the website. Only GRE scores taken within five years of anticipated enrollment will be considered as fulfilling this requirement. Applicants must have official reports of their GRE scores sent directly to the Graduate Admissions Office. Applicants for fall admission are urged to take the GRE by December. The results of later testing are frequently not available before decisions on admission must be made. The Educational Testing Service, P.O. Box 6004, Princeton, NJ 08541, administers the test in the United States as well as abroad. Addresses of test centers may be obtained from that organization. Applicants for admission to programs in Management, Sport Management, and Hospitality and Tourism Management are required to take the Graduate Management Admissions Test (GMAT) rather than the GRE.
8. For international student requirements see section titled International Applicants.
9. Application procedures for the Five College Cooperative Ph.D. Program are listed in the section entitled Doctoral Degree Requirements.
10. Applicants for dual master’s degrees must indicate the specific programs on the application. Each program makes its admission decision independently. Some applicants may be accepted into only one of the collaborating programs.
11. Finally, recommendation of admission by the graduate program applied for and formal acceptance by the Dean of the Graduate School.

Admission of Faculty and Staff Members to Graduate Study
Members of the university faculty at the rank of assistant professor or higher who wish to retrain or redirect their professional interests may, under special circumstances, earn a graduate degree from the university. The Dean of the Graduate School may permit eligible faculty to become degree candidates subsequent to a favorable recommendation from both the appropriate academic dean and department head, assurance that no conflict of interest will occur, and that
the university’s best interests will be served. The degree may not be earned in the department in which the candidate is a faculty member. However, faculty members of any rank may enroll as non-degree students in any university courses.

Full-time university employees who enroll in one or more courses are eligible for full tuition waivers, including a waiver of the general fee. For employees on at least a half-time basis but less than full-time, no more than seven tuition-free credits may be approved for any one semester. Employees working less than one-half time are not eligible for a tuition waiver.

Readmission

A student or applicant who falls into one of these categories must reapply:

1. An applicant who has previously been admitted to the university but did not enroll on the entrance date stated in the acceptance letter;
2. A graduate student at this university who was accepted for one degree program and wishes to apply for another program or degree; and
3. A degree candidate who has not continuously enrolled in courses or paid the Program Fee (Continuous Enrollment), (see the General Regulations) must reapply and pay all associated fees.

New England Regional Student Program

The New England Regional Student Program (RSP), one of the basic programs administered by the New England Board of Higher Education (NEBHE), was established in 1957. The RSP enables a resident of New England to attend the University of Massachusetts and pay the resident Massachusetts tuition rate plus a 75 percent surcharge for those graduate programs which are not available at any of the student’s home-state public institutions. The RSP Graduate Catalogue, commonly known as the “Apple Book,” is available by writing the New England Board of Higher Education, New England Regional Student Program, 45 Temple Place, Boston, MA 02111 or calling (617) 357-9620 or online at www.nebhe.org.

At the graduate level only, some programs not listed as open in the “Apple Book,” and others not listed at all, may also be available through the RSP. For example, some highly specialized graduate programs and options under a general subject area are not listed. If one of these specialized programs or options is not available at a home-state public institution, the student should contact the Graduate Dean at his/her state university, as negotiation is possible in some cases.

Non-degree graduate students are not eligible for the reduced rate under the RSP.
Tuition and Fees

Tuition and Fee Change
Tuition and fees are subject to change and may be changed without prior notice.

Application Fee
A nonrefundable application fee of $40 for U.S. citizens and permanent residents or $65 for international applicants must be submitted with each application.

Tuition
Graduate students pay tuition at the following (Fall 2009 rates: residents of Massachusetts — $110 per credit hour up to $1,320 per semester; “regional students” — $192.50 per credit hour up to $2,310 per semester; nonresidents — $414 per credit hour up to $4,969 per semester.

In order to enroll as a Massachusetts resident for tuition and fee purposes, a student must have on file a Residency Statement. Students originally classified as nonresident who believe they have met the residency requirements may appeal their classification before the beginning of the semester. Forms are available from the Graduate School.

The Summer Session tuition charges and fees are stated in the Summer Session course listing.

Estimated Annual Tuition and Fee Expenses for 2009-10 (12 credits)

<table>
<thead>
<tr>
<th>Enrollment Status</th>
<th>Resident</th>
<th>Non-Resident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Tuition</td>
<td>$2,640</td>
<td>$9,937</td>
</tr>
<tr>
<td>Required Fees</td>
<td>8286</td>
<td>11,491</td>
</tr>
<tr>
<td>Total</td>
<td>10,926</td>
<td>21,428</td>
</tr>
</tbody>
</table>

Tuition and fees are calculated on an annual basis for a graduate student carrying 12 credits per semester. Tuition and fees are prorated for fewer than 12 credits. Graduate Assistants with a Graduate Employee Organization (GEO) tuition waiver pay annually about $1,350 in mandatory fees.

Continuing & Professional Education Charges
Graduate students enrolling in programs or courses offered through the Division of Continuing & Professional Education’s winter and summer sessions pay CPE fees rather than the tuition and fees described here. For an up-to-date list of CPE programs and charges check www.umassulearn.net.

Service Fee
The Service Fee provides students access to Fine Arts Council events, reduced ticket prices, and the transit system. It covers all bond issue debt service obligations of the University of Massachusetts Building Authority for Amherst campus facilities and projects.

Graduate Matriculation Fee
The Matriculation Fee replaces the former commencement and career services fees and provides the following services: lifetime free graduate transcripts, thesis or dissertation binding for the library, and student identification card (UCard). This nonrefundable fee is paid each time a student matriculates in a graduate degree program—on-campus, off-campus and graduate programs enrolled through the Division of Continuing and Professional Education. Non-degree students are not assessed this fee.

Health Services Fee and Student Health Insurance
A mandatory Student Health Fee is included in the tuition bills of all students taking five or more credits per semester. Enrollment in the Student Health Insurance Plan (SHIP) is required under state law for all students who are registered for five or more credits unless the student has acceptable comparable coverage. Additional information is available in the University Health Services section of the Bulletin. The Student Health Fee is not waivable. In certain instances, the SHIP is waivable. The deadline to apply for a waiver of the SHIP is the end of the Add/Drop period.

Graduate Student Senate Fee
This fee supports graduate student government and various agencies providing services and activities for graduate students.

Curriculum Support Fee
The fee supports the educational and general mission of the campus, allowing it to remain a comprehensive university offering a wide variety of programs at the graduate and undergraduate levels.

Off-Campus Fee
Students completing their thesis, dissertation, or internship at an “off-campus” site may be eligible for a reduction of the General Fee. Contact the Graduate Records Office for a form and more information.

Late Payment Fee
Any student who does not make payment of his or her semester charges by the date specified may be required to pay a Late Payment Fee of $50.

Continuous Enrollment Fee
Graduate students not enrolled for any course credits but who are candidates for a degree, must pay a fee each semester (excluding summer terms) for continuous registration until the degree for which the student has been accepted has been formally awarded. Deadline for enrollment under this option is the end of the add/drop period. Any student who does not register for the Continuous Enrollment course by the appropriate deadline and later seeks readmission or applies for graduation, shall pay the accumulated continuation fees plus a readmission fee of $125. Students seeking readmission must file a written request, endorsed by the appropriate Department Head or Graduate Program Director, with the Graduate Dean.

Student Finances
Students should arrive on campus with enough cash on hand to pay their tuition, fees, and insurance bills as well as room and board for at least one month after registration. (Students receiving financial assistance from or through the University will not receive their first checks for approximately three to four weeks after registration.)

Waivers of Tuition
(Tuition waivers do not apply to courses given through the Division of Continuing and Professional Education.)

Graduate Assistants and Fellowship Recipients
Tuition and curriculum fees are waived during the academic semester for graduate teaching and research assistants and associates and for fellowship recipients, provided that the formal service assignment pays not less than one-half of the full-time teaching assistant stipend.

Full-Time University Faculty and Staff Members
See section titled Admission of Faculty and Staff Members to Graduate Study.

Other Employees of the Commonwealth of Massachusetts
Full-time employees of the Commonwealth who have completed at least six months of service at the time of enrollment and who are covered by a collective bargaining agreement or a tuition remission personnel policy are eligible for a full tuition waiver, but not fees. Forms are available from the Graduate Admissions Office.

Spouses and Dependent Children of University Employees
Spouses and/or dependent children of full-time university employees are eligible for full tuition waivers. Further details such as definitions of spouse, dependent children, and full-time status should be referred to the University Human Resources Office.

Senior Citizens
Beginning with fall 2005, all entering senior citizens (Massachusetts residents 60 years of age or older), shall be granted a waiver of tuition for graduate courses offered by the University
of Massachusetts Amherst. Individuals receiving this categorical tuition waiver will be responsible for payment of all other associated fees and charges in conjunction with their enrollment including, but not limited to, Continuing Education course fees.

**National Guard Tuition Exemption**

Tuition exemptions for members of the Massachusetts National Guard have been authorized by the Massachusetts state legislature. The National Guard, Air or Army, must certify in writing that the individual concerned is a member in good standing in the Guard. In order to enable this exemption, such certification must be made each semester and presented to the Bursar’s Office.

**International Students**

A limited number of tuition waivers are available on a competitive basis for foreign students enrolled in degree programs. For further information contact the Foreign Students and Scholars Office.

**Tuition and Fee Refunds**

A student who leaves the university for any reason before a semester is completed, except as specified below, will be granted a pro rata refund of tuition and fees that applies for the first five weeks of the semester only. A student who makes an advance payment and then for any reason does not attend any part of the next semester or term at the university will be given full refund of tuition and fees. If academic credit is given, there will be no refund.

Refunds are first applied to reimburse scholarships or loan funds (up to the full amount), and any remaining amount is refunded to the student.

**Refund Schedule**

**Regular Term**

- a. Within the first two weeks from the beginning of semester or term — 80%
- b. During the third week — 60%
- c. During the fourth week — 40%
- d. During the fifth week — 20%
- e. After the fifth week — no refund

*This refund schedule does not apply to courses offered through the Division of Continuing & Professional Education.*

**Room Rent**

The average room rent charge in University residence halls for graduate students is $2,310 per semester, and there is an additional surcharge for a single room, if such space is available.

**Room Rent Refunds**

Room rent refunds are granted less any applicable room reservation prepayments or cancellation fees. (These amounts are subject to change on a pro rata basis which applies for the first five weeks of the semester, according to Trustee policy.) No rent refunds are granted after five weeks.

**Board**

University Food Services, tel. (413) 545-2472, offers menus with a wide selection of food at each meal. These menus, prepared by a registered dietitian, are based on sound nutritional patterns, on actual surveys of student food preferences, and on verbal and written comments from students and staff members.

The 2008-09 schedule for board costs per semester is:

<table>
<thead>
<tr>
<th>Plan</th>
<th>Meals per semester</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlimited</td>
<td>224</td>
<td>$1,795</td>
</tr>
<tr>
<td>unlimited</td>
<td>unlimited</td>
<td>2,090</td>
</tr>
</tbody>
</table>

Food service is available on weekends for those on the Unlimited and Value plans or may be purchased individually on a cash basis. Kosher dinners are available Monday through Friday in Hampden Dining Hall for a $200 additional charge per semester to any meal plan.

**Board Refunds**

Authorized refunds will be made on a pro rata basis. A student who is suspended or expelled from the university for disciplinary reasons forfeits all rights to a refund.

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**Fellowships and Assistantships**

**Fellowships**

**Graduate School Fellowships**

A limited number of Graduate School Fellowships are awarded to graduate students on a universitywide basis by competition. They are intended to encourage and assist superior students in pursuing graduate study and in completing the requirements for graduate degrees in the minimum possible time.

The award stipend is payable from September through May. Graduate School Fellowship awards are for one year and may be renewed upon departmental nomination and Fellowship Committee recommendation. These fellowships also provide for waiver of tuition, curriculum fee waiver, and arrangements for payment of the Health Benefit (if the Health Benefit is not covered by another appointment, i.e., Research Assistantship, Teaching Assistantship), but not general fees. A recipient of a Graduate School Fellowship must enroll as a full-time student.

Prospective students may indicate their desire for a fellowship or an assistantship as part of the admissions application form supplied in the regular admissions material by the Graduate School of the University of Massachusetts Amherst. Interested incoming students should have their completed applications packet on file in the Graduate Admissions Office no later than January 15. Current students should check with their graduate program director for this information. Awards are announced for incoming students by mid-March. Information is available at www.umass.edu/gradschool.

**Graduate Student Travel Grants**

The Graduate School offers funding to degree-seeking, in-residence graduate students presenting the results of their research, creative, or scholarly activities at major professional meetings, exhibitions, symposia, or conferences. While the purpose of the funding is to supplement expenses incurred in such activity, students must approach other sources such as their department, program, or adviser before applying to the Graduate School. For further information, contact the Graduate Program Director, the Graduate Dean’s Office or www.umass.edu/gradschool.

**Federal Fellowships**

The university participates in the various federal fellowship programs sponsored by the National Science Foundation, the National Institutes of Health, and the Department of Education. For further information, contact the department or the Graduate Student Grants Service, tel. (413) 545-3428.
Financial Aid

Other Fellowships

Direct fellowship awards are available from a number of sponsors. Students may obtain information concerning these fellowships by calling the Graduate Student Grants Service.

Assistantships

The university offers graduate assistantships in the research and instructional programs of the various departments. Graduate assistants and associates making at least the minimum stipend set by the campus are not required to pay tuition, Curriculum Fee, and most of their Health Fee. For further information, contact the Graduate Program Director of the department involved or the Assistantship Office of the Graduate School.

Research Assistantships

A number of research assistantships are available to qualified graduate students. These are made possible through research grants awarded to members of the Graduate Faculty from sources outside the university or from funds provided by the university’s internally sponsored programs. Stipends vary with the type of work and the amount of time involved. A full-time research assistant is normally required to devote 20 hours per week to research. For further information, contact the department involved.

Teaching Assistantships

Many departments offer teaching assistantships to qualified graduate students. A full-time teaching assistant is normally required to devote 20 hours per week to preparation and teaching. The stipends vary with each department. For further information, contact the department involved.

International Teaching Assistants

Many departments offer teaching assistantships to qualified, enrolled graduate students. International applicants are eligible for these assistantships. Since teaching assistantships involve instruction, students who are awarded a teaching assistantship and whose native language is not English are required to demonstrate oral English proficiency. Students may do this either by passing the Test of Spoken English administered by the Educational Testing Service (ETS) before their arrival on campus and at their own expense or by passing the SPEAK test upon arrival on campus at no cost to them. A score of 50 or above is required to pass the TSE or SPEAK test. Information about the ETS may be obtained online at www.toefl.org or by writing to: TOEFL Services, Educational Testing Service, P.O. Box 6151, Princeton, NJ 08541-6151.

If the teaching assistantship is awarded, the test result has no bearing on the funding of the teaching assistantship. Students who do not pass the test are assigned responsibilities corresponding to their level of proficiency in spoken English and asked to enroll, at no cost to them, in the spoken English Communication Instruction classes offered by the Graduate School.

This requirement may be waived upon the Graduate Program Director’s request for students in the following categories: a. students who have taken and passed a test with similar purpose at another U.S. university; b. students who have an undergraduate degree from a U.S. university; or c. students whose entire education has been in the United Kingdom, Ireland, English-speaking Canada, Australia, New Zealand, Commonwealth Caribbean, or the United States.

Graduate Financial Aid Services works with students to make available the best resources for managing their education. Regardless of students’ income or eligibility for need-based financial aid, there are programs available to assist them in funding their education.

Located in 243 Whitmore Administration Building, the office is open Monday-Friday, 8 a.m.-4 p.m. Students with any questions or concerns should call (413) 577-0555; TDD (413) 545-9240; email Grads@finaid.umass.edu, or visit the office’s website at www.umass.edu/umfa.

Applying for Financial Aid

Financial Aid Requirements:

In order to be considered for Federal Financial Aid, applicants must be:

1. a U.S. citizen or permanent resident
2. enrolled in or admitted to a degree-seeking program with at least half-time status (six credits)
3. making satisfactory progress in a program of study
4. not be in default on a Federal Student Loan or owe a refund on a Federal Grant
5. registered for the Selective Service (if required)
6. free of convictions for any illegal drug offenses or meet the specific eligibility criteria determined by the Department of Education in the case of a drug-related conviction.

Application Form

The Free Application for Federal Student Aid (FAFSA) is the only application used to apply for financial aid at the University of Massachusetts Amherst. The information on the FAFSA is used to determine eligibility for federal, state, and institutional funding. Applicants must list the University of Massachusetts Amherst on their FAFSA application and indicate the school code, 002221, so that Graduate Financial Aid Services are able to receive their information. The following versions of the FAFSA form are available. Applicants should submit only one version to the central processor.

Although there is no deadline to file an application for a Direct Student Loan, consideration for other types of need-based aid such as Federal Work-study are given on a first-come first-served basis. Such programs require applications to be filed by February 15 to meet the University’s March 1 deadline.

Electronic and Renewal FAFSA Applications

Students are encouraged to use the interactive FAFSA application available online. This method has built-in edits that immediately identify errors that could otherwise hold up the process. Before completing the online FAFSA, the Department of
Eligibility for this loan is determined by the University of Massachusetts Amherst. Non-Degree Students may be eligible for a Federal Direct Loan if the student is formally awarded. Continuation fee students may be eligible for a Federal Direct Loan if the research work they are performing is equivalent to at least half-time (six credits per term). Students who are on continuation fee and who would like to borrow a Direct Loan must obtain a letter from their Graduate Program Director that states that they are performing at least half-time work. The letter should be sent to the Graduate Registrar’s Office, where their enrollment status will be updated. Their enrollment status will be verified by the Financial Aid Office.

Federal Financial Aid Awards

The William D. Ford Federal Direct Subsidized Loan is a need-based Federal Loan administered by the University of Massachusetts Amherst. Eligibility for this loan is determined by completing the FAFSA form. The federal government pays the interest on a subsidized loan while a student is enrolled at least half-time and during the six-month grace period following graduation. The interest rate is fixed and can not exceed 8.25 percent. This rate is adjusted annually on July 1.

The William D. Ford Federal Direct Unsubsidized Loan is a Federal Loan administered by the University of Massachusetts Amherst that is awarded regardless of financial need. Eligibility for this loan is determined by completing the FAFSA form. The student is responsible for the interest that accrues on this loan from the time that the funds are disbursed. Students have the option to pay the interest on the loan while they are enrolled or they may postpone payments on principal and interest until six months after they graduate or if they fail to enroll at least half-time (six credits). Like the subsidized loan, the interest rate is fixed and cannot exceed 8.25 percent. This rate is adjusted annually on July 1.

Alternative Financial Aid Resources

Several programs are available to supplement students’ financial aid awards or to help students who do not qualify for federal funding. Although alternative loans come from outside sources, Financial Aid Services is only able to certify loans up to a student’s cost of attendance at the university. More information about estimated cost of attendance is available on the Financial Aid website or by contacting the office. Additional eligibility information is also available online.

Loan Deferments

Deferments are available for graduate students who have outstanding federal student loans and are currently enrolled at least half-time (six credits). The Graduate Registrar’s Office coordinates loan deferments for graduate students with the National Student Loan Clearinghouse.

Scholarships

Students may search for scholarships online at www.massachusetts.edu/scholarships or contact Graduate Student Grant Services, 517 Goodell Building, tel. (413) 545-5279.

On-Campus Housing

The university provides 12-month limited housing for graduate students in one traditional residence hall. Facilities include lounges and study areas, one with a TV and one with a pool table, a kitchen area, and laundry and vending facilities. Graduate students wishing to live on campus should contact the Housing Assignment Office, Room 235, Whitmore Administration Building, as early as possible to ensure space will be available. Call (413) 545-2100 for an application or download one from the Housing and Residence Life website, www.housingumass.edu.

The terms of occupancy are as follows:
1. Space will be assigned on a full semester basis only.
2. Graduate students will be assigned to Cashin Hall on a space-available basis.
3. Both single and double occupancy rooms are available. Graduate students requesting double occupancy will have a roommate.
4. Room rent is commensurate with the charge for nine-month residence halls. All graduate students have the option of remaining during the summer vacation periods at an additional monthly charge. Fees are set prior to the beginning of each semester, and the university reserves the right to alter fees whenever necessary.
5. Applications must be accompanied by a non-refundable $100 prepayment in U.S. currency (this amount is subject to change). If space is not available, the $100 prepayment will be returned promptly.
6. Graduate students are assigned by the Housing Assignment Office. Once an assignment is made, students will be notified. Graduate students must sign a Residence Hall Contract.
7. Policies and regulations outlined in the Residence Hall Manual apply to all graduate students. Residence hall rules and regulations require that occupants assume responsibility for damage in or to their rooms. The university is not responsible for lost, stolen, or damaged property unless there is negligence or wrongdoing on the part of the university. Students are well advised to secure a rider to existing home owners’ policies or to purchase a renter’s insurance policy in anticipation of possible problems.
8. Hot plates and other such equipment used in preparing hot food are strictly prohibited in student rooms. A kitchen is available for cooking snacks or meals.

Family Housing

The university owns and operates a limited number of apartments located adjacent to campus. All students who meet established eligibility criteria may apply for an apartment, but should...
Programs Offered

not plan on immediate occupancy because of the extensive waiting list. There are also handicapped-accessible apartments for disabled individuals. For more information, contact the Family Housing Office, Wysocki House, tel. (413) 545-3115; email: family.housing@housing.umass.edu.

Off-Campus Housing
Housing and Residence Life offers an online resource of area rental listings for students. The online resource also provides students the ability to create a renter profile. Area landlords and students search these profiles to contact prospective tenants and roommates. For additional information, contact the Housing Assignment Office, 235 Whitmore Administration Building, tel. (413) 545-2100, or visit the website www.housing.umass.edu.

Major Fields In Which Courses Are Offered Leading to the Degree of Doctor of Philosophy
Afro-American Studies
Animal Biotechnology and Biomedical Sciences
Anthropology
Astronomy
Biochemistry
Chemical Engineering
Chemistry
Civil Engineering
Communication
Communication Disorders
Comparative Literature
Computer Science
Economics
Electrical and Computer Engineering
English
Entomology
Food Science
Forest Resources
Geosciences
Germanic Languages and Literatures
Hispanic Literatures and Linguistics
History
Industrial Engineering and Operations Research
Kinesiology
Linguistics
Management
Mathematics
Mechanical Engineering
Microbiology
Molecular and Cellular Biology
Music
Neuroscience and Behavior
Nursing
Organismic and Evolutionary Biology
Philosophy
Physics
Plant Biology
Plant and Soil Sciences
Political Science
Polymer Science and Engineering
Psychology
Public Health
Regional Planning
Resource Economics
School Psychology
Sociology
Sport Management
Wildlife and Fisheries Conservation

In several fields, degrees are awarded under the Five College Cooperative Ph.D. Program: all departments in the biological sciences, astronomy, chemistry, geology, and physics.

See Communication Disorders section for information on the Doctor of Audiology degree.

Major Fields In Which Courses Are Offered Leading to the Master’s Degree
Accounting
Afro-American Studies
Animal Biotechnology and Biomedical Sciences
Anthropology
Applied Mathematics
Architecture
Art
Art History
Astronomy
Biochemistry
Chemical Engineering
Chemistry
Chinese
Civil Engineering
Communication
Communication Disorders
Comparative Literature
Computer Science
Design
Economics
Education
Electrical and Computer Engineering
English
Entomology
Environmental Engineering
Food Science
Forest Resources
French and Francophone Studies
Geography
Geosciences
Germanic Languages and Literatures
Hispanic Literatures and Linguistics
History
Hospitality and Tourism Management
Industrial Engineering and Operations Research
Italian Studies
Japanese
Kinesiology
Labor Studies
Landscape Architecture
Latin and Classical Humanities (see Classics)
Linguistics
Management
Mathematics
Mechanical Engineering
Microbiology

See Education section for concentrations of study leading to the Doctor of Education degree.

See Nursing section for information on the Doctor of Nursing Practice degree.

For information on the Master of Science and Doctor of Philosophy Intercampus Marine Science and Technology program refer to www.umassmarine.net/degrees/.

See Education section for concentrations of study leading to the Doctor of Education degree.

See Nursing section for information on the Doctor of Nursing Practice degree.

For information on the Master of Science and Doctor of Philosophy Intercampus Marine Science and Technology program refer to www.umassmarine.net/degrees/.
Degree Requirements

All requirements for any advanced degrees to be awarded at a given degree-granting period (February, May, September) must be completed by the appropriate deadline—February: January 15; May: last working day of April; and September: last working day of August. The completed Eligibility for Degree Form, signed by the candidate, the Graduate Program Director, and the Department Chair/Head, must be submitted to the Graduate School Office of Degree Requirements by the specified date so that all the candidate’s credentials can be certified before the degree is actually awarded. Please refer to the Graduate Student Handbook (online at www.umass.edu/gradschool/handbook/Handbook.pdf) for further detailed guidance in the preparation and completion of a program of study. Guidelines for Master’s Theses and Doctoral Dissertations is also available in the Office of Degree Requirements or online at www.umass.edu/gradschool/dissertationandthesis/index.html.

It shall be the responsibility of the Dissertation Committee to approve the dissertation project, to supervise its execution, and to arrange and attend the final examination of the student. All members of the Dissertation Committee must tentatively approve the dissertation before the final oral examination is scheduled and agree that it is time for this examination to be held. Attendance at the final oral examination is open to all members of the candidate’s major department and any member of the Graduate Faculty. However, only members of the Dissertation Committee may cast votes. A unanimous vote of the Dissertation Committee is required for the student to pass the final oral examination. If, at the final examination, two members of the Dissertation Committee cast negative votes, the candidate will be informed that he or she has not passed the examination. If there is but one negative vote, the degree will be held up pending action of the Graduate Council.

The doctoral degree is conferred upon graduate students who have met the following requirements:

1. Successful completion of all courses and projects specified by the adviser/guidance committee within the guidelines of the candidate’s graduate studies program.
2. Satisfactory completion of foreign language requirements under Graduate Council policy. (These requirements are listed in the departmental sections of this Bulletin.)
3. Passing a preliminary comprehensive examination conducted by the major department. Any student who fails the comprehensive examination may, at the discretion of the examining committee, be permitted a second and final examination.
4. Submission of an approved dissertation prospectus to the Graduate School at least seven months prior to the Final Oral Examination (defense of dissertation).
5. Preparation of a dissertation satisfactory to the Dissertation Committee and the Department Head/Chair.
6. Passing a final (at least partly oral) examination conducted by the Dissertation Committee on the Amherst campus. This examination shall be primarily upon, but not necessarily limited to, the candidate’s dissertation. This examination time and date shall be submitted to the Graduate Dean for announcement to the Graduate Faculty when all of the Dissertation Committee members and the Department Head/Chair agree that the dissertation is sufficiently complete to stand defense; approval of the dissertation, passing the defense, and/or recommending the degree are not implied by scheduling this examination.

The department Graduate Program Director is responsible for the following, all within the guidelines of the Graduate School and the candidate’s graduate studies program:

a. Approving the candidate’s program of courses.
b. Approving the procedure for satisfying the language requirements, if any.
c. Arranging for the candidate’s preliminary comprehensive examination.
d. Reporting fulfillment of the above requirements to the Head/Chair of the Department, and to the Graduate School.

As soon as the student has passed the preliminary comprehensive examination, the Department Head/Chair or Graduate Program Director of the candidate’s major department shall recommend to the Dean of the Graduate School the names of at least three members of the Graduate Faculty to serve as a Dissertation Committee. At least two of the Graduate Faculty so nominated shall be from the candidate’s major department. One member shall be appointed from outside the candidate’s department but from within the University community. The outside member shall, without exception, be a voting member of the Dissertation Committee.

*Refers to administrative entity for which degree has been authorized (i.e., department, program, school, etc.).
7. Registration for the required number of dissertation credits (refer to the General Regulations section, item number 15).

8. A doctoral candidate must spend the equivalent of at least one continuous academic year of full-time graduate work (nine credits per semester) in residence at the university. The residency year must be either in fall/spring or spring/fall sequence. During this year, the student must spend some part of each week physically on campus. Doctoral students enrolled in recognized off-campus programs may satisfy this regulation at their off-campus site.

9. Doctoral students are required to complete their program within five years of achieving candidacy. Candidacy is recommended by the academic department upon satisfactory completion of coursework and passing the qualifying examination. Two-year extensions to this policy will be considered upon recommendation submitted to the Graduate School by the student’s Graduate Program Director.

Five College Cooperative Ph.D. Program

A cooperative Ph.D. program is offered by Amherst, Hampshire, Mount Holyoke and Smith Colleges, and the University of Massachusetts Amherst. The degree is awarded by this university, but in exceptional cases much of the work leading to it may be taken at one or another of the participating institutions. Departments authorized to offer the cooperative Ph.D. degree are: all departments in the biological sciences, Chemistry, Geology, Physics, and Astronomy.

An applicant must apply for the Five College Cooperative Ph.D. Program through the Graduate School of the University of Massachusetts Amherst. The application must then secure the approval of the appropriate academic department at the university. The application then will be forwarded to the appropriate Five College institution for its evaluation. The letter of acceptance to the applicant is sent only by the Dean of the Graduate School of the University of Massachusetts, not by the other cooperating institution.

Registration for the Five College Cooperative Ph.D. students is handled only through the Graduate School of the University of Massachusetts.

Degrees awarded in this program will be appropriately indicated on the diploma and the permanent record.

All requirements for the Five College Cooperative Ph.D. degree are similar to those for the Ph.D. degree at the university except for the residency requirement. Residence in this program will apply to the institution where the dissertation work is done.

The names of the Graduate Faculty at cooperating institutions are listed at the end of this Bulletin.

Doctoral Dissertation

In addition to the other requirements of the Graduate School, a candidate for the degree Doctor of Philosophy (Ph.D.) or Doctor of Education (Ed.D.) must complete an acceptable dissertation. The dissertation qualifies for acceptance when it satisfies the following criteria: 1) It should demonstrate the candidate’s intellectual competence and maturity in the field of concentration; 2) It should make an original and valid contribution to human knowledge; 3) It should be an individual achievement and the product of independent research.

Although doctoral dissertations may result from a project involving collaboration of several scholars, the individual contribution of each doctoral candidate must be substantial, clearly identified, and separately presented. Length of the dissertation is governed by the nature of its subject matter.

The dissertation in its completed form will be judged largely upon the ability of the candidate to review and make critical use of the literature; to formulate a problem, plan a method of attack, and work systematically toward a solution; to summarize the material or data, and draw conclusions based thereon. Scholastic attainment in writing and presenting the results of the study will be crucial. The goal of the dissertation is to make a contribution to knowledge. It should be of publishable quality.

The following rules shall be adhered to in preparation and presentation of a dissertation:

1. The professor responsible for the direction of the student’s research shall be the Chair of the candidate’s Dissertation Committee. Only members of the Graduate Faculty may be appointed to this committee.

2. It is the responsibility of the Chair of the Dissertation Committee to arrange a conference with other members of the committee and the candidate to discuss the research problem before approving the dissertation prospectus.

3. A copy of the candidate’s dissertation prospectus must be signed by each member of the Dissertation Committee and Department Chair/Head or Graduate Program Director to indicate that the prospectus has been approved and that a conference with the candidate has been held. The signed copy of the prospectus shall then be sent to the Dean of the Graduate School, via the candidate’s Graduate Program Director.

4. Prior to arranging for the final preparation of dissertations, candidates should refer to the Guidelines for Master’s Theses and Doctoral Dissertations, available online at www.umass.edu/gradschool/dissertationandthesis/index.html.

5. The Dissertation Committee is responsible for preparation of an acceptable dissertation. The dissertation must have the tentative approval of this Committee and the approval of the Department Head or Chairman before arrangements are made for the final examination for the degree.

6. Because of the time required to give adequate consideration to the research, it is important that the dissertation be submitted to the Dissertation Committee at least one month before the Graduate School degree-granting deadlines.

7. Although different disciplines have distinctive research and presentation styles, the Guidelines for Master’s Theses and Doctoral Dissertations (see 4 above) must be followed in order to achieve the maximum uniformity possible. As the Graduate School has every dissertation microfilmed, much attention is paid to the finished form. Both the Dissertation Committee and the Graduate School must approve the final format and appearance.

The candidate shall submit the dissertation to the Graduate School in electronic format following the instructions online at www.umass.edu/gradschool/dissertationandthesis/elecdis. html by the deadline for the appropriate degree period. The dissertation will be made available at the W.E.B. Du Bois Library and at branch libraries. Some departments require a bound copy for their own file as well.

The microfilm fee is required. This fee covers the submission of the electronic dissertation and the microfilm publication of the dissertation by ProQuest/University Microfilms Dissertation Services and the publication of the abstract in Dissertation Abstracts International.

8. The Eligibility for Degree form and two original signature pages for the dissertation must be submitted to the Graduate School by the deadline for the appropriate degree-granting period.

9. The University of Massachusetts Amherst requires that all dissertations be copyrighted by placing a copyright notice in all copies of the work. Registration of the copyright and payment of the registration fee are optional. Further information concerning copyright is available in the Guidelines for Master’s Theses and Doctoral Dissertations. For current fees, check with the Office of Degree Requirements.

The dissertation will be cataloged in the Library of Congress and in the University of Massachusetts Library. Copies may be purchased from University Microfilms Dissertation Services, 300 N. Zeeb Road, P.O. Box 1346, Ann Arbor, MI 48106-1346 or online at www.umicro.com. Publication by microfilm does not preclude the printing of the dissertation in whole or in part in a journal or as a monograph.
Master’s Degree Requirements

In addition to the Master of Arts (M.A.) and Master of Science (M.S.) degrees, the University also offers the following master’s degrees: Master of Architecture (M.Arch.), Master of Arts in Teaching (M.A.T.), Master of Business Administration (M.B.A.), Master of Science in Accounting (M.S. Accctg.), Master of Education (M.Ed.), Master of Fine Arts (M.F.A.), Master of Landscape Architecture (M.L.A.), Master of Music (M.M.), Master of Regional Planning (M.R.P.), Master of Science in Chemical Engineering (M.S. Ch.E.), Master of Science in Civil Engineering (M.S.C.E.), Master of Science in Electrical and Computer Engineering (M.S.E.C.E.), Master of Science in Engineering Management (M.S.E.Mgt.), Master of Science in Environmental Engineering (M.S.Envr.E.), Master of Science in Industrial Engineering and Operations Research (M.S.I.E.O.R.), Master of Science in Mechanical Engineering (M.S.M.E.), Master of Public Policy and Administration (M.P.P.A.), and Master of Public Health (M.P.H.). Programs are described elsewhere in this section; for all other programs consult specific program of study.

Dual master’s degrees are offered in the following programs: Civil Engineering (M.S.C.E.)/Management (M.B.A.), Environmental Engineering (M.S.E.E.)/Management (M.B.A.), Hospitality and Tourism Management (M.S.)/Management (M.B.A.), Industrial Engineering and Operations Research (M.S.I.E.O.R.)/Management (M.B.A.), Landscape Architecture (M.L.A.)/Regional Planning (M.R.P.), Mechanical Engineering (M.S.M.E.)/Management (M.B.A.), Nursing (M.S.)/Public Health (M.P.H.), Public Policy and Administration (M.P.P.A.)/Management (M.B.A.), Sport Management (M.S.)/Management (M.B.A.).

Requirements

1. A minimum of 30 graduate credits, of which not more than six credits (for M.F.A. students, 12 credits) of grade B or better may be transferred from other institutions with the consent of the student’s program, and Special Problems/Independent Study courses shall be limited to 6 credits (for M.F.A. students 12 credits). If a thesis is not offered, at least 12 credits must be earned at this University (600-800 series courses). A minimum of half the required credits for a master’s degree in each department must be on a letter graded basis; some or all of the remaining number of credit hours toward the degree may be on a pass/fail basis, subject to the approval of the student’s department. The option as to which courses may be taken on a pass/fail basis rests with the department/school rather than with the individual candidate. Transfer credits cannot be used as part of the required component of one-half credits of letter grades. No more than 10 credits may be earned by means of a thesis.

2. The thesis is optional with the school or department; if one is required, however, it shall be under the supervision of a Thesis Committee. This committee shall consist of one or more members of the Graduate Faculty appointed by the Dean of the Graduate School upon recommendation of the Graduate Program Director or the Head or Chair of the Department. A copy of the candidate’s thesis outline must be signed by each member of the Thesis Committee to indicate that the outline has been approved. A signed copy of the thesis outline shall be sent to the Graduate Dean four months prior to the thesis defense. The thesis must be approved by the Thesis Committee and the Department Chair or Head. If the candidate prepares a thesis, Special Problems courses shall be limited to six credits.

3. Candidates who do not write a thesis may be required to pass a general examination (written or oral), depending on program requirements. The Examining Committee usually consists of three graduate faculty members, and the positive recommendation of at least two of the three members of the Examining Committee shall be requisite to receiving the degree.

4. Candidates for the doctoral or master’s degree may apply for the master’s degree when they have fulfilled normal requirements in their Department/School for the master’s degree.

5. Foreign language requirements for the master’s degree are optional with the school or department.

6. Course credits used previously to fulfill the requirements for any prior degree may not be used for fulfilling requirements for any master’s degree at this University.

7. The Statute of Limitations (total time period in which to earn the master’s degree) is three calendar years from acceptance into the program, except that for the M.F.A. program and the part-time off-campus programs in music education and management, the period is four years. Dual master’s degrees are given five years unless otherwise noted in the program description.

Master of Arts in Teaching

The Master of Arts in Teaching program is primarily for those who do not have adequate academic preparation or appropriate teaching experience but who do hold a bachelor’s degree to become effective teachers either at the secondary school or community/junior college level. The M.A.T. program leads to a terminal degree combining professional aspects of the M.Ed. degree with the academic tradition of the M.S./M.A. degree. A minimum of 39 credits are required for the secondary school option, and 45 credits for the community/junior college option (specific credit requirements are detailed in the program descriptions.) A maximum of nine graduate credits of grade B or better from another accredited institution may be applied toward the degree, upon recommendation by one of the participating programs (Spanish, Classics, French and Italian) and approval by the Graduate Dean.

Master of Fine Arts

The Master of Fine Arts degree program is designed particularly for those interested in the creative aspects of the arts and may be obtained in the Department of Art for work in the visual arts, the Department of English for work in creative writing, or the Department of Theater for work in dramatic art. The basic requirements for the degree are:

1. Sixty credits at the graduate level. Not more than 12 credits may be transferred from other institutions upon recommendation of the department and approval of the Graduate Dean. No more than 18 credits may be earned for the thesis.

2. The exact nature of the thesis project will be determined by the student’s major adviser and the student. It is to be understood that the student will produce a work in the creative arts. A written analysis of the work itself and of the procedures used in producing it is required. The candidate will be asked to pass an examination in the major field in addition to presenting the thesis project publicly.

Dual Master’s Degrees

Dual master’s degree programs are designed upon the request of two cooperating programs. All degree requirements for each program must be completed. The total number or credits for the dual degree program must be at least 60 credits of which no fewer than 30 credits must come from each of the two programs. If either of the cooperating degree programs requires a thesis, a thesis will be required under the dual degree option. The thesis should address a topic which is derived from the rationale for the dual degree. In order for a student to be permitted to exercise the dual degree option, he or she must...
General Regulations

meet the entrance requirements of each individual program and be admitted by both programs. Both degrees must be awarded concurrently. The Statute of Limitations for completion of a dual degree option shall be five years. A student who does not complete both courses of study required by the cooperating programs may be awarded one master’s degree upon completion of the program requirements for one of the two programs.

Master’s Thesis
The requirements for the master’s thesis are the same as those for the doctoral dissertation, listed above, with the following exceptions:
1. The Chair or Head of the Department shall submit nominations to the Graduate Dean for a Thesis Committee. This committee may consist of one, two, or three members, all of whom must be members of the University of Massachusetts Graduate Faculty. After the Thesis Committee has been appointed by the Graduate Dean, it shall review the candidate’s proposed thesis outline. When accepted, all members shall sign a cover sheet indicating approval. The thesis outline, with the cover sheet bearing the signatures of the committee members and the date of the Thesis Committee’s meeting with the candidate, will be forwarded to the Graduate Dean by the Graduate Program Director at least four months prior to the thesis defense. All candidates who prepare a thesis must pass a thesis examination, not necessarily limited to the thesis topic, and administered by the Thesis Committee.
2. The candidate shall submit the thesis to the Graduate School in electronic format following the instructions online at www.umass.edu/gradschool/dissertationandthesis/elec mast.html by the deadline for the appropriate degree period. The thesis will be made available at the W.E.B. Du Bois Library and at branch libraries. Some departments also require a bound copy for their own files.
3. The Eligibility for Degree form and two original signature pages for the thesis must be submitted to the Graduate School by the deadline for the appropriate degree period.

1. Course Numbering System at the University of Massachusetts

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>001-099</td>
<td>Noncredit</td>
</tr>
<tr>
<td>100-199</td>
<td>Introductory lower division (freshman)</td>
</tr>
<tr>
<td>200-299</td>
<td>Other lower division (sophomore)</td>
</tr>
<tr>
<td>300-399</td>
<td>Upper division (junior/senior)</td>
</tr>
<tr>
<td>400-499</td>
<td>Upper division (junior/senior); graduate credit may be awarded only to candidates outside the department's own graduate program when taught by a member of the Graduate Faculty.</td>
</tr>
<tr>
<td>500-599</td>
<td>Combined graduate/undergraduate</td>
</tr>
<tr>
<td>600-699</td>
<td>Master's or first-year graduate</td>
</tr>
<tr>
<td>700-899</td>
<td>Doctoral and advanced graduate</td>
</tr>
<tr>
<td>900-999</td>
<td>Post-terminal degree</td>
</tr>
</tbody>
</table>

Fixed Numbers (Graduate/Undergraduate)

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>590</td>
<td>Experimental courses</td>
</tr>
<tr>
<td>591-595</td>
<td>Seminars, variable titles</td>
</tr>
<tr>
<td>596</td>
<td>Independent study</td>
</tr>
<tr>
<td>597</td>
<td>Special topics, variable titles</td>
</tr>
</tbody>
</table>

2. “More Restrictive” Program Regulations
Any Graduate School regulation or procedure shall not preclude graduate programs from developing specific regulations or procedures which are more restrictive or selective.

3. Retaking Courses
Unless otherwise noted a course may be taken more than once but may be offered only once toward degree requirements.

4. Grading Policy
The following letter grades can be given to graduate students in graduate-level courses: A, A-, B+, B, B-, C+, C, F. These grades carry the following numerical equivalents for purposes of computing cumulative averages: A = 4.000, A- = 3.700, B+ = 3.300, B = 3.000, B- = 2.700, C+ = 2.300, C = 2.000, and F = 0. Graduate students enrolled in undergraduate courses may receive grades of C-, D+ and D (C- = 1.700, D+ = 1.300, D = 1.000).

5. Academic Dismissal
A student who in any two semesters, consecutive or otherwise, has semester averages of below 2.800 is subject to academic dismissal.

6. Academic Average for Graduate Degrees
In the courses which a student is offering to satisfy degree requirements, a minimum standard for satisfactory work is a 3.000 average.

7. Satisfactory or Reasonable Progress
A student must make satisfactory and reasonable progress toward completion of a degree program within the Statute of Limitations for that degree. A student who is not making satisfactory or reasonable progress is subject to termination.

8. Maximum Credit Load
A graduate student may register for up to 16 credits during the fall and spring semesters and nine credits during the summer Session. Any student who wishes to register for more than the maximum credit load must secure written permission from the graduate program director in the major department and the Graduate Dean’s approval.

9. Continuous Enrollment
Graduate students are required to maintain continuous enrollment each semester by registering for course/thesis/dissertation credits or by paying the Program Fee. Failure to be properly enrolled will result in a student’s withdrawal at the end of the Late Registration Period.

10. Full/Half/Part-Time Student Credits
The Graduate School defines full time as nine or more credits, part time as eight or fewer credits, and for loan deferments, half time as six or more credits. Master’s and doctoral candidates may be considered full-time or half-time students regardless of the number of thesis or dissertation credits for which they register, provided the major department certifies that they are working full time on research.

11. Statute of Limitations
Doctoral students are required to complete their program within five years of achieving candidacy. Candidacy is recommended by the academic department upon satisfactory completion of coursework and passing the qualifying examination. Master’s students have three calendar years from acceptance into the program (or four years for the M.F.A. and off-campus programs in engineering, music education, and management) to earn the degree. Part-time students may be granted an additional year upon petition to their Graduate Program Director.

12. Leaves of Absence
A. Personal
A leave of absence is requested when the student, because of unexpected circumstances, is not able to actively pursue his or her graduate program of study. Graduate students who request a leave of absence must petition their Graduate Program Director who, in turn, provides justification for
the request to the Graduate Dean. If the Dean grants a leave of absence, the student’s statute of limitations is extended appropriately. However, graduate students on leave of absence must maintain continuous enrollment by paying the Continuation Fee every semester during their leave.

B. Health

When a student’s health or mental health problem precludes successful completion of his or her academic course work, the student may receive a health leave of absence or withdrawal from the University, upon recommendation by the appropriate physician or therapist of the University Health Services. Normally, the leave of absence/withdrawal will result from the student’s voluntary efforts. In exceptional circumstances involving life-threatening behaviors, a student may be asked to leave the university involuntarily until serious life-threatening circumstances have been controlled.

1. A voluntary health leave of absence/withdrawal may be requested by any student with a serious health problem who, in the opinion of the attending physician/therapist, cannot complete his/her course work. All such leaves/withdrawals will be reviewed and approved by the Medical Director or Mental Health Director. In order to remove the conditions of the health leave/withdrawal, a student must present evidence that the health problem no longer precludes successful completion of academic work. At least one academic semester must have passed before readmission for a mental health leave/withdrawal can be considered.

2. An involuntary leave of absence/withdrawal for health reasons may be recommended by a physician or therapist on the staff of the University Health Services. An involuntary health withdrawal must involve a strong likelihood of: serious risk of physical harm to the student him/herself, manifested by evidence of threats of suicide or attempts at suicide or other serious bodily harm; serious risk of physical harm to other persons in the community, including evidence of homicidal or other violent behavior; or a reasonable risk of physical impairment or injury to the person him/herself because of impaired judgment that would not allow the person to live independently or protect him/herself in the community. All recommendations for an involuntary health leave/withdrawal must be approved by either the Medical Director or the Mental Health Director. The reasons for the recommendation must be documented. Once documented and approved, the terms of the leave/withdrawal become effective immediately and the student may be required to leave campus immediately, even though he/she will be able to subsequently appeal the decision.

A student who has been given an involuntary health leave of absence/withdrawal has ten (10) business days to appeal the decision in writing to the Executive Director, University Health Services, stating the reason for the appeal and the desired resolution. An Appeals Panel will be constituted by the Executive Director of the University Health Services and the Dean of the Graduate School, and will be composed of two non-involved physicians, one of whom must be a psychiatrist, and the Dean of the Graduate School or his/her designee. The Appeals Panel will consider the case within five (5) business days of the request for the appeal. At the time of the hearing, the student will have the opportunity to contest the decision and will be permitted to have an adviser present.

The decision of the Appeals Panel is final. Only in cases of procedural irregularity will a further appeal be possible through the Graduate School’s Grievance Procedure. In order to remove the conditions of the involuntary health leave/withdrawal, a student must present evidence that the health problem no longer precludes safe attendance at the university. The student will also be examined by the Medical Director or Mental Health Director, or designee, originally involved. At least one full academic semester must have passed from the time of the leave/withdrawal and/or after the appeal before the student can re-enroll if the leave/withdrawal was for mental health reasons.

During the period of a health leave of absence the student must maintain his/her status by paying the Continuation Fee. Accordingly, the Graduate School will adjust the student’s statute of limitations for the duration of the leave of absence.

13. Course Withdrawal Regulations

a. To add, drop, or change a course, students must use the web-based SPIRE registration system. Certain courses and/or departments may require written approval of the instructor concerned and/or faculty adviser. Signed approval forms are to be filed with the Graduate Records Office.

b. Up to and including 10 academic days from the beginning of a semester a student may add, drop or change courses without penalty; that is, no entry will be made on the student’s permanent record. No courses may be added after this date.

c. After period (b) but within six calendar weeks after the beginning of a semester a student may drop courses with a grade of DR (Drop) provided approval is obtained from the instructor and the student’s major adviser.

d. During periods (b) and (c) a student may withdraw from the university without academic penalty. Grades of DR will be noted on the record. After six weeks, grades of WF (Withdraw Failing) or WP (Withdraw Passing) will be entered unless special permission is obtained from the Dean of the Graduate School. No student may withdraw from courses after final examinations begin.

14. Incompletes

A student can obtain credit for an “incomplete” only by finishing the work of the course before the end of one calendar year from the time of enrollment in that course. At the end of that period, if a grade is not submitted an IF (Incomplete Failure) will be recorded. The initiative in arranging for the removal of an “incomplete” rests with the student. This regulation does not apply to thesis and dissertation credits but does apply to terminal project credits.

15. Thesis and Dissertation Credits

(Thesis 699 and Dissertation 899) The required number of thesis and dissertation credits varies by program. They range up to a maximum of 10 for master’s theses and from a minimum of 10 to 18 for doctoral dissertations. No student is exempt from this requirement; normal tuition rates will apply. These credits will be graded IP (In Progress) until the thesis or dissertation has been accepted by the Graduate School at which time these credits will be converted to SAT (Satisfactory).

16. Transfer of Courses and Credits Taken Over and Above Credits Earned For a Bachelor’s Degree

An undergraduate student in the senior year at any of the Five College institutions who will earn during that year more credits than are needed for the bachelor’s degree may register concurrently for graduate credits at the University of Massachusetts after securing the permission of the graduate course instructor. The student registers for these credits in the normal registration process. The Graduate School will accept a maximum of six credits earned via this method, provided that 1) the student is accepted into a Master’s program, 2) the student’s graduate program director recommends the transfer, and 3) the undergraduate registrar certifies that the courses were over and above those needed by the student for the Bachelor’s degree. Acceptance of such courses follows transfer guidelines in force at the time of petition.

17. Grievance Procedure

For the purposes of this procedure: A grievance is defined as a complaint by a currently enrolled graduate student(s) alleging that some member(s) of the university community has caused the student(s) to suffer some specific harm related to a matter within the authority of the Dean of the Graduate School. However, complaints that concern 1) matters of academic judgement, or 2) the substance (as opposed to the administration) of university, campus, or Graduate School
policies and regulations shall not be considered grievances under this procedure, and grievances which have been brought to a hearing under another campus grievance procedure shall not be brought to a hearing under this procedure.

The Graduate School Grievance Procedure is available from the University Ombuds Office and the Office of the Dean of the Graduate School.

18. Academic Honesty Policy

It is the expressed policy of the university that every aspect of graduate academic life, related in whatever fashion to the University, shall be conducted in an absolutely and uncompromisingly honest manner by graduate students.

Apparent and alleged breaches in this policy are covered in the Student Academic Policy (Sen. Doc. no. 07-040A). A copy of this policy is available in the Ombuds Office, Faculty Senate Office, and the Office of the Dean of the Graduate School.

19. Graduate Student Honor Code

We, the graduate students of the University of Massachusetts Amherst, hereby affirm that graduate students do not lie, cheat, or steal, or willingly tolerate those who do.

We do not plagiarize the work of others, falsify data, or knowingly allow false data to be generated or published with our compliance.

We do not harass or discriminate against others for reasons of race (phenotype), creed, sexual orientation, or political belief, or keep faith with those who do.

20. Hazing Policy

Under Chapter 269 of the General Laws of the Commonwealth of Massachusetts “hazing” of a student by another student is a crime punishable by a fine and/or imprisonment. Students may also be subject to civil lawsuits by victims of hazing.

A copy of the statute is available in the Office of the Dean of Graduate School.

21. Absences for Religious Reasons

Chapter 151C of the Massachusetts General Laws as amended states:

“Any student in an educational or vocational training institution, other than a religious or denominational educational or vocational training institution, who is unable, because of his religious beliefs, to attend classes or to participate in an examination, study, or work requirement on a particular day shall be excused from any such examination or study or work requirement, and shall be provided with an opportunity to make up such examination, study, or work requirement which he may have missed because of such absence on any particular day; provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of his availing himself of the provisions of this section.”

22. Administrative Withdrawal

A student may be administratively withdrawn from the university if, after due notice, the student fails to satisfy an overdue financial obligation to, or to comply with certain administrative requirements of, the campus of the University of Massachusetts at which the student is registered.

Section 1. Conditions Warranting Administrative Withdrawal

Any of the following conditions may warrant administrative withdrawal:

(a) Failure to comply with administrative requirements, specifically,

(1) Failure by a student to satisfy an overdue financial obligation to the university, consisting of tuition, loans, board, room fees, library (charges); or other student charges, including orientation, student activities, health services (child care), and other such fees as may be established from time to time.

(2) Failure to comply with prior conditions on admission to the university imposed by the Graduate School in compliance with university policies.

(b) Forgery, fraud, or falsification of information on any official university form or document, such as Bursar’s Clearance Card, grade report, recommendations, transcripts, etc.

(c) Certified physical or mental health problem of a hazardous nature.

Section 2. Effects of Administrative Withdrawal

(a) If administratively withdrawn, a student shall cease to be enrolled and shall not be allowed to complete the current semester or to register for future semesters.

(b) The student shall return his/her identification card and any and all property belonging to the university currently in his or her possession.

(c) The student shall receive no further material or notification from the Registrar concerning university affairs.

Section 3. Reinstatement

Any student who has been administratively withdrawn may at any time during the semester in which the withdrawal was made make arrangements with the Registrar for the resolution of the matter. Upon such a resolution satisfactory to the Registrar, the Registrar shall forthwith reinstate the student to active enrollment status. Any student who has attempted to resolve the matter but has failed to satisfy the Registrar may petition for reinstatement by mailing or delivering to the Administrative Withdrawal Committee a written statement describing the actions he/she has taken to resolve the matter and the reasons why the student believes himself or herself entitled to reinstatement. The Committee at its discretion may decide the matter on the written petition of the student and such answer as the Registrar may submit, or may schedule a hearing on the matter at the earliest practicable date. If the Committee decides in favor of reinstatement, the Registrar shall cause the student to be reinstated forthwith upon receipt of the decision. The determination of whether a reinstated student shall receive credit for the period for which he/she was withdrawn shall be made by the instructor for each course involved.

Section 4. Administrative Withdrawal Review Committee

The Administrative Withdrawal Review Committee shall be appointed each year by the Chancellor. The Registrar shall not be a member of said Committee except that he/she shall sit in place of a regular member in any case wherein said regular member is the administrative official recommending withdrawal. The Committee shall be empowered to make decisions concerning administrative withdrawal as provided above.

23. Picketing Code

1. All students, undergraduate and graduate, have a right to demonstrate on university premises provided, however, that no such demonstration shall be permissible which for any reason of time, place, or type of behavior materially disrupts class work or other university business, or involves substantial disorder or invasion of the rights of others.

2. Campus buildings are for university business. Any form of demonstration that interferes with university business in office or classroom spaces is a violation of this Code.

3. Students are prohibited from blocking free entry to or exit from buildings, interfering with free movement, or presenting obstacles to regular university activities. “Interfering with free movement” is defined as any physical denial or restriction of a person’s ability to freely reach or leave a given geographical area, or harassment as defined in the Code of Student Conduct. “Obstacles” are defined as physical devices, bodies, or signs which cause interference with free movement, or sounds which prevent normal aural communication.

4. There shall be no interference with demonstrations on the grounds of content of speech, except for any speech or demonstration which
incites immediate, violent action and represents a clear and present danger to the campus community, which shall be a violation of this Code.

5. No student shall intentionally and substantially interfere with the freedom of expression of another person on university premises or at university-sponsored activities.

6. Failure to cease any activity in violation of this Code immediately following either written or oral notice by a university official shall also be a violation of this Code.

7. Any violation of this Code may subject a student to expulsion from the university or such lesser sanction(s) as may be deemed appropriate by the university.

24. Foreign Language Requirements
Under Graduate Council policy, each academic program establishes foreign language requirements for its own advanced degree candidates. The program determines both the number of foreign languages, which may include computer literacy, and the level of competency required. A foreign language is defined for this requirement as a language other than the candidate’s native tongue, in which there is a significant body of literature relevant to his or her academic discipline.

25. Privacy of Educational Records
The Family Educational Rights and Privacy Act of 1974 protects the privacy of student records, ensuring that the university will not release a transcript or personal information about a student to a third party without the student’s knowledge and consent. Only those data items which have been defined by the university as directory information are released without prior student consent.

The university defines directory information as a student’s name, local (mailing), home and email addresses, major, local telephone number, date and place of birth, acknowledgement of a student’s participation in officially recognized activities and sports, weight and height of members of athletic teams, date(s) of attendance, degrees, certificates, awards received, the most recent previous educational agency or institution attended by the student. For graduate students who are teaching/assisting credit courses and for graduate students who are employed as assistant residence directors, the work department, office address, and employment category will also be considered as directory information.

The university will make public some or all of this information, unless the student specifically requests in writing that his/her prior consent be obtained. Requests by individual students to suppress from public distribution the above-mentioned information are to be made annually to the Graduate Records Office in person or in writing.

A document titled Family Education Rights and Privacy Act at the University of Massachusetts explains in detail the procedures established by this institution for compliance with the provisions of the Act. A copy is available for inspection in the Graduate School.

26. Sexual Harassment Policy
The University of Massachusetts Amherst is committed to providing students, faculty, and staff with an environment in which they may pursue their studies or careers without being sexually harassed. Sexual harassment, as here defined, is a violation of Title VII of the 1964 Civil Rights Act, and Title I of the Civil Rights Act of 1991. For purposes of this policy, it is defined as follows:

Unwelcomed sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when:

1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual’s employment or academic work; or
2) submission to or rejection of such conduct by an individual is used as the basis for employment or academic decisions affecting such individual; or
3) such conduct has the purpose or effect of unreasonably interfering with the individual’s work performance or creating an intimidating, hostile or offensive working or academic environment.

The Equal Opportunity and Diversity Office will be responsible for administering this policy and its procedures. Further information and the complete text of the policy are available from the Equal Opportunity and Diversity Office, the Ombuds Office and the Office of the Dean of the Graduate School.

27. Intellectual Property Policy
Any graduate student who expects to be involved in research with potential commercial implications should carefully consult the university’s Intellectual Property Policy (Doc. T96-040). Particularly important are the sections on ownership of intellectual property, the administrative procedures associated with inventions and copyrightable works, and the university’s role, if any, in protecting the work in question. The full text of the policy is available on the Web at www.umass.edu/research/ora/intel.html.

Individuals who need clarification of any points in the full policy should contact the university’s Office of Commercial Ventures and Intellectual Property, tel. (413) 545-3606; email: cvip@research.umass.edu.
Other Services

University Health Services
University Health Services (UHS), the campus health center, cares for University of Massachusetts Amherst students, faculty, and staff, along with their spouses, domestic partners, and dependents. For the latest news and information, visit www.umass.edu/uhs.

Services
The UHS team of experts includes board-certified physicians, along with nurse practitioners, physician assistants, registered nurses, optometrists, psychiatrists, psychologists, social workers, and certified medical assistants. Specialists in areas such as acupuncture, mind/body medicine, neurology, obstetrics/gynecology, orthopedics, and sports medicine also have office hours at UHS.

UHS offers on-site physical therapy, allergy and travel medicine clinics, and pharmacy, optical, radiology, and laboratory services. The Health Education department’s college health specialists provide information on smoking, stress management, sexual health, alcohol and drug concerns, nutrition and eating disorders, violence prevention, gambling, and other issues.

Locations and Hours
Located in the Central Residential Area, near Franklin Dining Commons, UHS is open 24 hours a day, seven days a week during the academic semester; during January and summer intersession, hours are 8 a.m.-midnight. Some departments have different schedules; call before coming in.

For routine care, appointments are recommended; call 577-5101. A triage nurse answers general questions and directs callers to treatment; call 577-5229 between 8 a.m. and 8 p.m.; after hours, call the main number, 577-5000. A walk-in clinic serves patients needing immediate medical attention. In a life-threatening emergency, call 911 for transportation to a hospital.

Mental health services are located in Hills North, a separate building also near Franklin Dining Commons. Services include crisis intervention; short-term therapy for individuals, couples, families and groups; medication management; and consultation and education.

For an appointment, call 545-2337 weekdays, 8 a.m.-5 p.m.; a same-day screening matches callers with appropriate services. Emergency services are available 24 hours a day, seven days a week; after hours, on weekends or holidays, call the UHS main number, 577-5000.

Health Insurance
Massachusetts requires full-time college students to have primary health care insurance. Students who do not already have insurance, or whose plan will not meet their needs while at school, can take advantage of the university-sponsored Student Health Insurance Plan (SHIP). The plan meets state requirements and offers benefits for physician office visits, hospitalization, emergency room care, x-ray and lab services, prescription drugs, and more.

Students taking five or more credits are automatically enrolled in SHIP, and charged on the semester’s tuition bill.

Those who want family insurance, are taking fewer than five credits, or are a degree-seeking Continuing and Professional Education student must come to UHS Patient Services to enroll. Charges will be forwarded to the Bursar’s Office for inclusion on the semester tuition bill.

U.S. students who already have comparable coverage under another major medical insurance plan may waive SHIP. Those covered by a Commonwealth Care plan should contact their insurance carrier to verify their status. Students who are no longer eligible for Commonwealth Care must contact UHS’s Patient Services department to be enrolled in the SHIP.

Students with comparable coverage can waive the SHIP. The online waiver process must be completed online before the end of the Add/Drop period. SPIRE and the UHS website provide links to the waiver site.

Student Health Fee
A mandatory Student Health Fee is added to the tuition bills of all students taking five or more credits per semester.

The fee is not insurance, but works together with students’ primary plan, entitling them to be seen at UHS and absorbing many costs not covered by primary health insurance.

Students taking fewer than five credits per semester and those enrolled in a degree-seeking program through Continuing and Professional Education or University Without Walls are eligible for UHS services, but must come to UHS Patient Services before the end of the Add/Drop period to register; charges will be forwarded to the Bursar’s Office for inclusion on the semester tuition bill.

Billing
Visits to UHS are first billed to the primary health insurance; the Student Health Fee absorbs the cost of most services not covered by insurance.

Students should always bring their primary insurance plan’s ID card whenever they use UHS services. When filling prescriptions at the UHS pharmacy, students should bring their primary insurance plan’s prescription card and be prepared to pay the plan’s co-payment; these are not absorbed by the Student Health Fee. The pharmacy accepts cash, check, UCard, Visa, MasterCard, and Discover.

Immunization Requirements
Massachusetts law requires college students to be immunized against diphtheria, tetanus, measles, mumps, rubella, and hepatitis B. Full-time residential students must also be immunized against meningitis or complete a waiver; full- and part-time non-residential students, and part-time residential students, are exempt from this requirement.

To submit the required information, download and print the Massachusetts State Required Immunization History Form, available on the UHS website, www.umass.edu/uhs/immunizations. This form should be completed and signed by the student’s healthcare provider. Immunization records from previous schools, military records, and records from healthcare providers are also acceptable in lieu of this form. Documentation must be submitted to the new Student Immunization Program (NSIP) at UHS before the end of the Add/Drop period.

Students should contact their healthcare provider to update their immunizations prior to beginning school. UHS can provide immunizations by appointment, on a fee-for-service basis. For more information, call NSIP, 577-5275.

Disability Services/Learning Disabilities Support Services
Director: Madeline L. Peters
231 Whitmore, (413) 545-0892 V/TTY Email: ds@educ.umass.edu
Disability Services, part of the Equal Opportunity and Diversity Office, works to ensure that reasonable and effective accommodations and support services are put in place for students with documented disabilities. In order to identify the accommodations and determine the appropriate and available resources and accommodations, students are strongly urged to meet with a consumer manager during the application process.

Advocacy, counseling, and support are provided at all levels of academic and administrative programs and services. Consumer managers are skilled in the field of Disability Services at the post-secondary level, as well as being highly knowledgeable in disability issues, laws, and resources.

Disability Services is open year-round, Monday through Friday from 9 a.m. to 5 p.m. Those who need ASL or oral interpreters can also call (413) 545-0892 V/TTY in advance to request these services for the day of appointment or campus visit.

International Programs Office
The International Programs Office (IPO) promotes activities and programs in international education. One emphasis is on providing study abroad opportunities for a wide range of students. Another is to offer services to the many students abroad opportunities for a wide range of students.
and scholars from around the world. These services include advising on immigration regulations; guidance on employment issues; personal, financial, and academic counseling; advice on adjusting to American life; and assistance in dealing with both U.S. and foreign government agencies. IPO also encourages university faculty and staff seeking professional experience abroad. For further information, contact the IPO, tel. (413) 545-2710.

University Ombuds Office
The Ombuds Office is available to assist in the resolution of university-related problems and grievances which have not been redressed through normal channels. The Ombuds Office can frequently secure needed information and a reasonable outcome where delay or disagreement is a problem. The Ombuds staff can also function as neutral intermediaries in disputes and can often facilitate an informal settlement where formal procedures fail. In addition, the Ombuds Office can answer general questions about the university or provide referrals to the appropriate person or agency for further information.

Although appointments are not required, it is suggested that you call to arrange a convenient time to meet with a member of the Ombuds Office staff. For further information or to arrange an appointment, call Kay Politella, tel. (413) 545-0867 or drop by the Ombuds Office, 823 Campus Center. Additional information is available on-line at: www.umass.edu/ombuds_office. The Ombuds Office can also be reached by fax: (413) 545-9720 or email: ombuds@umbuds.umass.edu.

Research Services
Research Services, available to the University research community, are composed of the following facilities:

- The Electron Microscopy Facility offers training and assistance to researchers with projects involving ultrastructural analysis, principally of biological specimens.
- The Glassblowing Laboratory provides scientific glassblowing services for all research needs.
- The Genomics and Bioinformatics Facility provides DNA sequencing, real-time PCR, freezer program, microarray analysis, and bioinformatics.
- The Cartographic Information Research Services assist in locating various kinds of maps and other cartographic information, including aerial photographs and space images.

For additional information, contact the Office of the Vice Chancellor for Research and Engagement, 239 Whitmore Administration Bldg., tel. (413) 545-5270.

Institutional Review Board
The Institutional Review Board (IRB) for Human Subjects is a federally mandated committee that works to protect the rights and welfare of humans participating in research conducted by, or under the supervision of, University of Massachusetts Amherst faculty, staff, and students. Reviews are conducted in accordance with federal and institutional regulations and policies. Education and training in the protection of human research volunteers is required of all investigators who are engaged in the planning, conduct or analysis of human subject research. More information is available in the Human Research Protection Office in the Research Administration Building, tel. (413) 545-3428; email to humansubjects@ora.edu; website www.umass.edu/research/humancomp.html.

Graduate Student Senate
The Graduate Student Senate serves as the representative body of graduate students at the university. It pursues policies and objectives that serve to advance the social, cultural, material, and academic needs of the graduate student community.

The Graduate Voice is published approximately four times each semester. The Voice provides graduate students with information on GSS and campus activities and serves as a forum for commentaries on issues affecting graduate students at this campus.

The Senate appoints representatives to numerous university-wide councils including the Graduate Council, the Research Council, the Health Council, the Academic Matters Council, and the Student Affairs and University Life Council. Representatives are also appointed to administrative personnel search committees, and committees such as those concerned with the operations of the Campus Center and the Library.

The Graduate Student Senate provides funding for various service organizations on campus, including Legal Services Office (LSO); Everywoman’s Center Graduate Women’s Program; and New World Theater. It also funds the Graduate Women’s Network. Applications for funding of ad hoc events from a variety of campus groups are considered throughout the year, and departmental graduate student organizations that have representatives in the Senate may apply for funds through the revenue-sharing plan. Limited funds are available through the Graduate Student Senate Child Care Voucher Program to help defray the costs of child care to eligible graduate students. Administrative support is provided by the Senate for registered Graduate Student Organizations.

Information about the Graduate Student Senate and its various services can also be accessed at www.umass.edu/gss. For more information regarding the Graduate Student Senate, contact the GSS Office in 919 Campus Center, tel. (413) 545-2896; or email to gss-info@grad.umass.edu. Fax: (413) 545-2373.

Grant and Fellowship Opportunities
The Graduate Student Grants Service (GSGS) provides University of Massachusetts Amherst graduate students with information on and assistance with applications for external (non-University) grants and fellowships to support study and research. The service takes several forms: departmental workshops, information sessions on key fellowships, and access to three searchable funding databases through the website www.umass.edu/gradschool/gsgs. GSGS also provides individual consultations in their office, 517 Goodell Bldg., by appointment or during office hours.

The Graduate Student Grants Service also distributes a biannual newsletter, Grantscape, which lists important upcoming grant and fellowship deadlines by discipline. Copies are sent to all graduate departments, posted on the GSGS bulletin board, and distributed at workshops. The office also administers the Fulbright-Hays Doctoral Dissertation Research Abroad Fellowship, which has an institutional application process. For more information, contact the Graduate Student Grants Service Coordinators, tel. (413) 545-5279/5273 or email them at gssg@grad.umass.edu.

Postdoctoral Fellows, Research Associates and Visiting Fellows
Postdoctoral Fellows and Research Associates will be entitled to faculty privileges for the duration of their appointments at the University. Qualified scholars who desire temporarily the privileges of the library and research facilities of the University, and who are not candidates for a degree, may be appointed as Visiting Fellows (without stipend) upon petition to the Dean of the Graduate School. Such Fellows may be entitled to faculty privileges. However, use of research facilities will have to be arranged on an individual basis with the chairman or head of the department in whose area the facilities are located.

Office of Equal Opportunity and Diversity
The Office of Equal Opportunity and Diversity (EO&D) monitors the implementation of federal and state affirmative action, equal opportunity, and nondiscrimination regulations at the university. Additionally, EO&D assists in the development and monitors the implementation of these institutional policies and procedures and has responsibility for providing programs that enhance diversity and foster equality. The
Special Research Resources

The Political Economy Research Institute
The Political Economy Research Institute (PERI) addresses basic issues of human and ecological well-being through research written for the general public, policy makers, and academic audiences. PERI researchers are currently involved in three broad and interrelated areas: Globalization and Macroeconomics; Labor Markets and Living Wages; and Development, Peacebuilding and the Environment. Students and faculty from the University of Massachusetts Amherst and visiting scholars, including postdoctoral fellows, come to PERI to pursue research in the defined areas. Among the specific current research topics are increasing income and wealth inequality, problems facing low-wage workers both in the U.S. and in developing countries, underemployment and informalization, environmental deterioration, financial market instability, and the relationship between inflation and unemployment. PERI is located in Gordon Hall, 418 N. Pleasant St., Amherst, MA 01002. Co-Directors: Gerald Epstein, Professor of Economics, tel. (413) 577-0822, email: gepstein@econs.umass.edu; Robert Polin, Professor of Economics, tel. (413) 577-0819, email: polin@econs.umass.edu.

Donahue Institute
The University of Massachusetts Donahue Institute is the public service, outreach, and economic development unit of the University of Massachusetts President’s Office. Established in 1971, the Institute maintains offices throughout the Commonwealth. The Institute’s staff of over 120 work cooperatively with faculty and staff from the University’s five campuses, other institutions of higher education, and the public, private and non-profit sectors to provide a valuable bridge between theory and innovation, and real-world business applications.

Supporting the University President’s Office in numerous statewide initiatives, the Donahue Institute is currently one of the state’s largest and strongest providers of management development programs, client-oriented training and technical assistance, applied research and evaluation, and integrated information technology and economic development initiatives. Staff also have extensive experience in workforce development, organizational restructuring, and the creation of strategic alliances.

In collaboration with client organizations, the Donahue Institute has developed more than 400 books, reports, surveys, guides, manuals, newsletters and other publications of use to the public. In its more than 30 years of service to the citizens of Massachusetts, the Donahue Institute has generated over $100 million in grants and contracts.

The Institute’s central administrative office is located at The Mass Venture Center, 100 Venture Way, Suite 9, Hadley, MA 01035; tel. (413) 545-0001; fax: (413) 545-3420; email: info@donahue.umassp.edu; Website: www.donahue.umassp.edu.

Labor Relations and Research Center
The Labor Relations and Research Center conducts research on work, the labor movement, and labor relations. This research is funded by the labor movement and state and federal agencies, as well as private foundations. Recent research includes race, immigration, and labor; the implementation of living wage ordinances; community responses to plant closings; strategic bargaining campaigns; union organizing; and family and work issues. The Center provides educational services to trade unionists across the Commonwealth, including short courses and seminars as well as larger conferences. The M.S. degree is offered in a limited-residency format for trade union staff and officers nationwide, and also in a two-year, semester-based format.

The Environmental Institute
The Environmental Institute (TEI) and its associated centers promote environmental research and scholarship on campus. Activities span academic disciplines in the life sciences, natural resources, engineering, public health, and social sciences. TEI’s goal is to promote collaborations to better understand the environmental problems and challenges confronting society and to develop the tools and methods to address these challenges. Its mission is fourfold: to encourage high-quality, high-impact environmental research addressing important environmental issues; to serve as a gateway for information on environmental research and education on campus; to coordinate and foster scholarly environmental activities; and to facilitate collaborations between University researchers and public agencies and private and non-profit groups.

TEI develops interdisciplinary collaborations in the environment through research, conferences, lecture series, and groups, and includes the Massachusetts Water Resources Research Center, the Environmental Analysis Laboratory, and the Earth Sciences Information Center. Center-sponsored research projects and activities involve faculty, students, and interdisciplinary working groups. TEI is a unit of the Vice Chancellor for Research and Engagement and is located in Blaisdell House; tel. (413) 545-2842, email: tei@tei.umass.edu, and website www.umass.edu/tei.

Animal Care Service
The Animal Care Service is one of the research services offered by the Office of the Vice Chancellor for Research and Engagement. The
members of the Animal Care Office staff provide the specialized husbandry and veterinary care for the laboratory animals used in teaching and research activities at the university. The Office serves as a resource for all students, faculty, and investigators needing training in or seeking any information about the handling, care, and use of laboratory animals. A production service for monoclonal and polyclonal antibodies is available to investigators. Questions and requests regarding requirements for animal care and use protocols, other documentation, training or information should be directed to the Animal Care Office, Research Administration Building, tel. (413) 545-0668. Additional information about the Animal Care Office and the IACUC can be found at the university’s Research Website: www.umass.edu/research/aco.

**Institutional Animal Care and Use Committee**

The university’s Institutional Animal Care and Use Committee (IACUC) is a federally mandated committee composed of research and teaching faculty, veterinarians, animal care personnel, non-scientists, and community members. The IACUC reviews all protocols involving the use of live vertebrate animals in teaching and research to ensure that all federal and state laws and University guidelines are followed. The committee also conducts semi-annual reviews of the animal care facilities and program, animal procedure laboratories, and associated support areas. The university’s IACUC Animal Use Protocol forms and related information are available on the compliance website at www.umass.edu/research/comply/animalcomp.html and from the Animal Care Office.

Specific information on required student participation in courses involving animal use is available through the appropriate departmental office.
Programs, Faculty, and Courses
Description of Programs

Before consulting the course descriptions listed in this section, students should become thoroughly familiar with the General Regulations governing registration for courses in the Graduate School. The regulations cover such matters as graduate credit, course numbering system, changing or dropping of courses, and requirements regarding incomplete work in a course. Students should also acquaint themselves with the requirements governing the particular degree which they wish to earn.

For description of courses numbered from 100 to 499, go to SPIRE on the university’s website: www.umass.edu.

Afro-American Studies

Graduate Faculty

Amilcar Shabazz, Professor and Chair of the Department of Afro-American Studies, B.A., Texas at Austin, 1982; M.A., Lamar, 1990; Ph.D., Houston, 1996.


Ernest Allen, Jr., Professor.


The Doctor of Philosophy Degree

The core of the doctoral program is a three-semester sequence of seminars required of all students in their first three semesters. In the first year, students take a two-semester double seminar in which they read fifty-six major works of Afro-American Studies. In the second semester of the first year, students take a course on literary theory in its application to African American literature. In the third semester, students take a seminar on historiography, a seminar on Black politics, and a continuation of the Major Works seminar. At the end of this three-semester sequence, students take a General Examination on the entire three semesters of study.

After completing the first General Examination satisfactorily, students select either the History/Politics or the Literature/Culture track. In the next three semesters, students take a total of nine seminars, several of which will normally be offered by other departments, in either History and Politics or Literature and Culture. At the end of the sixth semester, students take a second General Examination in the field of their research interest, based on a reading list of twenty-five books selected by the student in consultation with the member of the faculty who will direct the student’s doctoral dissertation.

The department has several archival collections available for research, including the W.E.B. Du Bois papers and the Horace Mann Bond Collection.

Students enrolled in the doctoral program will earn the degree of Master of Arts upon completion of the preliminary requirements for the doctorate.

Requirements

1. Grades of B or better in sixteen graduate courses and seminars for a total of 64 credits.
2. Three semesters of required seminars, including a three-semester sequence devoted to major works of Afro-American Studies, a seminar on Literary Theory as applied to African American Literature, a seminar on Black Politics, and a seminar on historiography.
3. Nine additional seminars or courses, in either the History/Politics or Literature/Culture track, including a reading course in preparation for the second half of the General Examinations.
4. Demonstration of reading proficiency in one language other than English directly related to the research interests and dissertation topic of the student, to be accomplished by the end of the sixth semester.
5. Satisfactory performance on a two-part written General Examination, the first part of which will test the student’s general knowledge of the field of Afro-American Studies, and the second, the student’s mastery of advanced materials in either the History/Politics or Literature/Culture track.
6. A total of ten Dissertation credits (AFRO-AM 899).
7. A Doctoral Dissertation satisfactory in form and content.

Further Information

Further information concerning planned graduate course offerings can be obtained by calling the Afro-American Studies Department office, tel. (413) 545-2751, or by visiting the department’s website at www.umass.edu/afroam/index.html.
All courses carry 4 credits unless otherwise specified.

601 Slavery
Seminar focusing on slavery from its rise in the United States until its destruction during the Civil War. Slavery as a political and economic institution, and as a day-to-day lived experience. Emphasis on broad themes and interpretation, including the construction of the concept of “race” and the debate over the origins of slavery, the nature of slave communities and culture, gender and slavery, slavery in a comparative perspective, the significance of slave resistance, and the politics of slavery.

604 Black Intellectual History and Ideology
Principle currents of black intellectual history and ideology from the early 19th through the late 20th centuries. Themes of assimilation, nationalism, black feminism, civil and political rights, religion, and international perspectives. Emphasis on the structural and thematic patterns which emerge through study of diverse ideas of African Americans ranging over a century and a half.

610 The Life and Thought of W.E.B. Du Bois
A critical examination of the life and thought of W.E.B. Du Bois, black scholar and activist, with reference to his major works. Topics include Du Bois as sociologist, historian, propagandist, and creative writer, taking into account his often shifting views on art and culture, politics, leadership, civil rights and the color line, trade unionism, Pan-Africanism, socialism, internationalism, and double consciousness.

652 Literature of the Harlem Renaissance
An intensive study of the literature and orature associated with the Harlem Renaissance, from the philosophical underpinnings supplied by Du Bois, Johnson, Locke, Garvey, and Randolph to the varied poetic visions of Hughes, Spencer, Brown, Cullen, and McKay to the fictional explorations of Toomer, Hurston, Fisher, Larsen, Fauset, and Thurman to the inspiration supplied by blues, jazz, and folklore of the African American tradition.

667 The Afro-American Presence in American Literature
An intensive survey of the portrayals of Afro-Americans in American literature, examining how characters, themes, and ideas are portrayed when filtered through the race, gender, class, politics, historical time frame, and individual artistic aesthetic of a variety of writers.

691A Black Religious Movements in America
Some of the major religious movements and religious institutions of African Americans before and after the American revolutionary war. African religions in the New World; conversion experiences wrought by the Great Awakenings; the development of the “invisible institution” on slave plantations; the formation of the free black church; the institutional developments in black Christianity following Emancipation; the emergence of the Holiness and Pentecostal movements; the impact of urbanization on black urban and rural religious institutions, including the birth of the “store-front” church; the impact of charismatic religious leadership during the Great Depression; the growing influence of Islam, beginning in the 1920s; the role of the church in the modern Civil Rights movement; and trends in African American religion in the post-1960s era.

691B Black Workers in the U.S. Since Emancipation
Some of the significant issues in the history of African American workers since Emancipation, and related recent scholarship. The history of capitalism in the U.S. and Black workers; the role of Black labor in several industries; Black women as workers; Black labor and the Black power movement; and Herbert Hill’s critiques of organized labor and the labor history establishment.

691C Historiographical Methods in Afro-American Studies
Introduction to some of the basics of what it means to read, think, and write as an historian. What historians do and why, the “objectivity question,” the development of African American history as an academic discipline, and one or two current controversies. Students learn how to locate and use the resources of the Du Bois Library such as microforms, government documents, the papers of W.E.B. Du Bois, online indices and collections, and various important national repositories including the Library of Congress.

691D Major Works in Afro-American Studies
Open only to doctoral students in Afro-American Studies.

691E African American Women Novelists Since 1945
Novels written by African American women since World War II, focusing on the conception and representation of identity in these works.

691F Black Political Struggle in America: 1776-Present
An historical examination of the black political struggle for equality and citizenship in America—the obstacles placed in the path of that struggle by the American political system in general and by the American state in particular—and the countless ways in which racial politics have shaped the system that is called American Democracy.

691G African American Poetry
An intensive survey of African American poetry from Lucy Terry to the present, focusing on how language, form, and content reflect the ways that African Americans have perceived their positions in American society and their roles as reflectors and/or shapers of African American culture. Explores sources and influences in various works of African, American, and British literature as well as works of African American folklore. Includes secondary critical works dealing with the African American poetic tradition.

691H Race and Public Policy
Historical examination of the role of public policy in both advancing and obstructing the black struggle for civic equality in America. Topics include the Freedmen’s Bureau, the development of public policy occasioned by the Great Depression, the emergence of Lyndon Johnson’s War on Poverty in the Sixties, and the contemporary racialization of social policy that has elevated the conservative economic and political agenda to mainstream legitimacy. Specific issues include welfare, affirmative action, jobs, poverty, and the criminal justice system.

691K The Politics of Slavery and the Coming of the Civil War
The significance of slavery in the growth of sectional politics in antebellum America. The rise of a distinctive slave society in the south and of antislavery in the north. Early sectional differences over slavery such as the Missouri crisis and the nullification controversy. The role of the slavery expansion issue and the breakdown of the second party system in causing the Civil War and the origins of secession.
691L The Black Arts Movement
The Black Arts Movement of the 1960s and 1970s in its many manifestations, including literature, theater, music, and the visual arts. Focus on the ways in which domestic and international political movements (e.g., Civil Rights, Black Power, and anti-colonial) intersected with Black Arts, deeply influencing the formal and thematic choices of African American artists. The distinctive regional variations of the movements and the ways in which Black Arts fundamentally changed how art is produced and received in the United States.

691M The Life and Thought of C.L.R. James
The reading of several of James’s major works as well as a substantial selection from his political writings and correspondence to acquaint students with James’s own words on a variety of the political, social, and cultural issues that he attempted to address during his lifetime. Also includes reading in the secondary literature that attempts, with varying success, to situate James in various contexts.

691N Critical Race Theory
An interdisciplinary look at the critique of legal theory and practice mounted in recent years by a number of legal scholars of color. Readings from history, the social sciences, and law.

691P Critique of the Concept of Racism
Focus on racism as an historical system in the settlement of the North American continent and the organization and development of the American nation state. Also includes a brief comparative survey of apartheid in South Africa and anti-Semitism in the Third Reich.

691Q Black Images in Antebellum Literature
The Southern Plantation, so largely dependent on the “peculiar institution” of slavery for its existence, as the source of some of the most abiding literary characterizations or images of American Blacks. Focus on these literary characterizations and their validity or invalidity, their purposes, and their ramifications.

691S Contemporary Afro-American Literature
Themes of love, war, assimilation, feminism, homosexuality, and more as found in contemporary Afro-American literature. The identification and analysis of some of these themes (the focus changing from semester to semester) in the works of such writers as Baldwin, Ellison, Morrison, Wright, Williams, and Hines.

691T Great Migrations: Migration, Urbanization and Modernity in the African American Novel Since 1900
The representation of migration, urbanization, and modernity (or post-modernity) in a range of African American novels published between 1900 and the present. Focus on the development of the city as a literary landscape for foundational African American narratives of freedom, empowerment, imprisonment, decay, and deracination.

691U Reimagining America
The conventional meta-narrative of American history as the story of freedom and the ways in which it has been contested by many historical voices and by the contrary experiences of many peoples of color. The histories of Blacks, Asians, Latinos and Native Americans related to the hegemonic narrative to try and conceptualize a more multicultural perspective of American history. Also examines the resistance of some elements of the academy and society to these alternative viewpoints.

692A Literary Theory
Literary theory since 1965 and how it has influenced the study of African American literature and culture, with emphasis on the sometimes troubled relationship between “high” theory and its successors and African American Studies. How theory has informed and challenged African American literary studies and vice versa. Various critical moments or movements placed in their historical contexts.

692B The Black Power Movement
Overview of the Civil Rights movement, examining the influences that came to shape the call for Black Power: remnants of the Garvey movement, the Cuban revolution, the Nation of Islam, the political decolonization of Africa, and reactions by African Americans to the violence engendered by non-violent protests for civil rights. Diverse interpretations of Black Power examined in detail, along with reasons for the movement’s decline.

692E Du Bois and Booker T. Re-examined
Du Bois and Washington within the tradition of black leadership of which they were a part, situating them in the history of their times, tracking the development of their ideas, and reflecting on the efficacy of their strategies and programs.

692F From Reconstruction to Renaissance
African American literature and culture from the rise of Reconstruction through the onset of Jim Crow and the Great Migration to the beginnings of the Harlem Renaissance.

692G African American Women’s Narrative
Gender, race, class, slavery, the woman as artist, domesticity, and the territory of love as concepts located in the narratives of selected African American women writers. Students interrogate these issues, among others, in the narratives of 19th- and 20th-century African American women and examine critically the challenges and the victories that these writers present in their texts.

692H Africa in the Americas
The effectiveness of cultural politics within the dynamics of the struggles for liberation, equality, and participation in the African diaspora. Seminar supplemented by visual cultures.

692I Africa in Latin America
The history, expressive cultures, politics, religions, and music of Latin America, the most racially and culturally diverse continent. The intellectual history and political culture of Africans in colonial and independence eras. Focus on the influence, survival, and the resilience of African traditions on modern Afro-Latin American culture.

692J African American Literary Movements
A critical investigation of three distinct periods of literary production among African American writers: The New Negro Harlem Renaissance (1920s); Chicago Writers (1930s); and the Black Arts and Aesthetics Movement (1960s and 1970s). Examines formative themes and concepts that have shaped these important literary movements.

697A Historical Sociology of the Black Atlantic: Afro-Latino Diasporas
The histories, politics, and cultures of Afro-Latinos in the Americas and Latinas/os in the U.S. Includes historical analysis of the place of Afro-Latino diasporas within the Black Atlantic since the 16th century and the divide of the two Americas in the contexts of the 1846–48 Mexican-American War and the 1898 Spanish-Cuban-American War.

697 Langston Hughes and Sterling Brown
A discussion of the lives and major works of Hughes and Brown, placing their works in the context of American literature and
culture—especially music and folklore—of their times.

697 Classic Figures in 20th Century Afro-American Literature
A comprehensive and intensive examination of the work of major figures in 20th century Afro-American literature, with an examination of the major relevant criticism.

697 History of the South: Colonial Period to 1900
The history of the south as a distinctive region of the U.S. from the colonial period to Populism. Examines the southern societies apart from the rest of the nation but also those which divided the south internally along regional, class, race, and gender lines. Topics include the rise and fall of slavery, southern women’s history, southern nationalism, the transition from slavery to capitalism, the underdevelopment of the postbellum southern economy, race relations, and the agrarian revolt of small farmers at the turn of the century.

697 Topics in Black Women’s History
Some of the latest scholarship on the role of African American women in political and advancement organizations. Some of the developing bodies of primary source material on the history of Black women.

697E Jesse Jackson and American Presidential Politics
Modern efforts of Black Americans to influence electoral politics in general and the Democratic party in particular through the medium of presidential campaigns. Examines, beginning with the Great Depression, the movement of Blacks into the Democratic Party, the significance of the black vote in national elections, the contradictory role of black elected officials, and the theory and practice of the “balance of power” strategy as exemplified by Jesse Jackson’s two historic campaigns for President. Jackson’s impact upon Democratic Party politics and policies, and the vagaries of press coverage in the 1988 campaign.

697O Dynamics of Law and Race
An intensive examination of the intersection of race with American law. Focus on the critique of established legal theories mounted by a number of legal scholars in what has come to be known as the Critical Race Theory Movement. Supreme Court cases and other legal materials combine with theoretical, historical, and critical works on the law and American society. Topics include the law of slavery, affirmative action, voting rights, and the nature of legal education.

699 Master’s Thesis
Credit, 1-10.

701-702 Major Works Seminar in Afro-American Studies I and II
An intensive study of fifty major works of Afro-American Studies. Required of all first-year doctoral candidates, and open only to them.

753 Special Topics in Afro-American Literature and Culture: The Blues
An intensive study of the history of the blues, analyzing the nature of blues music and lyrics, placing them in an African and African American social, political, and musical context, and exploring the use of the blues tradition in literature. Open to graduate students only. No reading knowledge of music required or expected.

790E Ideological Critique

797S African Americans and the Movement to Abolish Slavery
The rise of the antislavery movement in the United States from the American Revolution to the Civil War, with particular attention to the role of African Americans. Includes the ideology of black abolitionism, its contributions to the antislavery movement as a whole, the impact of slave narratives on the abolition movement, individual African American abolitionists, the rise of black nationalism and African American women activists. The nature and impact of black abolitionism on the broader movement.

899 Doctoral Dissertation
Credit, 10.

Animal Biotechnology and Biomedical Sciences

Graduate Faculty

Samuel J. Black, Professor and Head of the Department of Veterinary and Animal Sciences, B.S., Queens University, 1970; Ph.D., Edinburgh, Scotland, 1974.

Pablo Visconti, Associate Professor and Graduate Program Director, B.S., Buenos Aires, Argentina, 1983; M.S., 1986; Ph.D., 1991.


Juan Anguita, Assistant Professor, M.S., University of the Basque Country, Leioa, Spain, 1988; Ph.D., Leon, Spain, 1993.

Kathleen Arcaro, Associate Professor, B.A., Rutgers, 1980; Ph.D., 1987.

Cynthia L. Baldwin, Professor, B.A., Hampden-Sydney, 1976; Ph.D., Cornell, 1983.

John M. Clark, Professor, B.S., Wisconsin at Madison, 1972; M.S., 1977; Ph.D., Michigan State, 1981.

Rafael A. Fissore, Professor, D.V.M., Buenos Aires, 1983; M.P.V.M., California at Davis, 1988; Ph.D., Massachusetts at Amherst, 1993.

Carlos Gradil, Extension Assistant Professor and Director of Large Animal Health, D.V.M., Lisbon, Portugal, 1977; Ph.D., Minnesota, 1988.

George R. Howe, Associate Professor, B.S., Vermont, 1957; M.S., Pennsylvania State, 1959; Ph.D., Massachusetts, 1961.


Jesse Mager, Assistant Professor, B.S., Cleveland State, 1998; Ph.D., North Carolina, 2003.

Lisa Minter, Research Assistant Professor, B.S., Catholic University of America, 1981; Ph.D., Massachusetts at Amherst, 2001.

Barbara Osborne, Professor, B.A., Moravian College, 1970; Ph.D., Stanford, 1979.

Ana Maria Salicioni, Research Assistant Professor, M.S., San Luis, Argentina, 1987; Ph.D., 1993.
Janice C. Telfer, Assistant Professor, B.S., Wake Forest, 1988; Ph.D., Harvard, 1995.


Adjunct/Associate Faculty

Richard A. Goldsby, Professor of Biology and John Woodruff Simpson Lecturer, Amherst College.

Eric Overstrom, Associate Professor, Tufts University School of Veterinary Medicine.

Sallie W. Smith-Schneider, Research Assistant Professor.

The graduate program in Animal Biotechnology and Biomedical Sciences includes studies in mammalian biology with options in reproductive and developmental biology, immunology and infectious diseases, cancer biology, and mammalian toxicology. Students must have a strong background in biology and chemistry. Requirements for both the M.S. and Ph.D. degrees include courses that have a cellular and molecular biology basis, some of which are offered by the departments of Biology, Chemistry, Biochemistry, and Microbiology. In addition to the Ph.D. and master’s degree with thesis research, the department offers a non-thesis M.S. degree that may be completed as a fifth-year master’s degree if the student transfers 6 graduate credits into the program and has research experience. Teaching is considered an important component of graduate education and Ph.D. candidates are required to teach a minimum of one semester.

All courses carry 3 credits unless otherwise specified.

521 Physiology of Reproduction
Comparative aspects of anatomy, embryology, endocrinology, and physiology of reproduction and lactation. Credit, 4.
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555 Environmental Toxicology in Context
(1st sem, even yrs)
Web-based course that primarily teaches the toxicology of environmental pollutants using current examples.

585 Animal and Environmental Toxicology
(1st sem, odd yrs)
All aspects of insecticide chemistry, including toxicity, classification, pharmacodynamics and metabolism, mechanisms of action, resistance, and environmental toxicology. Also examines veterinary drugs that control eco- and endo-parasites. For those with animal science, toxicological, agricultural or environmental interests.

596 Independent Study
Generally this level is used by upper level undergraduates but can be used by beginning graduate students. All faculty. Credit, 1-6.

597A Immunology
A comprehensive basic course in immunology.

672 Molecular Medicine
An introduction to diseases of major organ systems and biotechnological approaches to improve diagnosis and treatment. Topics include cancer, genetic disease, cardiac disease, neurologic disorders, tissue transplantation. Prerequisites: BIOCHEM 523 and course in physiology. Jerry

696 Independent Study
Specific problem in some aspect of animal or biological sciences including research by non-thesis master’s students. May be taken for satisfactory/unsatisfactory or graded credit. Students register with the interested faculty member. Can be used for master’s students to review literature on the topic chosen for their laboratory research but this requires an oral presentation. All faculty. Credit, 1-6.

697 Special Topics in Cells, Genes and Development
Hormone signaling and mechanisms of signal transduction, fertilization, early embryogenesis, applications of gamete and embryo manipulations for biomedical purposes and sustained agricultural production, tissue-specific gene expression and tumorigenesis. Alfandari, Fissore, Jerry, Visconti

697J Journal Club in Toxicology
Presentation and critique by students of recent scientific papers and their own work in progress. Arcaro, Clark. Credit, 1 ea. sem.

699 Master’s Thesis
Credit, 1-10.

792 Seminar in Animal Biotechnology and Biomedical Sciences
Presentation of research projects and literature review by faculty and graduate students within the department as well as by guest speakers from around the world. Credit, 1 ea. sem.
Anthropology

Graduate Faculty

Elizabeth S. Chilton, Associate Professor and Chair of the Department of Anthropology, B.A., New York at Albany, 1985; M.A., Massachusetts at Amherst, 1991; Ph.D., 1996.

H. Martin Wobst, Professor and Graduate Program Director, B.A., Michigan, 1966; M.A., 1968; Ph.D., 1971.


Jean Forward, Lecturer, B.A., Massachusetts at Amherst, 1971; M.A.T., 1974; Ph.D., 1986.


Krista M. Harper, Assistant Professor, B.A., California at Berkeley, 1992; M.A., California at Santa Cruz, 1994; Ph.D., 1999.


Brigitte M. Holt, Assistant Professor, B.A., Southern Illinois at Carbondale, 1984; M.A., 1987; Ph.D., Missouri at Columbia, 1999.


Brian T. Jones, Lecturer and Associate Director, University of Massachusetts Archaeological Services, B.A., Oberlin, 1986; M.A., Ph.D., Connecticut at Storrs, 1998.


Elizabeth L. Krause, Associate Professor, B.J., Missouri-Columbia, 1984; M.A., Oregon State, 1992; Ph.D., Arizona, 1999.


Ventura Perez, Assistant Professor, B.A., Iowa, 1997; Ph.D., Massachusetts at Amherst, 2006.

David W. Samuels, Associate Professor, B.A., Wesleyan, 1979; Ph.D., Texas at Austin, 1998.


Adjunct/Associate Faculty

Margi Abel, Post-doctoral Research Associate.

Susan DiGiacomo, Post-doctoral Research Associate.

Jennifer Foster, Assistant Professor of Nursing.

Elliot Fratkin, Professor, Smith College.

Alan Goodman, Professor of Natural Science, Hampshire College.

Eric Johnson, Research Associate.

Barbara Kerewsky-Halpern, Post-doctoral Research Associate.

Andrew Lass, Professor, Mount Holyoke College.

Lynn M. Morgan, Professor of Anthropology, Mount Holyoke College.

Ellen J. Pader, Associate Professor of Regional Planning.

Richard Wikander, Lecturer.

Master’s Degree Requirements

Students working toward the Master of Arts degree in anthropology, in addition to fulfilling the general requirements of the Graduate School for the degree, must complete, and be evaluated on, a core program, normally comprising four to six specified courses, that has been developed in consultation with the student’s guidance committee. The core program is normally completed in the first two to three semesters of graduate work. Students complete the M.A. degree requirements through additional coursework or with an M.A. thesis.

Doctoral Degree Requirements

Students working toward the Doctor of Philosophy degree in anthropology will, under the guidance of their committee members, prepare statements of field in three areas of specialization that reflect their career goals and intellectual interests. Students frequently combine the dissertation prospectus and one of the three statements of field. After the completion and approval of the statements of field and prospectus, the student takes an oral Ph.D. Preliminary Comprehensive Examination, normally at the end of the fourth or fifth semester of doctoral work. Upon successful completion of this examination, the student concentrates on the research that will provide the basis for a required dissertation. Normally, all candidates are expected to engage in field work.

There is no general foreign language or tool of research requirement for degree qualification in anthropology. However, where the candidate’s guidance committee deems the acquisition of certain relevant skills as necessary for the effective pursuit of his or her research and professional
objectives, the student may be expected to develop satisfactory levels of competence in the use of various research tools and/or languages.

Note: The following is a list of all courses that comprise the department’s permanent offerings. Given the importance of current research and disciplinary debate to our graduate curriculum, many of the important course offerings any year are topical seminars and special topics courses (e.g., Historical Archaeology; Political Economy of Health; Research Design; Hunter/Gatherers; Environmental Archaeology; Contemporary Evolutionary Theory), which are not included by title in this list. For more detailed information on courses offered, please consult the course list available in the department office (215 Machmer Hall) or consult the department’s website at www.umass.edu/anthro, where course lists, schedules, and descriptions are posted and frequently updated.

All courses carry 3 credits unless otherwise specified.

515 Primate Anatomy
Lecture, laboratory dissection. Emphasizes the structural-functional analysis of skeletons as joint-link systems. Prerequisite to seminar on comparative structure and phylogeny of primates, emphasizing evolutionary trends and adaptive radiations. (Limited to 15 students.) Credit, 4.

520, 521 Economic Anthropology I, II
Patterns of production, distribution and consumption in traditional societies, and social and political matrices in which these occur. Alternative theoretical approaches to selected problems.

525 Archaeology and Law
Federal and state laws, regulations, and administrative procedures for protection of archaeological resources. Training for effective involvement in cultural resource conservation. Basic introduction to professional work in cultural resource management.

529 Archaeology of Northeastern North America
Prehistoric record of northeastern North America (Pennsylvania to Labrador). Initial peopling of the area and subsequent demographic and cultural growth, against background of climatic and geomorphic changes of past 12,000 years. Major area problems stressed over regional sequences.

574 Cultures of the Far East
Survey of culture-history and ethnography of representative peoples of East Asia peasant subcultures of traditional and contemporary China, Japan, and Korea. Consent of instructor required.

577 Summer Field School in Archaeology
Practical training in archaeological field and laboratory techniques, problem formulation and appropriate methodologies. Emphasis may vary from survey to excavation of prehistoric or colonial sites. Prerequisite: ANTHRO 102 or equivalent. Credit, variable.

578 Theory and Method in Archaeology
Intensive examination of the scientific approach to modern archaeological research and utilization of this approach for deriving and testing theories of prehistory and behavioral patterns. Consent of instructor required.

582 History of Archaeology
Events, major ideas, and researchers important in development of archaeology during the 19th and 20th centuries. Emphasis on theoretical and technical advances related to present state of archaeology.

591-595 Seminars

596 Independent Study

597 Special Topics

621 Prehistoric Cultural Ecology
Analysis of cultural ecology approaches to interpretation of the prehistoric record. Consent of instructor required.

625 Andean Archaeology
Selected problems in excavation, analysis, and interpretation of Andean prehistory. Emphasis on later stages of development of native American civilizations.

641, 642 Theory and Method in Social Anthropology I, II
Two-semester sequence devoted to structural functional analysis as developed in British social anthropology. Emphasis on method in analysis of social and political theoretical issues. Credit, 6 (3 each).

649 European Prehistory
Analysis of prehistoric cultures of Europe to end of the Iron Age. Cultural evolution, and long range trends in natural and cultural adaptation emphasized. Consent of instructor required.

660 Seminar in European Anthropology
Particular attention to problems resulting from students’ field investigations in Europe.

664 Problems in Anthropology
Current anthropological thought in regard to specific problems chosen from physical anthropology, archaeology, and cultural anthropology. Consent of instructor required.

670 Problems in North American Archaeology
Selected problems in North American archaeology, emphasizing the anthropological interpretation of prehistoric data.

680 Field Course in Cultural Anthropology
Field course for advanced undergraduates and graduates. Supervised training in cultural anthropological research. Location varies from year to year. Credit, 6.

681 Quantitative Methods in Anthropology
Interpretation and analysis of data from all fields of anthropology. Descriptive statistics, formulation and testing of hypotheses, correlation and regression. Current trends in methodology of anthropological research.

683 Contemporary Anthropological Theory
Nature of social science paradigms and their relationship to society; critique of structural-functional paradigms, including modernization theories; in-depth examination of ecological, evolutionary, Marxian, and neo-Marxian theories in anthropology; implications of anthropological theory for general social science.

685 Seminar in European Anthropology II
Seminar for returning participants of European Field Program in Anthropology.

691-695 Seminars

696 Independent Study

697 Special Topics

698 Practicum

699 Master’s Thesis
Credit, 1-9.

712 Seminar in Social Biology
Interaction of social, biological, and ecological factors involved in various aspects of human biological and cultural diversity.
The History of Anthropological Theory
Origin and development of anthropological theory, cultural evolution, culture history, and cultural dynamics with a primary focus on trends in American anthropology up to mid-20th century.

Revolution and Social Change
Drastic social and cultural change. Emphasis on historical background and social contexts of political revolutions and their role in modernizing nations.

Language and Culture
Linguistic prehistory and classification; methods and interpretations of comparative linguistic analysis; linguistic methodology and "ethoscientific" approaches; the "Whorf hypothesis" and linguistic relativity.

Seminar in Comparative Symbol Systems
Current theory and analytic method in symbolic analysis of sociocultural systems.

Anthropology of Communication
Various communicative codes, from a biological and sociocultural viewpoint.

Linguistic Anthropology: The Social Dimension
Seminar. Phenomena, methods of investigation, and interpretation of social correlates of linguistic usage and variability.

Methods in Anthropological Research
Methods of studying cultures of homogeneous and heterogeneous societies among peoples of the world. Emphasis on various techniques of field work.

Physical Anthropology: The Skeleton
The human skeleton considered in its functional aspects and with reference to evolution, age, and sex. Methods of osteological investigations and osteometrics.

Physical Anthropology of the Living
Field and laboratory methods used to assess a group's biological and social well-being. Topics include nutritional assessment, health surveys, human growth, time allocation, energy flow analysis and social support and measurement of environmental and social stress.

Seminar in Biological Anthropology
Advanced treatment of current topics and debates in biological anthropology such as anthropological genetics, demography, growth and development, nutrition, medical anthropology and human adaptability. Emphasis on advances in these areas in past decade and future research directions.

Human Adaptability
Seminar. Mechanisms of human adaptation to environmental stress; emphasis on human variation. Cultural and biological modes of adaptation. Prerequisite: ANTHRO 372 or consent of instructor.

Seminars
Directed individual research in anthropology. Credit, 1-12.

Independent Study
Directed individual research in physical anthropology. Credit, 1-12.

Research in Cultural Anthropology
Directed individual research in cultural anthropology. Credit, 1-12.

Research in Linguistic Anthropology
Directed individual research in linguistic anthropology. Credit, 1-12.

Doctoral Dissertation
Credit, 10.

Graduate Faculty


Joseph Krupczynski, Associate Professor, B.F.A., Parsons School of Design, 1982; M.S., Massachusetts, 2001.

Skender Luarasi, Assistant Professor, B.Arch., Wentworth Institute of Technology, 2000; M.Arch, Massachusetts Institute of Technology, 2004.

Kathleen R. Lugosch, Professor, B.A., St. Lawrence, 1974; M.Arch., Harvard, 1983.


Adjunct/Associate Faculty
Peggi L. Clouston, Associate Professor of Building Materials and Wood Technology, Department of Natural Resources Conservation.

D. Charlie Curciija, Lecturer in Mechanical Engineering.

David Damery, Associate Professor of Building Materials and Wood Technology, Department of Natural Resources Conservation.

Paul R. Fisette, Professor of Building Materials and Wood Technology, Department of Natural Resources Conservation.

Simi Hoque, Assistant Professor of Building Materials and Wood Technology, Department of Natural Resources Conservation.

Timothy Rohan, Associate Professor of Art History.

Alex Schreyer, Lecturer in Building Materials and Wood Technology, Department of Natural Resources Conservation.

Master's Programs
At the graduate level, the Architecture and Design program offers Master of Architecture and Master of Science in Design degrees. The
Master of Science degree was established in 1976. The Master of Architecture degree program is fully accredited by the National Architectural Accreditation Board (NAAB).

The Architecture and Design program works to create a learning environment in which all students can discover and develop their own design process and professional potential. Students in the program are encouraged to critique the work of fellow students as a way to develop their analytic skills and establish ongoing working relationships.

Financial Assistance
The Master of Architecture and Master of Science in Design degree programs offer to selected qualified students teaching and research assistance that carries a semester stipend and a waiver of tuition, the Curriculum Fee, and most of the Health Fee in accordance with University guidelines (see the Fellowships and Assistantships section elsewhere in this Bulletin).

Admission
In addition to the university graduate application requirements, applicants to the Master of Architecture and Master of Science in Design degree programs must submit a portfolio or representations of their work with a maximum of 20 pages illustrating the ability to see and think in two and three dimensions, to compose, and to experiment. Applicants to the Master of Architecture degree program are required to submit GRE scores and three letters of recommendation. All application materials must be received by February 1 for fall admission only.

Master of Architecture
The Master of Architecture degree is the first and only accredited architecture degree at a public institution in New England.

The course of study consists of three main components: core requirements, area of knowledge concentration, and a culminating degree project. Course offerings are organized around an interdisciplinary curriculum involving faculty and students from architecture, interior design, studio art, art history, public history, landscape architecture and regional planning, building materials and wood technology, civil engineering, environmental engineering, environmental sciences, computer science, and management.

Students may also take classes through the Five College consortium, also including Amherst, Hampshire, Mount Holyoke, and Smith colleges.

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The NAAB, which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the bachelor, master, and doctor of architecture. A program may be granted a six-, three- or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Master’s degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The Master of Architecture degree at the University of Massachusetts Amherst was fully accredited in 2007.

Requirements
Prerequisites for admission to the three-year program are college physics and calculus. Recommended is an introduction to architectural history. Applicants who hold a four-year pre-professional degree in architecture from an institution with an NAAB program (or equivalent) may be admitted with advanced standing and may be able to graduate in two years. The minimum requirement for graduation is 87 credits or 57 credits with advanced standing.

Core Requirements
Students are required to satisfactorily complete a core sequence in these areas: Studio, Technical, History and Theory Practice.

Studio Sequence
Studio, Analysis, and Representation courses are required. A total of 36 credits can be earned in this area (18 credits for students with advanced placement).

Technical Sequence
Technical courses in Building Physics, Tectonics, and Architectural Integration are required. A total of 21 credits can be earned in this area (15 credits for students with advanced placement).

History and Theory Sequence
A minimum of 9 credits is required in the History and Theory sequence.

Master’s Project
A two-semester sequence of Research Forum (3 credits) is followed by Master’s Project (9 credits).

Areas of Knowledge
Each student in the Master of Architecture program is also required to assemble a coherent, faculty-approved study plan in an Area of Knowledge. The study plan comprises three electives for a total of at least 9 credits, the Research Forum, and the Master’s Project Architecture in which this knowledge is developed and integrated. The following interdependent groupings contribute to each Area, which is defined by a viewpoint of interiority and/or architecture.

Agency: Anthropology and Cultural Studies, Archeology, Assistive Technology, Economics, Gender Studies, Legal Studies, Resource Economics


Legacy: Archeology, Art/Architectural History, History, Legal Studies, Public History, Politics, Religion


Terrain: Landscape Architecture, Environmental Engineering, Environmental Sciences, Geosciences, Urban and Regional Planning

Students have access to rich and diverse course selections to design their Area of Knowledge through a network of courses and resources across the University and the Five College consortium, also consisting of Amherst, Hampshire, Mount Holyoke, and Smith colleges.

All courses carry 3 credits unless otherwise specified.

500 Graduate Design Studio I
Explores how a project is generated by careful attention to program and site. Credit, 4

501 Graduate Design Studio II
Studio projects emphasize project evolution through careful attention to program and site. Students analyze the physical spaces that surround them, considering materiality, dimension, color, and light. Exercises, including analysis of built projects, foster understanding of the history of the discipline and the importance of creative thinking. Emphasizes acquisition of skills necessary to communicate design intention. Credit, 4
510 Furniture Technology and Design
Drawing studio. Furniture design in drafting and sketch models only. One-of-a-kind and mass-produced furniture, free-standing and built-in architectural woodwork. Advanced drafting and small-scale sketch model making. Three furniture design projects in presentation drawings and/or models, plus materials and methods research, field trips, and special lectures.

520 Building Physics I
Includes studio. Energy conservation in contemporary residential construction. Emphasis on energy-efficient building materials, products, and construction technology; alternative energy sources; passive solar design; environmental concerns; regulatory issues and building codes. Preparation of electrical plans, reflected ceiling plans for a completed structure. Manufactured products in building: cabinets, stairs, doors and exits, acoustics, and HVAC considerations.

540 Analysis and Representation I
Studio. Various media explored, including model making and digital media.

541 Analysis and Representation II
Visual communication skills necessary and related to interior/architectural design presentation. Black-and-white and color presentations. Techniques include perspectives, axonometrics, and medium exploration, including digital media and physical models.

550 Tectonics I
Analysis and review of the entire light-frame construction process, from regulation and design through site preparation, project management, and ultimate delivery of a completed structure. Manufactured products in building: cabinets, stairs, doors and exits, acoustics, and HVAC considerations.

600 Graduate Design Studio III
Principles and process of architectural design. Projects developed and presented by student with individual attention from instructor. Each project reviewed by open jury system with visiting critics. Readings from texts and journals. Design projects, sketch problems. Credit, 4

601 Graduate Design Studio IV
Several complex planning and design projects. Emphasis on refined planning and presentation techniques. Credit, 4

620 Building Physics II
Importance of light in shaping physical environment. Developing a lighting plan. Topics include physics of light and color, basic electricity, characteristics of different lamp sources and psychological impact of lighting. Field trip to view successful lighting installations. Studio exercises include redesign of an existing lighting scheme and design of a luminaire.

630 Philosophy of Architecture and Design
Intensive reading and writing on the central theories and philosophies shaping architectural discourse in the 20th century, with emphasis on the period 1968 to the present. Concepts, techniques, and qualitative and quantitative approaches from the design professions.

650 Tectonics II
Introduction to the mechanical behavior of building materials. Basic structural concepts, including statics and strength of materials, addressed in a practical manner. Manufactured products in building: cabinets, stairs, doors and exits, acoustics, and HVAC considerations.

652 Building Physics III
Basic elements of construction: masonry, wood, metals, concrete, sheathing, and surfacing materials. Includes drawing assignments leading to final assignment of a rudimentary set of working drawings.

653 Tectonics III
Addresses areas in advanced detailing, documentation, and design of large-scale structures, predominantly related to steel and concrete. Includes drawing assignments.

660 Business of Building
Introduction to issues affecting the operation of a professional design/architecture office: managing a project, contracts, marketing, scheduling, personnel, leadership, interpersonal communication, human behavior, finance, budgeting, and ethical and legal considerations.

670 Research Forum
Topics include design criticism, current design literature, man/environment problems, design education, sociology of design, energy conservation through design. Guest speakers, possibly one or two field trips. Each participant prepares a class presentation on a chosen topic.

700 Integration
Professional design procedures consisting of complete design solutions from start to finish of a project.

799 Master’s Project
Credit, 9.

Other courses are listed under the collaborating departments of Art, Art History, Building Materials and Wood Technology, Civil and Environmental Engineering, Landscape Architecture and Regional Planning, and Mechanical Engineering.

Master of Science (in Design)
The Master of Science in Design program offers candidates with strong backgrounds in art, architecture or design, an opportunity to pursue special interests in design research and practice. The program requires each student to develop a research focus that draws from disciplines and departments across the university and the Five Colleges, working in concert with the Program Director and Graduate Program Director.

Requirements
The Master of Science is a two-year program for applicants who hold a professional degree in architecture, design or a related field. Students develop coherent academic plans with their advisors. Minimum graduate requirements are 51 credits. Core courses include a two-semester studio sequence, a two-course technical sequence, a Research Forum, and Master’s Project in Design. For more information on course offerings for Architecture and Design, visit www.umass.edu/architecture.
Portfolio Submission

Applicants should submit a portfolio of 20 pieces to demonstrate independent thought and the diversity of their experience in the visual arts.

Digital Portfolio Guidelines

Applicants may also submit their portfolios in a digital format. Digital files should be organized as a slide show, Keynote or PowerPoint, so that the viewing order is clear. Folders that contain image files are not recommended, as the viewing is too haphazard. Applicants should print a checklist and include thumbnail images that represent their digital portfolio on a separate page along with the medium and scale of each work. Digital portfolio files must be both Macintosh and PC compatible, on CD-R or DVD-R with the following formats: PDF file, Photoshop, Keynote or PowerPoint. Applicants should write their names and discipline(s) interest directly on the disk.

Web portfolios can also be reviewed; the applicant’s URL should be sent as a link. Video or time-based pieces (no longer than 10 minutes) may also be submitted if on a DVD-R with tested navigation.

The Department of Art is not responsible for reviewing materials that are not readily accessible. A CD-R or DVD-R should be tested and retested on multiple computers and playback devices, including consumer-quality DVD players using a remote control, before mailing.

Applicants should include a self-addressed mailer with sufficient postage if they wish the portfolio to be returned.

Overseas Exception

Other than using international coupons, applicants from outside the U.S. and its territories may provide a postal or bank money order or a cashier’s check (not personal checks) to cover the cost of returning their portfolios by U.S. mail only. The money order or bank check should be payable in U.S. dollars to: the Art Department, University of Massachusetts. It is the applicant’s responsibility to determine the weight of the portfolio and the cost of return postage. This option is available only to international or overseas applicants, including Canada.

Questions regarding format or submission of the portfolio should be directed to the Art Department’s Graduate Office, tel. (413) 545-6937.

Master of Arts (in Art Education)

The Art Department’s M.A. Program in Art Education offers the candidate two options: 1) a graduate program for candidates who have completed an undergraduate degree in Art (or the equivalent based upon faculty review), and who wish to be certified to teach art in an N-9 or 5-12 school program; 2) a graduate program for candidates who have completed an undergraduate degree in art, are currently certified to teach art, and wish to pursue an advanced degree in Art Education.

Option 1

The M.A. Program for Provisional Certification with Advanced Standing requires a minimum of 48 credits in the following three areas: studio art, art history, art education and student teaching. At least 39 of these credits must be at the 500 level or above, with a minimum of 12 credits at the 600 level or above. Additional courses may be necessary, depending on the individual candidate’s previous education. This program is subject to change based upon state certification requirements.

Option 2

Option 2 requires a minimum of 36 credits in the following three areas: studio art and art history; professional coursework; art education. A minimum of 12 credits must be at the 600 level or above. The remaining credits must be at the 500 level or above. Additional courses may be necessary, depending upon the candidate’s previous education.

Admission

Admission to the M.A. Program in Art Education requires a bachelor’s degree in studio art or art education, or the equivalent based upon faculty review, and a minimum 2.75 cumulative GPA. In addition, admission to Option 2 requires certification as a teacher of art. All candidates must submit two letters of recommendation from previous professors and/or employers, and a slide portfolio of their own work. (Refer to “Portfolio Submission” information above.)
range of other areas, using an interdisciplinary approach when desired. Applicants should select an emphasis area, based on their interests and indicate it as well as secondary areas, if any, on the application form, Section II.

Transfer Credit

Upto 12 graduate level credits may be transferred from another institution, subject to approval from the Director of Graduate Programs and the Graduate Dean. A maximum of six credits can be transferred from non-degree graduate work at this University.

Program Requirements

Of the 60 credits required, approximately 33 to 36 credits must be in the major area, 18 of which constitute the master’s thesis. The remaining 24 to 27 credits should be taken in other areas, including art history and visual culture. Up to 21 credits may be taken as independent study. Under special circumstances an additional six credits of independent study may be taken outside of Art, but only upon approval from the Director of Graduate Programs.

Students are also required to have their studio work reviewed by M.F.A. area faculty at mid-semester and the end of the semester for the first two years of the M.F.A. Program. Lack of satisfactory progress towards the completion of the M.F.A. degree, as determined by the area faculty through the review process, may result in a student being placed on probation or a recommendation that the student be withdrawn from the program. Both a positive area recommendation from the student’s instructors and grades of B or better are required for a student to remain in good standing. A student is also required to have area faculty approval before beginning thesis work. The thesis (required) consists of a one-person exhibition/presentation supported by a written statement and other documentation, including a slide of each work in the exhibition. The candidate must also make an oral defense of the thesis.

M.F.A. candidates are restricted from using 500-level courses in their major area toward graduation credit. For example, painters cannot use course/credit from the ART 520 series, sculptors cannot use the ART 560 series, printmakers cannot use the ART 540 series. Again, this restriction applies only to 500-level courses in the major area.

Admission

Fall enrollment is necessary to ensure continuity in the program. The number of graduate students that can be accepted into the studio-art program each fall is limited. The normal requirements for admission to the Graduate School apply except that the GRE is not required for M.F.A. applicants.

M.F.A. applicants also need to submit a portfolio of their own work as well as a resume. The portfolio is the primary criterion for selection. (For further information, see the “Portfolio Submission” section above or visit the Art Department website.)

All courses carry 3 credits unless otherwise specified.

501 Advanced Drawing

Investigation and development of various techniques and media. Emphasis on figure drawing.

502 Advanced Drawing Problems

Advanced work in traditional and contemporary drawing media. Independent exploration of graphic problems. Solutions to problems sought in relation to student’s personal objectives.

(Art Ed) 501 Student Teaching Practicum N-9

Art Education student teaching in grades K-9. Taken in conjunction with ART 761. Prerequisites: Art Education major, ART 510, 512, 515 or 516, and consent of instructor. Credit, 3-12.

(Art Ed) 502 Student Teaching Practicum 5-12

Art Education student teaching in grades 5-12. Taken in conjunction with ART 761. Prerequisites: Art Education major, ART 510, 512, 515 or 516, and consent of instructor. Credit, 3-12.

510 Visual Arts and Human Development I (1st sem)

Visual arts as they relate to the development of the individual. The nature of art, artistic and concept development, art and psychology, integrated arts, art appreciation and criticism, and lesson planning. Field experiences, workshops, and readings. Prerequisite: Art Education major or consent of instructor.

512 Visual Arts and Human Development II (2nd sem)

May be taken prior to ART 510. Visual arts as they relate to the development of the individual. Presentations, workshops, current literature in the field. Topics include: grading and evaluation, discipline, special needs students, art therapy, ordering of supplies, budgets, and lesson planning. Prerequisite: Art Education major or consent of instructor.

515 Advanced Problems in Art Education N-9 (1st sem)

Three components: curriculum development, special needs students, and practicum to be arranged in area schools. Prerequisites: Art Education major, completion of ART 510 and 512; or consent of instructor.

516 Advanced Problems in Art Education 5-12

(See ART 515.)

520 Painting—Representation I

Basic practice and theory of painting developed through the study of traditional and contemporary procedures used in the development of pictorial form. Emphasis on still life, landscape and the human figure. Materials: oil and aqueous media.

521 Painting—Representation 2

Basic practice and theory of painting developed through the study of traditional and contemporary procedures used in the development of pictorial form. Emphasis on still life, landscape and the human figure. Materials: oil and aqueous media.

522 Advanced Painting Problems

Thematic development based upon the study of objects, the environment, human figure and non-objective vocabularies. Related contemporary and historical issues included. Group and individual critiques used to develop continuity of work.

523 Painting Methods

Study of formal and informal painting procedures. Focus on development of form as content. Information provided regarding painting processes and associated materials. Related contemporary and historical theoretical issues also included. Prerequisites: ART 521, 522, or consent of instructor.

540 Printmaking: Relief I

Techniques and aesthetic considerations of the woodblock print and related media. Emphasis on drawing and on understanding technical procedures.

541 Printmaking: Intaglio I

Techniques and aesthetic considerations of techniques, engraving, aquatint, and related media. Emphasis on drawing and on understanding technical procedures.

542 Printmaking: Lithography I

Techniques and aesthetic considerations of making lithographs. Emphasis on drawing and on understanding technical procedures.
560 3-D Studies/Clay Sculpture — Figure
Focus on representing the human figure using clay as the primary material. Introduction to building techniques in clay. Focus on observation and elements of three-dimensional form.

561 3-D Studies/Wood Sculpture
Three-dimensional form through a sequence of assignments stressing visual design principles. Projects primarily in wood, using woodshop equipment and power tools.

562A 3-D Studies/Metal Sculpture — Casting
A sequence of problems in direct and cast-metal sculpture. Emphasizes traditional and modern lost wax casting.

562B 3-D Studies/Metal Sculpture — Welding
Primary emphasis on constructivist methods using electric and oxy-acetylene welding.

580 3-D Studies/Ceramics — Handbuilding
Introduction to all basic methods of handbuilding and decorating techniques. Focus on both vessel tradition and ceramic sculpture. Introduction to glazes, slips and firing. Overview of ceramic/historical traditions.

581 3-D Studies/Ceramics — Wheethrowing
Emphasis on multiples and ceramic surface solutions. Personal solutions to assignments highly encouraged. Introduction to temperature glaze, slips, and clay making. Overview of contemporary ceramic history.

582 3-D Studies/Ceramics — Moldmaking

583 3-D Studies/Ceramics — Advanced Throwing
Emphasis on further development of advanced throwing techniques; uses on- and off-wheel methods of building. Glaze making and firing instruction.

584 Ceramic Process
Introduction to the technology of ceramic materials and procedures in the studio. Clay body and glaze formulation at all temperature ranges, decorative and firing techniques.

597B Special Topics — Color Theory
Introduction to the use of color in art and design; emphasis on the visual effects of colors due to context. Various color phenomena isolated and studied independently. Review of major color order systems.

597D Special Topics — Computing in the Fine Arts
Historical overview of the development of computing in the arts. Major types of graphics and imaging devices surveyed. Projects include hands-on experience with a computer graphics system to create both graphic output and programs. Prerequisite: completion of Art Foundations courses or consent of instructor.

597M Special Topics — Photography I
Introduction to photographic materials and processes. Emphasis on acquiring technical skills. Involves the balance between self-inquiry and the importance of process and materials as vehicles of meaning. Critiques and slide presentations employed to examine photography from both a personal point of view and its wider cultural context.

597P Special Topics — Photography II
In-depth exploration of techniques and materials including: zone system, large format, non-silver processes. Slide lectures, discussions, and readings. Prerequisite: ART 597M or consent of instructor.

597Q Special Topics — Animation Fundamentals
With studio. Introduction to methods and techniques of animation, as well as history of experimental film. Hands-on work with object, sand, line and clay animation, among others. Basic audio and video skills. Students develop projects of their own design resulting in a fully edited videotape of their work. Prerequisite: consent of instructor.

640 Printmaking: Relief II
Advanced study of materials, techniques, and aesthetic considerations relevant to relief printmaking.

641 Printmaking: Intaglio II
Advanced study of materials, techniques, and aesthetic considerations relevant to etching, engraving and aquatint.

642 Printmaking: Lithography II
Advanced study of lithography. Emphasis on concepts and techniques of color lithography.

691A New York Professional Outreach
Introduction to the professional art system in New York City. Overnight trips. Visits to artist studios and art critics. Meetings with curators at nonprofit, alternative and museum spaces. On Friday nights: performance art, video screenings, art openings, underground films, dance events. Independent work from students’ studios discussed in critiques with class and instructor in Amherst.

697C Special Topics — Computer-Aided Design
Focus on producing a range of drawings on the computer: plans, sections, elevations, details, and perspectives using Auto-CAD. Prerequisite: consent of instructor.

697J Special Topics — Computer Animation I: Introduction to Computer Animation
With studio. Principles and applications of computer animation in film, video, music and technology. Introduction to 2-D and 3-D animation programs. Skills acquired in preparation for production in second semester. Emphasis on professionalism and quality. Prerequisite: ART 597Q or consent of instructor.

697L Special Topics — Introduction to Electronic Still Photography
With studio. Aspects of image processing in the context of electronic still photography. Topics include: image acquisition, image enhancement, image analysis, spatial and color transformation, image display and recording. Students develop images and algorithms for display on various devices. Prerequisites: ART 597D and 597M or consent of instructor.

697M Special Topics — Photography III
Students submit a proposal outlining a semester-long project. An audio-visual presentation focusing on all the influences related to the project also required. Class time divided between critiques, discussions based on readings, presentations and tech-
697P Special Topics—Photography IV
Continues work begun in Photography III (ART 697M). Final presentation includes the development and consideration of forms in relation to content and issues of audience and location. Critiques, discussion of assigned readings, and slide lectures. Prerequisite: consent of instructor.

697Q Special Topics—Computer Animation II: Advanced Computer Animation
With studio. Animation production using both 2-D and 3-D software, video and audio editing equipment. Includes a group project and a personal animation submitted on fully edited, individual videotape. Emphasis on professionalism and quality. Prerequisite: ART 697J.

697R Special Topics—Research in the Fine Arts
Graduate research methods in theory, technology and/or experimental practice.

698 Master’s Project
Credit, 1-18.

720A-D Painting
Graduate Painting majors only. Emphasis on independent studio work. Regular meetings with peers and Area Coordinator.

740A Printmaking/Intaglio Emphasis
Graduate Printmaking majors only. Emphasis on independent studio work. Regular meetings with peers and Area Coordinator.

740B Printmaking/Lithography Emphasis
Graduate Printmaking majors only. Continuation of ART 740A.

740C Printmaking/Relief Emphasis
Graduate Printmaking majors only. Continuation of ART 740B.

740D Printmaking/Varied Media
Graduate Printmaking majors only. Continuation of ART 740C. Choice of medium/technique.

760A-D 3-D Studies/Sculpture
Graduate Sculpture majors only. Emphasis on independent studio work. Regular meetings with peers and Area Coordinator.

761 Seminar—Art Education

780A-D 3-D Studies/Ceramics
Graduate Ceramics majors only. Emphasis on independent studio work. Regular meetings with peers and Area Coordinator.

791C Seminar—Computer, Design and Photography
Personal approaches to fine art and creativity. Students select projects of personal interest and complete them in a studio setting. Development of discussion, production, critique and presentation skills. Readings based on locating the project within contemporary visual practice. Taken every semester of first two years by graduate computer and photo arts degree graduates.

792K Supervision in Art Education (2nd sem)
Guided field work in supervision of undergraduate art education student teachers in the schools. Graduate Art Education majors only. Credit, 6.

792L Graduate Seminar in Art Education
Required for all students in the M.A. in Art Education Program. Current issues in art education. Readings, discussions, and lectures. Graduate Art Education majors only.

792M Research in Art Education
Research methodologies and problems in art education. Designing of a research problem/study and engaging in a pilot study for further research. Graduate Art Education majors only.

792N Independent Research Project in Art Education
An extensive research paper in art education. Graduate Art Education majors only.

793B Seminar—Graduate Photography
Graduate Photography majors only. Emphasis on the development of a long-term project. Discussion, lectures, and critiques. Readings based on locating the project within contemporary visual practice. Weekly meetings with peers and Area Coordinator.

795 Studio Art Seminar
Graduate discussion group on critical issues relating to the process of making art. Emphasis on contemporary art issues and cultural influences. Open to all graduate students.

796 Independent Study
Credit, 1-6.

797F Special Topics — Graduate Art Forum
Series of lectures/presentations, panel discussions with guest speakers. Wide variety of topics relating to art. Alternate years, usually spring semester.

797G Special Topics — Graduate Drawing
Emphasis on individual thematic development. Discussion of contemporary issues in the visual arts; active involvement in group and self-criticism. Strongly recommended for all first-semester students; others encouraged.

797P Special Topics — Criticism, Theory and Practice
Attempt to integrate the complex history of Postmodernism(s). Topics include: locating the postmodern; deconstruction; the political economy of art and culture; and the emergence of the “subject” in identity politics. Lectures, readings, discussion, film and video screenings. Prerequisite: consent of instructor.

799 Master’s Thesis
Credit, 1-18.
Art History

Graduate Faculty


Monika A. Schmitter, Associate Professor and Graduate Program Director, B.A., Oberlin, 1986; M.A., Michigan, 1991; Ph.D., 1997.


Mario J. Ontiveros II, Assistant Professor, B.A., California State at Fullerton, 1989; M.A., California at Riverside, 1994; Ph.D., California at Los Angeles, 2005.


Master of Arts
(in Art History)

The area of Art History accepts each year a small number of qualified individuals into its Master of Arts program; successful candidates have come from a wide variety of academic backgrounds, and have entered the program with a broad range of career goals in mind. A minimum of 30 credits of course work is required for the degree, as well as successful completion of the qualifying examinations. The latter consist of an image examination, an essay examination in a major and minor field of concentration, and an oral examination. With permission, a publishable paper may substitute for the essay examination in the major concentration. Most students require two years to complete the degree.

Requirements for the degree also include a distribution of courses in time and geographic area, completion of four graduate seminars, and research proficiency in the German, French, or Italian language. In addition to the courses listed in this Bulletin according to topic, the Seminar and Great Themes rubrics allow for specialized courses of timely interest to be taught on a one-time basis. Many candidates for the degree take advantage of the Independent Study courses to pursue topics of specialized interest under the guidance of a faculty member.

The Master of Arts in Art History program is designed to prepare candidates for a variety of careers; internships in museums and historical associations, teaching assistantships, and other individual programs of study combining academic and practical experience are encouraged for qualified students. Resources in the Five College consortium, including some courses as well as use of library facilities, further expand opportunities for learning and research.

For further information about the Master of Arts program, please write to the Graduate Program Director for Art History, Bartlett Hall, University of Massachusetts, Box 30505, Amherst, MA 01003-0505.

Application Deadlines
For Fall — February 1
For Spring — October 1

All courses carry 3 credits unless otherwise specified.

602 Evaluating Greek Art: Ancient Culture, Scientific Technology and Modern Politics
The origins, unfolding, and flowering of Greek sculpture, architecture, and painting from approximately 900 to 100 B.C. Readings from ancient literature provide essential historical and cultural background. Particular attention paid to the powerful magic of early Greek images and to issues and controversies surrounding Greek art as it is presented to the American public. Ms. LaFollette

603 Roman Art: Politics, Power and Society
The artistic and cultural achievements of the Romans—portraiture, illusionistic wall painting, and the development of vast interior spaces in architecture—as well as the creation of a multi-ethnic empire extending from England to Egypt. Particular attention paid to the dynamic of reciprocal influence between conqueror and conquered. Ms. LaFollette

605 Early Medieval Art
Development of Christian art in Western Europe from early Middle Ages to beginning of Romanesque period. Focus on Early Christian Byzantine, Hiberno-Saxon, Carolingian and Ottonian periods and related political, intellectual and cultural developments. Ms. Haney

607 Romanesque and Gothic Art
Development of architecture, sculpture, painting and minor arts from 1050 to 1400 in France, England and Italy; society in which these art forms developed. Relation of monuments to contemporary political, social, intellectual, and literary trends. Ms. Haney

608 Medieval Painting
The history of the illustrated book from early Christian period through the high middle ages. Problems in materials and technique; stylistic and iconographic questions. Ms. Haney

610 Art and the City-State in Early Renaissance Italy (1250-1500)
How city-states developed distinctive artistic styles, and how different governmental systems favored various forms of patronage. Cities include Naples, Rome, Siena, Florence, Milan, Mantua, Ferrara, Padua, Urbino, and Venice. Focus on the revival of interest in classical antiquity and the development of the mathematical system of one-point perspective. Ms. Schmitter

613 Late Renaissance and Mannerist Italian Art
The development of the visual arts in the major artistic centers of Italy during the 16th century, including Florence, Rome, Venice, Mantua, Ferrara, Parma, and Bologna. The lives and works of specific artists, such as Leonardo, Raphael, Titian, and Michelangelo. Focus on thematic issues concerning the relationship between art and society, including: the rise in social status of the artist and the conception of artistic genius; the influence of patronage and collecting; art and the creation of political identities; women as subjects, patrons, and practitioners of art; classicism and “anti-classicism” (Mannerism); art and religious reform; government and city planning. Ms. Schmitter

614 Sexuality, Drama and Invention: The Baroque Artist in Italy
The lives, works, and careers of five Baroque artists and architects: Michelangelo da Caravaggio, Artemisia Gentileschi, Guido Reni, Gianlorenzo Bernini, and Francesco Borromini. Focus on the role of sexuality in the artists’ lives and works as well as in Baroque culture more broadly. Concepts of drama and invention in relation to the theory and practice of Baroque art and architecture. Ms. Schmitter

618 The Play of Realism in the Northern Renaissance
Topical survey of art of the Renaissance in northern Europe. Jan van Eyck and symbolism, late Gothic spiritualism; Hieronymus Bosch and the fantastic; Durer and the
619 Court, Church and Community in Northern Baroque Art
Survey of 17th-century painting outside Italy. Focus on Velazquez, Poussin, Rubens, Rembrandt, and Vermeer. Emphasis on understanding meaning and function of the art in its historical and cultural contexts.

623 European Art, 1780-1880
Major artists and developments from David through Impressionism. Emphasis on historical context and related cultural and intellectual developments.

624 Modern Art, 1880 to Present
Focus on movements from Post-Expressionism, Symbolism, Expressionism, Cubism, Dada, Surrealism, to post-World War II and contemporary directions from Abstract Expressionism to Post-Modernism. Mr. Ontiveros

626 Criticism of Modern Art
Practical exercises and studies in evaluation of modern painting, including supporting theory. Readings, discussion, and reports on assigned topics.

627 Contemporary Art
Issues and developments in American art after 1940 from perspective of the nineties. Questions of cultural and art historical contexts for the work of American artists during the postwar period, from Abstract Expressionism through recent options raised in the works themselves, artists' writings, critics' interpretations, and public reception and support. Mr. Ontiveros

628 American Art to 1860
Survey of American art and architecture to 1860. Emphasis on major painters within the cultural and historical contexts. Mr. Oedel

629 American Art 1860 to 1940
Survey of American art and architecture from 1860 to 1940. Emphasis on major painters within the cultural and historical contexts. Mr. Oedel

634 History of Decorative Arts
The history of the decorative arts from the Renaissance to 1960. Various media examined, with an emphasis on furniture. Ms. Haney

642 19th-Century Architecture: History, Reform and Technology
The economic, social, and political forces that led to the creation of new building types, institutions, and technologies from 1750 to 1914. Seminal figures, monuments, urban environments such as Pugin, Viollet-le-Duc, Wright, Haussmann's Paris, Olmsted's Central Park, the Gothic Revival, the Beaux-Arts, and the various city-planning movements. Mr. Rohan

643 20th-Century Architecture: Modernism, Capitalism and Globalism
The architecture, design, and theory of the Modernist movement considered in relation to the primary ideologies of the twentieth century—socialism, capitalism, and globalism. Includes the works of founding figures—Wright, Mies, Gropius, and Le Corbusier—and significant themes such as the individual vs. the collective; European vs. American ideals; contributions of non-western cultures; impact of war, mass culture, and new technologies. Mr. Rohan

644 Vernacular Architecture
Seminar. American Colonial architecture of New England; variety of vernacular structures in later periods; e.g., barns, windmills, factories, etc. Important for students of architectural preservation and renovation.

645 Architecture Now
Seminar. For architects, interior designers, and environmentalists. Discussion, reading and prepared reports on immediate problems of architects, clients and the public with regard to characteristics of architecture today. How we have arrived; where we may go. ART-HIST 531 and 532 advantageous.

647 History of Islamic Art and Architecture I
Chronological study of history of Islamic art from its origins in Byzantine and Sasanian traditions of Near East, to its formation under Arab Empire and subsequent Turkish and Iranian dynastic patrons. Islamic world from Spain to India, with emphasis on the central Islamic lands of Middle East. Architecture, painting, textiles, carving in wood, crystal, stucco, stone, and ivory, metalware, ceramics, other media. Museum field trip. Given alternate years with ART-HIST 537. Mr. Denny

648 History of Islamic Art and Architecture II
Continuation of ArtHis 536. Artistic legacy of Islamic peoples from 14th through 17th centuries, including the arts of the Mamluk, Timurid, Ottoman, Safavid, and Mughal dynasties in the Middle East and India. Museum field trip. Given alternate years with ART-HIST 536. Mr. Denny

671-5 Great Themes in Art History
Changing treatment of central themes, issues and problems in art history. Topics often cut across traditional geographic or chronological boundaries. Although topics change from semester to semester, offerings are usually available every year in Modern, Islamic, and American art and architecture. List of current offerings available in Art History Office, 317B Bartlett. Prerequisite: upper-level survey course bearing on the particular theme, or consent of instructor.

Graduate Seminars

692A Winslow Homer and American Culture in the Gilded Age

693 Images and Reproductions
Meets one evening a week through the early part of the semester. The various ways in which works of art have been reproduced and how reproduction affects our perception of art. Includes methods of photography used in the scientific examination of art works. Practical discussion of photography of art and architecture, sources of reproductions, copyright laws. (Pass/Fail) Credit, 1.

694A 19th-Century Painting in the United States

696 Independent Study: Art History Credit, 3-12.

700 Problems in Greek Art

701 Problems in Roman Art

705 Studies in Medieval Iconography

710 Problems in Italian Art of the Early and High Renaissance

711 Problems in Italian Art of the Later Renaissance and Mannerism

718 Art of Northern Europe 1400-1600

719 Art of Northern Europe 1600-1700
Astronomy

721 19th-Century Painting and Sculpture
722 Art Since 1880
725 Problems in Contemporary Art
742 19th-Century Architecture
743 Themes in Postwar Architecture, 1945-1972
747 Problems in Islamic Art and Architecture
781 Methods of Art History
782 Museum Studies

Graduate Faculty
Ronald L. Snell, Professor and Head of the Department of Astronomy and Five College Astronomy Program Chair. B.A., Kansas, 1973; M.A., Texas, 1975; Ph.D., 1979.
Daniela Calzetti, Associate Professor, Laura in Physics, Rome, Italy, 1987; Ph.D., 1992.
Melinda D. Dyar, Associate Professor (Mount Holyoke College).
Suzan Edwards, Professor (Smith College).
Neal R. Erickson, Research Professor, B.S., California Institute of Technology, 1970; Ph.D., California, at Berkeley, 1979.
Mauro Giavalisco, Associate Professor, M.S., Rome, Italy, 1987; Ph.D., 1992.
George S. Greenstein, Professor (Amherst College).
Salman Hameed, Assistant Professor, (Hampshire College).
Mark Heyer, Research Professor, B.S., Boston College, 1980; Ph.D., Massachusetts at Amherst, 1986.
John Kwan, Professor, B.S., Utah State, 1969; Ph.D., California Institute of Technology, 1972.
James D. Lowenthal, Associate Professor, Smith College.
Houjun Mo, Professor, B.S., Anhui University, 1983; M.S., University of Science and Technology of China, 1986; Ph.D., Munich, 1991.
Gopal Narayanan, Research Assistant Professor, B.S., Anna University, India, 1989; M.S., California Institute of Technology, 1990; Ph.D., Arizona, 1997.
Todd M. Tripp, Associate Professor, B.S., Arizona, 1989; Ph.D., Wisconsin at Madison, 1997.
Daniel Q. Wang, Professor, M.S., Nanjing University, China, 1984; Ph.D., Columbia, 1990.
Martin D. Weinberg, Professor, B.S., Yale, 1979; Ph.D., Massachusetts Institute of Technology, 1984.
Grant W. Wilson, Assistant Professor, B.S., Tufts, 1991; M.S., Brown; 1993; Ph.D., 1997.
Judith S. Young, Professor, B.A., Harvard, 1974; M.S., Minnesota, 1977; Ph.D., 1979.
Min S. Yun, Associate Professor, B.S., California Institute of Technology, 1986; M.S., Harvard, 1988; Ph.D., 1992.

General Information

Students entering the Master’s and Doctor’s programs in Astronomy are expected to have a sound background in undergraduate physics. Previous training in astronomy is helpful but not required.

Summary of Requirements for the Ph.D. Degree

The general requirements for the Ph.D. in Astronomy are those of the Graduate School. In addition, students are required to complete 10 courses in three areas: a) four introductory physics and astrophysics courses, b) four core astronomy courses, and c) two other graduate courses in astronomy, physics, or related fields. Students are expected to maintain an average of B or better in each of these areas, and are also required to take the seminar Astronomy 791, 792 every semester.

Admission to candidacy for the Ph.D. is based on successful completion of the coursework, and on two research projects conducted by the student, which are followed by oral examinations. After admission, students are expected to devote their major efforts toward research. A wide range of theoretical and observational research topics are possible.

There is no foreign language requirement for the Ph.D in Astronomy. A student must register for 18 credits of Astronomy 899, Doctoral Dissertation.
Summary of Requirements for the M.S. Degree

The candidate for a Master’s degree generally takes a normal course load during the first year. The second year is devoted principally to either research directed toward a thesis or advanced course work. The requirements for the M.S. degree follow the guidelines of the Graduate School. A total of 30 graduate credits are required of which 15 must be in the astrophysics and physics “introduction” or “core” courses (see above). An additional six credits must be in either astronomy or physics graduate courses at the 600 level or above. Of the 30 credits, no more than 10 may be thesis or independent study.

All courses carry 3 credits unless otherwise specified.

640 Galactic Astronomy  Distribution of stars and gas in the Milky Way, Spiral structure; formation and evolution of Milky Way; kinematics of stars and gas; missing mass in our galaxy; the galactic center.

643 Astrophysics of Stars and Stellar Populations  Topics include gravitational equilibrium configurations, virial theorem, polytropes, thermodynamics, convective and radiative transport, stellar atmospheres, nuclear reactions and energy generation, pre-main-sequence contraction, evolution to red giant, white dwarf, and neutron star, and supernova explosions.

644 Radiation Processes in Astrophysics  Topics include continuum emission mechanisms (synchrotron radiation, inverse comp- ton, and free-free emission), dust emission, photo-ionization and recombination, excitation and transfer of atomic and molecular lines, line broadening, and population inversion and astrophysical masers.


646 Radiative Transfer  Broad survey of application of radiation transfer theory to astronomical problems; practical, rather than formal, aspects of subject. Analytic and numerical solutions of equation of transfer, including Monte Carlo method and difference equation techniques. Applications to problems of increasing complexity; stars with expanding atmospheres, nebulae, molecular clouds, interstellar masers.

650 Extragalactic Astronomy  Structure, formation, and evolution of galaxies. Stellar/gas content, kinematics, spiral structure, chemical evolution, galactic nuclei, missing mass in galaxies and clusters, galaxy collisions, determination of the Hubble constant, large-scale structure, and motions in the universe.

699 Master’s Thesis  Credit, 1-9.

717 Plasma Astrophysics  Fundamentals of plasma physics and magnetohydrodynamics; particle motion in electromagnetic fields, fluid description, wave propagation, instabilities, and radiation in plasmas. Specific applications of astrophysical interest: earth’s magnetosphere, sunspots, cosmic rays, interstellar medium, stellar winds, and pulsars. Prerequisite: PHYSICS 606 or consent of instructor.

731 Radio Astronomy  Principles of antennas, receivers, and spectrometers for radio astronomy. Surveys state-of-art systems at centimeter to sub-millimeter wavelengths. Observational techniques and basic system design discussed. There is a laboratory component to course.

732 Computational Methods for Physical Science  Basic numerical methods: linear algebra, interpolation and extrapolation, integration, root finding, extremization and differential equations. Introduction to Monte Carlo techniques used to simulate processes that occur in nature and methods to simulate experiments that measure these processes including random number generators, sampling techniques, and multidimensional simulation. Methods for extracting information from experiments such as experimental measurements and uncertainties, confidence intervals, parameter estimation, likelihood methods, least squares method, hypothesis tests, and goodness of fit tests. Chaotic dynamics and other special topics as time permits.

741 The Interstellar Medium  Describes the gas and dust components of the interstellar medium in ionized regions, atomic clouds, and molecular clouds. Shows how data from optical, infrared, and radio wavelengths can be utilized to determine density, temperature, composition, and dynamics of the various phases of the ISM. Comparison of these results with theoretical models. Includes an overview of the processes that affect the evolution of the ISM including the incorporation of gas and dust into stars, the effect of HII regions and young stellar objects, and the return of matter from evolved stars and supernovae.

742 Molecular Astrophysics  History of molecular astrophysics. Rotational spectra of molecules. Excitation of molecules under interstellar conditions. Techniques for inferring physical conditions in molecular clouds: microwave and infrared observations. Relationship of molecular clouds to star formation.


748 Cosmology and General Relativity  Observational cosmology and cosmological principles. Background radiation and Olbers’ paradox. Newtonian cosmology. General relativity, gravitational waves, relativistic cosmology, and gravitational collapse. Theories of the universe and origin of celestial structure.

791, 792 Seminar: Review of Current Literature  Discussion and review of current articles in astronomical literature. May be repeated for credit. Required of graduate students. Credit, 1-2 each semester.

796-797 Special Topics  Special study in astronomy or astrophysics, either theoretical or experimental under direction of faculty member. May be repeated for credit. Consent of Head of the Department of Astronomy and directing faculty member required. Credit, 1-6.

830 Radio Astrophysics  Physical theory fundamental to radio astronomy: propagation of electromagnetic waves in isotropic and anisotropic media with emphasis on plasmas. Faraday rotation,
emission and absorption of synchrotron radiation and bremsstrahlung emission, nonthermal radio source models.

850 Advanced Topics in Astronomy
Topics of special interest not covered in regular courses at the present time. Recent examples include material in infrared astronomical techniques and instrumentation; high resolution astronomy, including interferometry and speckle methods; and the use of modern computer hardware and software in astronomical problems involving large data sets.

860 Seminar on Research Topics in Astronomy
Topics of current interest not covered in regular courses. Instruction via reading assignments and seminars. May be repeated for credit. Consent of instructor required. Credit, 1-3.

899 Doctoral Dissertation
Credit, 18.

Related Courses

Physics

564 Introductory Quantum Mechanics I
606 Classical Electrodynamics I
614 Intermediate Quantum Mechanics I

Biochemistry and Molecular Biology

Graduate Faculty

Danny J. Schnell, Professor and Head of the Department of Biochemistry and Molecular Biology, B.S., Nebraska, 1983; Ph.D., California at Davis, 1987.

Lila M. Gierasch, Distinguished Professor and Graduate Program Director, A.B., Mount Holyoke, 1970; Ph.D., Harvard, 1975.

Frank C. Cannon, Professor, B.Sc., University College, Galway, Ireland, 1968; Ph.D., 1972.

Maura C. Cannon, Research Associate Professor, B.Sc., University College, Galway, Ireland, 1967; Ph.D., 1972.


Alice Y. Cheung, Professor, B.A., Smith, 1976; Ph.D., Yale, 1982.


David J. Gross, Associate Professor, B.S., Illinois at Urbana-Champaign, 1975; M.S., 1977; Ph.D., 1982.

Daniel N. Hebert, Associate Professor, B.A., New Hampshire, 1984; Ph.D., Massachusetts at Worcester, 1991.

Alejandro P. Heuck, Assistant Professor, M.S., Buenos Aires, Argentina, 1991; Ph.D., 1997.

Jennifer Normanly, Associate Professor, B.A., California at Santa Cruz, 1983; Ph.D., California Institute of Technology, 1989.

Karsten Theis, Assistant Professor, B.S., Free University of Berlin, Germany, 1991; Ph.D., 1996.

Hen-ming Wu, Research Associate Professor, B.S., Tung Hai University, Taiwan, 1974; Ph.D., Yale, 1982.

Robert A. Zimmermann, Professor, B.A., Amherst, 1959; Ph.D., Massachusetts Institute of Technology, 1964.

Adjunct Associate Faculty

Arnold T. Hagler, Adjunct Professor of Biochemistry and Molecular Biology.

Craig T. Martin, Professor of Chemistry.

Lynmarie K. Thompson, Associate Professor of Chemistry.

General Information

The goal of the graduate program is to produce scholars capable of teaching and doing research in contemporary biochemistry, molecular and cellular biology, biomedical sciences, and life sciences in general. Our students go on to careers in academics, industry, and research institutes. In order to accomplish the above goal, the program is designed to train students who have demonstrated competence in: 1) the fundamental physical and chemical principles related to the life sciences, as well as a thorough, advanced knowledge of modern molecular and cellular biology; 2) the design, implementation, and publication of significant research results; 3) the oral presentation of research results; and 4) teaching.

Summary of Requirements for the M.S. Degree

The department offers a special fifth-year Master of Science program designed to enhance the scientific education of undergraduate Biochemistry and Molecular Biology majors with strong academic records (minimum recommended GPA, 3.2). Requirements for the Master of Science degree set by the Graduate School apply. Students may complete the requirements of this program in 15 months from receipt of the bachelor’s degree. Applications by students from other universities are discouraged. Some laboratory research experience prior to admission to the Master of Science program is required. In most cases, an undergraduate research project can be developed more fully to provide the basis for the thesis project. Undergraduate majors interested in this program should discuss it with their academic adviser in the sixth semester, if possible.

Summary of Requirements for the Ph.D. Degree

All Ph.D. students in the department receive their degrees through an interdepartmental program, typically the Molecular and Cellular Biology,
Plant Biology or Neuroscience and Behavior programs.

It is anticipated that the Ph.D. candidate will spend four to five years in the program after the bachelor’s degree. During the first year, all students will complete three core courses covering more advanced aspects of biochemistry, molecular biology, and cell biology. They will also participate in two research projects during the first year of residence. At the end of the first year, a written qualifying exam will be taken. The second qualifying exam, which is an oral defense of a written proposition, will be taken during the second year. Courses in advanced physical chemistry, genetics, and cell biology offered in several departments are usually recommended.

Prerequisites to the Program
Candidates for the degree of Doctor of Philosophy are accepted under the general requirements of the Graduate School. Students must satisfy the requirements of the particular graduate program to which they are admitted. Students are generally supported by research assistantships or fellowships. All students, regardless of source of support, are required to serve as teaching assistants for one semester.

All courses carry 3 credits unless otherwise specified. See also listings under Molecular and Cellular Biology Program.

523 General Biochemistry (1st sem)
Structure and function of biological molecules, especially proteins, lipids, and carbohydrates. Important concepts include bioenergetics, enzyme function, and metabolic pathways as interacting regulated systems. Prerequisites: 1 year of organic chemistry or 2nd semester concurrently, and BIOCHEM 285.

524 General Biochemistry (2nd sem)
An integrated presentation of the biochemistry and molecular biology of cellular interactions. Topics include gene structures, replication, control of gene expression, post-translational processing, membrane associated reactions, behavior of transport systems, signal transduction, and cellular interactions. Prerequisite: BIOCHEM 523, and BIOLOGY 283, or comparable courses, strongly recommended.

526 Biochemistry Laboratory (both sem)
Modern techniques in experimental biochemistry and molecular biology. Methods include spectrophotometry, polymerase chain reaction, DNA cloning, electrophoresis, protein detection by immunoblot, RNA hybridization, and analysis of sequence data. Prerequisite: BIOCHEM 523. Spring semester enrollment restricted to Biochemistry majors. Credit, 4.

597 Drug Design (2nd sem)
Survey of the drug design process in pharmaceutical research including target selection, how rational and combinatorial methods are harnessed, and how the industry is evolving in the post-genomic era. Prerequisites: a course in biochemistry and a year of organic chemistry.

623 Advanced General Biochemistry (2nd sem)
Advanced treatment of selected topics in biochemistry, with readings taken from the current literature. Topics include protein structure-function, protein folding and processing, enzyme kinetics, and the study of metabolic processes (pathways and their regulation) with a molecular genetic approach. Students must have taken at least a one-semester course in upper division biochemistry and MOLCLBIO 642. Credit, 4.

642 Advanced Molecular Biology (1st sem)
Structure, biosynthesis, and function of nucleic acids and the translational apparatus. DNA replication; gene organization; chromatin structure; RNA transcription, regulation of gene expression; protein biosynthesis; mRNA, tRNA, and ribosomes. Prerequisite: BIOCHEM 523/524 or equivalent. Credit, 4.

691 Departmental Seminar
Required of all graduate students. Credit, 1 each semester.

692 Seminar: Molecular Biology
Credit, 2.

693 Seminar: Secretory Pathway
Credit, 2.

694 Seminar: Plant Molecular Biology
Credit, 2.

695 Seminar: Macromolecular Crystallographic Methods
Credit, 2.

696 Independent Study
Library or laboratory research under direction of faculty member. Credit, 1-6.

699 Master’s Thesis
Credit, 1-10.

797 Special Topics in Biochemistry
Topics of current interest may include hormones, lipids, carbohydrates, glycoproteins and proteoglycans, control mechanisms, protein synthesis, membranes, nucleic acids, biochemical data analysis, and protein-nucleic acid interactions. Prerequisite: BIOCHEM 623.

899 Doctoral Dissertation
Credit, 18.
Graduate Faculty

R. Thomas Zoeller, Professor and Chair of the Department of Biology, B.S., Indiana, 1977; M.A., Oregon State, 1979; Ph.D., 1983.

Dennis G. Searcy, Professor and Graduate Program Director, B.S., Oregon State, 1964; Ph.D., California at Los Angeles, 1968.


Tobias I. Baskin, Professor, B.S., Yale, 1980; Ph.D., Stanford, 1986.

Magdelena Bezanilla, Assistant Professor, B.S., California at Santa Barbara, 1994; Ph.D., Johns Hopkins, 2000.


Steven D. Brewer, Assistant Professor, B.S., Alma College, 1985; M.S., Western Michigan, 1996; Ph.D., 1996.

Bruce Byers, Associate Professor, B.S., Massachusetts at Amherst, 1987; Ph.D., 1993.

Ana L. Caicedo, Assistant Professor, B.S., Universidad de los Andes, Bogota, Colombia, 1996; Ph.D., Washington at St. Louis, 2003.

Elizabeth A. Connor, Associate Professor, B.S., St. Lawrence, 1977; Ph.D., Vermont, 1982.


Gerald Downes, Assistant Professor, B.S., Johnson C. Smith University, 1992; Ph.D., Washington at St. Louis, 1999.


Samuel P. Hazen, Assistant Professor, B.S., Arizona, 1994; M.S., Michigan State, 1996; Ph.D., 2000.

Duncan J. Irschick, Associate Professor, B.S., California at Davis, 1991; Ph.D., Washington at St. Louis, 1997.

Abigail M. Jensen, Associate Professor, B.A., California at San Diego, 1988; Ph.D., Wisconsin at Madison, 1992.

Rolf O. Karlstrom, Associate Professor, B.S., Northern Arizona, 1985; Ph.D., Utah, 1993.

Joseph G. Kunkel, Professor, A.B., Columbia, 1964; Ph.D., Case Western Reserve, 1968.

Wei-Lih Lee, Assistant Professor, B.S., Iowa, 1994; Ph.D., Johns Hopkins, 2000.

John R. Nambu, Associate Professor, B.A., California at Santa Cruz, 1982; Ph.D., Stanford, 1987.


Sandra L. Petersen, Professor and Associate Dean of the Graduate School, B.A., Rutgers, 1977; M.S., Oregon State, 1980; Ph.D., 1984.

Randall W. Phillips, Associate Professor, B.A., Miami (Ohio), 1981; Ph.D., Indiana, 1986.

Jeffrey Podos, Associate Professor, B.A., Franklin and Marshall, 1989; Ph.D., Duke, 1996.


Margaret Riley, Professor, B.S., Michigan State, 1981; M.S., Massachusetts at Amherst, 1983; Ph.D., Harvard, 1989.

Lawrence M. Schwartz, Professor and Science Director, Pioneer Valley Life Sciences Institute, B.A., Northwestern, 1976; Ph.D., Washington, 1982.


Patricia Wadsworth, Professor, B.S., St. Lawrence, 1977; Ph.D., Dartmouth, 1983.

Elsbeth Walker, Associate Professor and Director, Plant Biology Graduate Program, A.B., Mount Holyoke, 1984; Ph.D., Rochester University, 1990.


Adjunct/Associate Faculty

Cristina Cox Fernandes, Adjunct Assistant Professor of Biology.

The Biology Graduate Program is currently inactive, and has been replaced by four interdepartmental programs: Organismic and Evolutionary Biology, Neuroscience and Behavior, Molecular and Cellular Biology, and Plant Biology. For graduate study in the Biology Department, applicants should contact one of those four programs. In rare instances, a student who cannot fit elsewhere might be considered for admission into “Biology.” Questions should be addressed to the Biology Department.

All courses carry 3 credits unless otherwise specified.

504 Plant Morphology


510 Plant Physiology

Presentation of principles needed to appreciate the physiological mechanisms unique to plants. General areas include components and functions of cell structures and mechanisms of development. Examples from recent literature consider genetic engineering, sensory processes, and protection from biotic and abiotic stresses. Prerequisite: BIOLOGY 100-101 or BIOLOGY 103.

511 Experimental Plant Physiology

Optional laboratory to accompany BIOLOGY 510. Credit, 1.

514 Population Genetics

Focus on evolutionary processes affecting the distribution of genetic variation through space and time: gene flow, genetic drift, recombination, mating system, mutation, and natural selection. Includes overview of molecular population genetics and the neutral theory of evolution. Prerequisites: BIOLOGY 280 or 283 or equivalent: MATH 127 or 128 or STATISTIC 111 or equivalent. Ms. Caicedo

521 Comparative Vertebrate Anatomy

With lab. Detailed approach to the structure and evolutionary relationships of vertebrates. Evolutionary and functional significance of structures in different groups. Lab involves evolutionary trends and specializations, experience in dissection. Prerequisite: BIOLOGY 102 or BIOLOGY 100-101. Credit, 4. Ms. Coombs

522 Vertebrate Fossils and Evolution

Introduction to vertebrate history emphasizing fossil forms. Topics include: skeletal morphology and evolution, modes of life of extinct animals such as dinosaurs, faunal change over time, and relationships among the various groups of vertebrates. Lectures
and lab at Amherst College Pratt Museum, with study of display and other fossil specimens. Prerequisite: introductory course in a biological science, geology, or physical anthropology. 

523  Histology
With lab. The relation of cell, tissue, and organ microscopic structure to function. Discussion of major tissue types: epithelia, nerve, muscle and connective tissue. Lab includes light microscopic identification of various tissues and organ systems (primarily mammalian) and related electron micrographs. Prerequisite: BIOLOGY 102 or BIOLOGY 100-101. Ms. Connor, Ms. Wadsworth

528  Principles of Evolution
Advanced course for students who have already taken an introductory course in evolution. Evolutionary mechanisms and evolutionary history, including evolutionary genetics, the role of chance in evolution, speciation and species concepts, the origin of life, the tempo of evolution, extinction, the evolution of behavior, evolutionary history of selected groups, research methods in evolution. Mr. Byers.

530  Biology of Invertebrates
With labs, field trips. Survey of biological relationships, structure, ecology, and distribution. Emphasis on aquatic (freshwater) and terrestrial non-insect groups. Use of keys for identification. Mandatory collection. Prerequisites: BIOLOGY 101, 102 or equivalent. Credit, 4.

540  Herpetology
Synopsis of the anatomy, evolution, systematics, and behavior of major living lineages of amphibians and reptiles; special attention to the New England herpeto-fauna. Lab: diversity, morphology and behavior; some dissection required. Prerequisite: BIOLOGY 521 or consent of instructor. Credit 4. Mr. Richmond

542  Ichthyology
With lab. The biology and evolution of fishes with a focus on the structure and function of major living groups. Topics include an overview of evolution, systematics, and biogeography of recent and fossil fishes, functional anatomy of feeding and locomotory systems, reproduction and reproductive behavior, physiological adaptations to aquatic habits, etc. Lab: anatomy, diversity, systematics and functional morphology of major lineages. Prerequisite: BIOLOGY 521 or consent of instructor. Credit 4.

544  Ornithology
With lab. Avian systematics, phylogeny, behavior, ecology, etc. Lab includes bird identification, anatomy, censusing, field studies. Prerequisite: upper-level biology course or consent of instructor. Credit, 4. Mr. Byers

548  Mammalogy
With lab. Lectures and readings on comparative biology and evolutionary relationships of mammalian groups. Lab involves detailed introduction to the New England mammalian fauna and study of selected representatives of other groups, emphasizing adaptation. Prerequisite: BIOLOGY 100-101 or 102 and any life science course beyond the introductory level. Recommended: BIOLOGY 512. Credit, 4. Ms. Dumont

550  Animal Behavior
For majors in biology, psychology, animal science, wildlife, fisheries, and related fields. Survey of recent developments emphasizing current research and its interpretations. Review of “classical” ethological approach. More recent developmental, physiological, ecological, and evolutionary approaches. Topics include behavior genetics, imprinting, migration and orientation, predatory-prey interactions, communication, and social behavior. Recent experimental and theoretical developments in sociobiology. Implications of these with respect to the analysis and interpretation of human behavior. Prerequisite: any introductory biology or psychology course, or consent of instructor. Mr. Podos, Ms. Novak

559/560  Cell and Molecular Biology II
Selected aspects of cellular structure and function including regulation of the cell cycle, chromosome structure, and experimental methods. Prerequisite: BIOLOGY 285 or equivalent. Credit, 3. (559, lecture only). Credit, 4 (560, with lab). Ms. Wadsworth.

564/565  Human Physiology
With lab. Mechanisms underlying organ system function in vertebrates: nervous, endocrine, cardiovascular, respiratory, muscular, digestive, excretory, reproductive systems. Prerequisite: BIOLOGY 285 or consent of instructor. Credit 3 (564). Credit 4, (565), with lab.

566/567  Comparative Physiology
With lab. Physiological principles involved in adaptations of animals to their environments. Credit, 3 (566). Credit, 4 (567, with lab).

568/569  Experimental Endocrinology
With optional lab. The role of hormones in the growth, metabolism, and reproduction of mammals. Molecular mechanisms of hormone action, environmental and feedback control of secretion. Current issues in endocrine physiology. Prerequisite: physiology (e.g., BIOLOGY 297A or 564/5), or consent of instructor. Credit, 3 (568). Credit, 4 (569, with lab). Mr. Zoeller

571  Biological Rhythms
The formal, molecular, genetic, cell biological, and physiological analysis of endogenous oscillations in plants and animals, including their entrainment by light and use in photoperiodism and navigation. Circadian, circatidal, and circannual rhythms emphasized. Prerequisite: BIOLOGY 285 or equivalent. Mr. Bittman

572  Neurobiology
Biology of nerve cells and cellular interactions in nervous systems. Structural, functional, developmental, and biochemical approaches. Topics include neuronal anatomy and physiology, membrane potentials, synapses, development of neuronal connections, visual system, control of movement, and neural plasticity. Prerequisite: BIOLOGY 285 or equivalent; or BIOLOGY 100 or 102 and PSYCH 330; or consent of instructor. Mr. Wyse

574  Cell Motility and the Cytoskeleton
The molecular and cellular basis for motion of whole cells and cell organelles. Topics include muscle motility, ciliary motion, amoeboid movement, cytoplasmic streaming, nuclear migration, mitosis, and membrane-cytoskeletal interactions. The assembly and regulation of microfilaments and microtubules examined. Prior completion of biochemistry recommended.

580  Developmental Biology
Physiological and biochemical aspects of development. Labs include discussions, demonstrations, computer modeling and experimental work. Prerequisite: BIOLOGY 560 or equivalent. Mr. Kunkel, Mr. Nambu, Mr. J. Karlstrom

597  Special Topics
Advanced Physiology (2nd sem)
Hormone actions in males and females from birth through old age. Steroid and thyroid hormone biochemistry, and molecular mechanisms of action. Endocrinology in the news. Current issues in endocrinology, including environmental contaminants that act as endocrine disrupters; physiological
basis of sexual differences in heart disease and Alzheimer’s disease; mechanism by which estrogen prevents osteoporosis, and antiestrogen administration to prevent breast cancer. Ms. Petersen

**Biology**

Lecture, lab. Methods in data capture and analysis with emphasis on biological problems. The “R” computing environment used with traditional and novel approaches, including time series, morphometrics, sequence data, and experimental design. Prerequisite: MATH 127, 128, or equivalent. Mr. Hazen

**Genetics II**

Current topics and advanced concepts in genetics with techniques for answering fundamental biological questions. Theoretical and experimental approaches to gene and genome structure, functional and genetic analyses, recombination, mapping, developmental and quantitative genetics. Prerequisite: BIOLOGY 283 with grade of C or higher. Mr. Alpert

**Information Technology in Biology Education (1st sem)**

Examines three topics in the specific context of biology education: 1) what principles underlie how people learn; 2) how these principles of learning can guide technology implementation; and 3) what the real-world practicalities are of using these technologies for teaching. Student projects include evaluating a technology product being used for biology education and developing a lesson for students that employs information technology to teach biology. Mr. Brewer

**Plant Genomes and Genetic Systems**

Emphasis on model genetic systems, *Arabidopsis* and maize. Genomics, gene and sequence databases, plant genome structure, transposable elements, mapping using molecular markers, strategies for gene cloning, quantitative trait loci, and epigenetic control of gene expression. Open to any student with the necessary background in genetics and molecular biology. Ms. E. Walker

**621 Topics in Plant Ecology: The Biological Basis of Wildlands Policy (alt 2nd sem)**

The ecological and social consequences of the disappearance of wildlands. How to judge whether conservation policies are biologically sound, how to design ecological research to improve them. Focus on current research and controversy. Participants present seminars and collaborate on a joint review paper. Consent of instructor required. Mr. Alpert

**641 Advanced Cellular Biology (Cross-listed with MCB 641)**


**696 Special Problems**

Directed research project on some problem in biology. Credit, 1-6.

**698A Practicum**

Credit, 1-12.

**699 Master’s Thesis**

Credit, 10.

**722 Vertebrate Paleontology**

A rigorous analysis of the vertebrate fossil record. Topics include: vertebrate systematics, morphological trends, transitions, functional anatomy, and faunal evolution. Additional 1-credit lab available. Offered alternate years. Four class hours. Prerequisite: BIOLOGY 521 or 522 or equivalent. Credit, 4. Ms. Coombs

**750 Advanced Animal Behavior**

Topics from active areas of current research (e.g., communication, development, behavioral ecology, sociobiology); emphasis on critical analyses of theory and methodology. Prerequisite: BIOLOGY 550, or consent of instructor.
Chemical Engineering

Graduate Faculty

T. J. Mountziaris, Professor and Head of the Department of Chemical Engineering, Diploma, Aristotle University, Greece, 1982; M.A., Princeton, 1983; Ph.D., 1989.

Jeffrey M. Davis, Associate Professor and Graduate Program Director, S.B., Massachusetts Institute of Technology, 1999; M.A., Princeton, 2001; Ph.D., 2003.

Surita Bhatia, Associate Professor, B.S.Ch.E., Delaware, 1995; Ph.D., Princeton, 1999.

W. Curtis Conner, Jr., Associate Professor, B.E.S., Johns Hopkins, 1968; Ph.D., 1973.

Neil St. John Forbes, Assistant Professor, B.S.Ch.E., Case Western Reserve, 1994; Ph.D., California at Berkeley, 2000.

David M. Ford, Associate Professor, B.S., State University of New York at Buffalo, 1991; M.S., Pennsylvania, 1992; Ph.D., California at Santa Barbara, 1992.

Michael Henson, Professor, B.S., Colorado at Boulder, 1985; M.S., Texas at Austin, 1988; Ph.D., California at Santa Barbara, 1992.

George W. Huber, Assistant Professor, B.S., Brigham Young, 1999; M.S., 2000; Ph.D., Wisconsin at Madison, 2005.

Michael F. Malone, Dean of the College of Engineering and Ronnie and Eugene Isenberg Professor, B.S., Pennsylvania State, 1974; Ph.D., Massachusetts, 1979.

Dimitrios Maroudas, Professor, Diploma, National Technical University of Athens, 1987; Ph.D., Massachusetts Institute of Technology, 1992.

Peter A. Monson, Professor, B.S., Queen Elizabeth College, London, 1976; Ph.D., 1979.


Susan C. Roberts, Associate Professor, B.S., Worcester Polytechnic Institute, 1992; Ph.D., Cornell, 1998.

Lianhong Sun, Assistant Professor, B.S., Inner Mongolia University, 1994; M.S., Dalian Institute of Chemical Physics; 1997; Ph.D., California Institute of Technology; 2003.

Phillip R. Westmoreland, Professor, B.S., North Carolina State, 1973; M.S., Louisiana State, 1974; Ph.D., Massachusetts Institute of Technology, 1986.


Adjunct/Associate Faculty

Scott M. Auerbach, Professor of Chemistry.

Harry Bermudez, Assistant Professor of Polymer Science and Engineering.

Michael F. Doherty, Professor, University of California at Santa Barbara.

Richard J. Farris, Professor of Polymer Science and Engineering.

David A. Hoagland, Professor of Polymer Science and Engineering.

Jennifer Normanly, Associate Professor of Biochemistry and Molecular Biology.

Maria Santore, Professor of Polymer Science and Engineering.

James J. Watkins, Professor of Polymer Science and Engineering.

The graduate program in chemical engineering emphasizes advanced study in engineering fundamentals rather than specific technological applications. For an applicant to be admitted to full graduate standing, one of the following requirements must be met.

- The applicant must have a recognized bachelor’s degree in Chemical Engineering; or the applicant must, as a minimum, show satisfactory academic training or demonstrate proficiency in the following subjects:
  - Mathematics (through Calculus, Differential Equations, and Linear Algebra).
  - Chemistry (through Organic and Physical).
  - Chemical Engineering (Stoichiometry, Transport Phenomena).
  - Thermodynamics (including thermodynamics of chemical change).

Every student admitted to graduate standing shall be required, as part of the academic requirements, to devote five hours per week to departmental teaching activities.

Master’s Degree Requirements

1. Satisfactory completion of 30 graduate credits with the following stipulations:
   a) No more than 10, nor less than 6 credits may be earned by means of the required thesis.
   b) At least 21 (including the thesis) of the 30 credits must be in the major field.
   c) A maximum of 6 credits of grade B or higher may be transferred from elsewhere.
   d) Course credits used for fulfilling the degree requirements must be taken on a graded basis. However, the required seminar credits shall be taken on a Pass/Fail basis.

2. Presentation of a thesis (either experimental or non-experimental) acceptable to the Graduate Thesis Committee and the faculty.

3. Satisfactory performance in a final oral examination.

4. Payment of all fees and expenses.

Doctoral Degree Requirements

1. Within the three months following initial registration as a doctoral candidate, select a major professor as your adviser, based on the area of research contemplated for the dissertation.

2. Arrange for and take the oral part of the preliminary comprehensive examination.

3. Upon successful completion of the oral part of the comprehensive exam, select a doctoral dissertation committee (thesis committee) composed of at least three graduate faculty members. For details regarding the composition of the dissertation committee refer to Doctoral Degree Requirements, elsewhere in this Bulletin.

4. Within 18 months following the successful completion of the oral part of the comprehensive exam, prepare and defend a dissertation proposal describing the research to be done for the dissertation. The defense of this prospectus will constitute the written part of the comprehensive exam.

5. The approved and signed original copy of the dissertation proposal must be filed with the Graduate School. This must be done at least seven months prior to the defense of your thesis. A signed copy of the approved prospectus must also be filed with the departmental office. It is the student’s responsibility to provide the required copies.

6. At least one month before the date of your final oral examination (thesis defense), submit to your adviser and dissertation committee a final draft of your thesis and an abstract of 600 words or less, suitable for publication. Arrange for an announcement of the date of the final oral exam in the Weekly Bulletin section of In the Loop. Follow the Typing Guidelines for Doctoral Dissertations, available from the Graduate School.

7. Following satisfactory performance in your final oral examination, submit your dissertation...
electronically to the Graduate School. Present one bound copy to your adviser (and others as may be appropriate). Also, one unbound copy is required for the department office.

8. Submit to the department the “Certification of Eligibility for a Doctoral Degree.” To complete this form, the student checks his/her status at the Graduate Records Office.

9. Pay all fees and expenses.

10. All of the requirements described above must be completed in accordance with a schedule available from the Graduate School, in order to qualify for granting of the degree at the commencement each year. For example, the requirements must normally be completed by the April deadline to qualify for the May commencement.

Preliminary Comprehensive Examination
For the Ph.D. degree the Graduate School requires the successful completion of the preliminary comprehensive examination. This examination consists of two parts, one oral and one written. The qualification procedure for the Ph.D. in chemical engineering shall consist of the following:

a) Earn a grade of B or better in the five core 600-level CHEM-ENG courses:
   621 Thermodynamics I
   625 Chemical Reactor Design
   631 Fluid Mechanics
   633 Transport Processes
   661 Advanced Analysis I
   Equivalent course work from other institutions may be used to satisfy this requirement with the approval of the Graduate Program Director up to the maximum permitted by the Graduate School.

b) An oral examination on the student’s research topic will be given each year in the summer. Requirement a) must be completed before the oral exam is taken. The exam will last approximately one hour, including a 30-minute oral presentation focusing on the state of knowledge in the research area, the research objectives, and a summary of research progress to date. The presentation will be followed by discussion of core principles of chemical engineering related to the proposed research. At least fourteen days prior to the oral exam, each student must submit a brief written document (10-15 single-spaced pages excluding figures) on their research topic to the Graduate Program Committee. The examining committee will consist of graduate faculty members in Chemical Engineering appointed by the Graduate Program Director in consultation with the Graduate Program Committee.

The examining committee will decide a grade of pass with distinction, pass or fail for each candidate. Students who fail the exam may retake it only upon invitation of the faculty. Retake exams will be offered in January of the student’s second year of study. In the event that the student is not invited to retake the exam, he or she will not be allowed to continue in the Ph.D. program.

c) A written proposal, describing the thesis research to be defended before the dissertation committee. This proposal is to outline the proposed research topic, including a statement of the problem and its relevance, literature survey, plan of attack, description of experimental equipment and/or analytical/computation techniques, description of safety considerations, object or conclusions to be derived from the study, timetable, etc. The proposal should be typed, double-spaced, and of sufficient length to cover the subject matter adequately. This shall constitute the written portion of the preliminary comprehensive examination. Students are urged to complete the proposal within one year of completion of the oral exams. Students failing to complete the proposal within 18 months of completion of the oral exams shall be ineligible for financial support until the proposal is complete.

Students entering the graduate program in September will take the exams the following summer. Students entering at other times will take the exams at a time decided by the Graduate Program Director, but no later than the second summer following their admission to the Ph.D. program.

All courses carry 3 credits unless otherwise specified.

555 Energy Conversion and Catalysis
Current and future energy conversion problems, the latter involving the use of heavy oils, coal, oil shale, etc., as energy sources. Fundamentals of catalysis and relation of the application of these fundamental concepts to developing modern catalytic processes. Prerequisite: Senior standing or graduate standing in Chemical Engineering or Chemistry, or consent of instructor.

556 Chemical Technology
Theory and computation of engineering property relations for thermodynamics, kinetics, transport. Correlations based on molecular and transition-state analogies; computational quantum chemistry; molecular simulation. Prerequisite: undergraduate physical chemistry.

592B Introduction to Biochemical Engineering
The application of chemical engineering and biochemistry principles to the design and optimization of processes in the food and pharmaceutical industries. Topics include enzyme catalysis, metabolic engineering and regulation, fermentation, microbial growth, bioreactor design, and product recovery and purification.

621 Thermodynamics I

622 Thermodynamics II

623 Thermodynamics III

625 Chemical Reactor Design

626 Advanced Kinetics and Reactor Design
Details of complex kinetics. Catalysis as a chemical, transport, thermodynamic, and interfacial phenomenon. The relationship between energetics, thermodynamics and kinetics. Non-steady-state kinetics between steady states and with changes in reactivity, e.g., catalyst deactivation. Prerequisite: CHEM-ENG 625.

631 Fluid Mechanics
Mathematics of vectors and tensors, continuum hypothesis, Euler’s axioms, Cauchy’s theorem, change of frame, constitutive equations, ideal fluids, vorticity dynamics, potential and viscous flows, boundary
conditions, Newtonian fluids. Prototype problems: converging flow, creeping flow, boundary layer, turbulence, macroscopic balances.

632 Heat Transfer
Continuum descriptions, equations of change in multicomponent, single-phase systems. Fourier’s law, multicomponent fluxes, boundary conditions, convective transfer. Prototype problems in energy transfer: forced convection, free convection, unsteady heat conduction, basic solutions of the diffusion equation, moving boundary problems, energy transfer and chemical reactions, combustion boundary layer, transfer coefficients, radiation, macroscopic balances. Prerequisite: CHEM-ENG 631; advisable co-requisite, CHEM-ENG 633.

663 Advanced Analysis III
Numerical methods for Chemical Engineering analysis. Linear system solutions with emphasis on robustness, speed and conditioning of equations. Applications in finite difference solutions of linear and nonlinear parabolic and elliptic pde’s. Robust methods for initial value problems and Methods of Lines solutions using finite difference discretizations. Weighted residual methods, especially collocation and finite element methods. Nonlinear equation solving by fixed-point and Newton-like methods. Continuation methods for multiple solutions. Applications in chemical reaction engineering, heat and mass transfer, fluid mechanics. Prerequisite: CHEM-ENG 661 or equivalent, and elementary programming skills in a high-level applications language such as FORTRAN or Pascal.

691 Seminar
A series of invited lectures on a variety of research programs. Required course; may be taken Pass/Fail. Prerequisite: graduate standing. Credit, 1.

699 Master’s Thesis
A theoretical or experimental study of a specific chemical engineering problem. Credit determined by work done, and by agreement with the Graduate Thesis Committee and the faculty. Credit, 6-10.

721 Solid State Chemistry and Materials Science

731 Advanced Mass Transfer

747 Advanced Process Control
Process identification and state estimation using recursive least squares and statistical analysis. Digital control system design using shift operator calculus. Pole assignment, optimal control and spectral factorization. Self-tuning control, the self-tuning principle, and stability results. Practical implementation of adaptive controllers, including a discussion on issues concerning the non-linear dynamics of adaptive control systems. Multistep control policies and robust control.

748 Process Dynamics
Properties of linear interconnected systems and large scale systems theory. Directed graphs and decomposition of interconnected systems. Rigorous and short cut methods. Dynamic analysis and control of interconnected chemical processes. Connections between automata and graph theory. Application to discrete event systems. Dynamics of discrete event systems and supervisory control of flexible, chemical manufacturing systems.

749 Advanced Process Design II
Continuation of CHEM-ENG 641. Emphasis on more complex designs and the uses of mathematical models or optimization techniques in the solution of these design problems. Prerequisite: CHEM-ENG 641. Credit, 1-3.

755 Combustion Phenomena

757 Polymer Rheology
Definition and measurement of rheological properties, continuum mechanics, and constitutive equations; molecular theories of polymer deformation; correlation and interrelation of material functions. Relations of the various approaches taken in describing the viscous and viscoelastic properties of polymers, and evaluation of these approaches; the role of modern rheology in the characterization and processing of polymers.
758 Polymer Processing
Application of engineering fundamentals, such as fluid-mechanics, heat transfer, etc., and constitutive relations of polymers to the analysis of polymer processing: extrusion, calendaring, coating flows, injection molding, and reaction injection molding, secondary shaping processes (fiber spinning, blow molding, fiber blowing). Specific phenomena as molecular orientation in flow, recovery (extrudate swell) and low Re instabilities. Prerequisites: POLYMER 504, CHEM-ENG 757.

860 Advanced Topics in Chemical Engineering
In-depth exploration of the advanced aspects of an area pertinent to chemical engineering. Credit, 1-3.

861 Advanced Topics in Transport Phenomena
In-depth exploration of a particular aspect of advanced transport phenomena. Prerequisites: CHEM-ENG 632, 633. Credit, 1-3.

862 Advanced Topics in Thermodynamics
Intensive consideration of current literature and research in a particular area of thermodynamics. Prerequisite: CHEM-ENG 622. Credit, 1-3.

863 Advanced Topics in Kinetics

864 Advanced Topics in Process Dynamics and Control
Topics from current literature, discussed in depth. Consent of instructor required. Credit, 1-3.

865 Advanced Topics in Analysis
For advanced graduate students in Chemical Engineering. Application of mathematics to problems in chemical engineering. Specific topics vary according to instructor and student interests. Prerequisites: CHEM-ENG 661, 662, or consent of instructor. Credit, 1-3.

899 Doctoral Dissertation
A theoretical or experimental study of a chemical engineering problem. Credit determined by work done and by agreement with the Graduate Dissertation Committee and the faculty. Credit, 18.

Graduate Faculty
Bret E. Jackson, Professor and Head of the Department of Chemistry, B.S., Carnegie-Mellon, 1979; Ph.D., M.I.T., 1983.

Craig T. Martin, Professor and Associate Head of Department, B.A., California at San Diego, 1979; Ph.D., California Institute of Technology, 1984.

Edward G. Voigtman, Jr., Associate Professor, Graduate Program Director, and Associate Head of Department, B.S., Rensselaer Polytechnic Institute, 1972; Ph.D., Florida, 1979.

Scott M. Auerbach, Professor, B.S., Georgetown, 1988; Ph.D, California at Berkeley, 1993.

Michael D. Barnes, Associate Professor, B.S., California State at Sonoma, 1985; Ph.D., Rice, 1991.

Patricia A. Bianconi, Associate Professor, B.S., Yale, 1979; M.A., Columbia, 1981; Ph.D., Massachusetts Institute of Technology, 1986.

James J. Chambers, Assistant Professor, B.S., New York at Buffalo, 1997; Ph.D., Purdue, 2002.

Min Chen, Research Assistant Professor, B.Sc., Tianjin, China, 1996; M.Sc., 1999; Ph.D., Frankfurt, Germany, 2004.

Paul L. Dublin, Research Professor, B.S., City University of New York, 1962; Ph.D., Rutgers, 1970.

Justin T. Fernmann, Senior Lecturer, B.A., B.S., Hartwick College, 1992; Ph.D., Georgia, 1996.

Lila M. Gierasch, Distinguished Professor (Joint with Biochemistry and Molecular Biology), A.B., Mount Holyoke, 1970; Ph.D., Harvard, 1975.

Jeanne A. Hardy, Assistant Professor, B.S., Utah State, 1994; M.S., 1994; Ph.D., California at Berkeley, 2000.


Igor A. Kaltashov, Associate Professor, B.S., Moscow Institute of Physics and Technology, 1987; M.S., 1989; Ph.D., Maryland, 1996.

Michael J. Knapp, Assistant Professor, B.S., California at San Diego, 1993; Ph.D., 1998.


Ricardo B. Metz, Associate Professor, B.S., Johns Hopkins, 1986; Ph.D., California at Berkeley, 1991.


Nathan A. Schnarr, Assistant Professor, B.S., Hope, 1999; Ph.D., Colorado State, 2004.

Howard D. Stidham, Professor, B.S., Trinity College, 1950; Ph.D., Massachusetts Institute of Technology, 1955.

Sankaran Thayumanavan, Associate Professor, B.S., The American College 1987; M.S., 1989; Ph.D., Illinois, 1996.

Lynn Marie K. Thompson, Associate Professor, B.S., California Institute of Technology, 1983; Ph.D., Yale, 1989.


Richard W. Vachet, Associate Professor, B.S., William and Mary, 1993; Ph.D., North Carolina, 1997.


Robert M. Weis, Associate Professor, B.S., Michigan, 1979; Ph.D., Stanford, 1984.

Adjunct/Associate Faculty
Scott C. Garman, Assistant Professor of Biochemistry and Molecular Biology.
David J. Gross, Associate Professor of Biochemistry and Molecular Biology.
Arnold T. Hagler, Adjunct Professor of Chemistry.
Daniel Hebert, Associate Professor of Biochemistry and Molecular Biology.
William E. Mahoney, Adjunct Professor of Chemistry.

Peter A. Monson, Professor of Chemical Engineering.
Jennifer Normanly, Associate Professor of Biochemistry and Molecular Biology.

Karsten Theis, Assistant Professor of Biochemistry and Molecular Biology.

Baoshan Xing, Professor of Plant and Soil Sciences.

The Department of Chemistry offers individualized programs leading to the Ph.D. degree with specialization in one or more of the following areas: analytical, biological, inorganic, organic or physical chemistry. Additional areas of specialization are possible via adjunct faculty who provide links with other departments and programs. Chemistry faculty members participate in several interdisciplinary programs and the department participates in the Five College Ph.D. Program.

The department does not have a master’s program per se; however, a master’s may be possible in the following circumstances: 1) A doctoral student needs a master’s degree en route to the Ph.D. 2) A student is unable to complete the Ph.D. program and petitions for a terminal master’s degree.

There are few formal requirements for the Ph.D. degree so as to allow each student’s program to be tailored to individual needs. In the first year, students take a two-semester core course as well as more specialized courses in their areas of interest. There is no foreign language requirement.

The Preliminary Comprehensive Exam consists of successfully presenting both a Prospectus and later an Original Research Proposal, unrelated to the prospectus/dissertation, along with any additional divisional requirements (“cumes”).

All entering graduate students participate in an orientation program in the week prior to the beginning of the first week of graduate study. This is designed to evaluate the student’s preparation and assist in planning a course of study. Students also take a short seminar course, Faculty Research Seminar, to expose themselves to the current research being done by the faculty. During the first semester, students participate in a series of short rotations in faculty research groups. Research advisers are assigned early in the second semester. After a research topic is selected, the student’s research adviser helps plan the remainder of the program. The Ph.D. degree is awarded for the production and successful defense of a dissertation describing original, publishable research work. Students accepted into graduate programs are expected to have undergraduate preparation comparable to that recommended by the American Chemical Society.

All courses carry 3 credits unless otherwise specified.

513 Instrumental Analysis
With laboratory. Theory and practical application of modern instrumental methods for chemical analyses. Atomic and molecular spectroscopy, electroanalytical chemistry, chromatography, and mass spectrometry. Applications to actual analytical problems. Prerequisite: CHEM 315. Credit, 4.

515 Theory of Analytical Processes
Aspects of the theory underlying modern analytical chemistry. Topics treated in depth vary with instructor, but can include relevant aspects of quantitative analysis; essential signal processing for analytical techniques; chromatography and other separation procedures; optical spectroscopy and spectrometry; microfluidics; use of statistics for the analysis and treatment of data. Prerequisite: CHEM 315.

519 Electronic Instrumentation for Scientists
With lab. Analog and digital circuits. Electronically aided measurement. Concepts involving instrumentation. Data domain conversion circuits. Approaches to improve the signal-to-noise ratio. Hands-on hardwiring and computer circuit simulation in lab. Prerequisites: year of physics; at least three junior/senior courses in student’s major; consent of instructor.

546 Advanced Inorganic Chemistry
Basic atomic structure concepts; stereochemical principles and bonding models applied to main group and transition metal species. Includes elementary molecular orbital and ligand field theory, and kinetics and reaction mechanisms of d-block complexes. Descriptions of metal-metal bonded and organometallic systems. Structure and bonding principles supplied to catalytic and biological system reactivity. Prerequisites: CHEM 241, 476.

551 Advanced Organic Chemistry
Mechanisms of some important organic reactions. Topics covered may include application of qualitative molecular orbital theory to pericyclic reactions, free radical chemistry, photochemistry, heterocyclic systems, cationic and anionic reactions. Prerequisite: one year of organic chemistry.

552 Spectroscopic Identification of Organic Compounds
Modern techniques for identification and structural analysis of organic compounds. Emphasis on the interpretation of spectra. Optional lab sections with opportunities to use spectroscopic facilities in the department, and to use spectroscopic techniques and procedures, such as nuclear-nuclear decoupling or 2-D NMR experiments (DEPT, COSY), spectral simulation and prediction, standard sample preparation methods. Prerequisites: CHEM 266H/268H or equivalent. Completion of a two-semester physical chemistry course prior to enrollment strongly recommended.

584 Advanced Physical Chemistry
Introduction to quantum mechanics and its application to chemical problems; electronic structure of atoms and molecules, molecular orbital theory, chemical bonding, potential energy surfaces, and molecular spectroscopy. Prerequisite: CHEM 476 or equivalent, or consent of instructor.

585 Advanced Physical Chemistry
Short review of thermodynamics. Introduction to statistical thermodynamics and its application to chemical problems. Statistical mechanical basis of thermodynamic behavior, e.g., entropy and attainment of equilibrium, and derivation of thermodynamic properties from basic microscopic description of molecules and solids, via quantum mechanics. Miscellaneous other topics may include gas imperfections, theory of liquids, adsorption, and molecular simulations. Prerequisite: CHEM 476 or equivalent, or consent of instructor.

648 Coordination Chemistry
Molecular orbital bonding theory, spectroscopy, magnetism, stereochemistry, and reaction mechanisms as applied to coordination species. Emphasis on transition elements. Prerequisite: CHEM 546 or equivalent.

649 Physical Methods in Inorganic Chemistry
Application of principles of spectroscopy to structural aspects of inorganic substances. Infrared and Raman, nuclear magnetic resonance, electron paramagnetic resonance, nuclear quadrupole resonance, Mössbauer spectroscopy, photoelectron spectroscopy, and X-ray crystallography. Prerequisite: CHEM 546 or equivalent.

650 Metals in Biology
Emphasis on structure/function relationships, acquisition and transport of metal ions, electron transport proteins, respiratory proteins, redox proteins and enzymes, metalloenzymes with nonredox roles, medical
aspects and spectroscopic methods for structure/function determination. Prerequisites: CHEM 546, BIOCHEM 523, or consent of instructor.

660 Organic Reaction Mechanisms
Fundamental concepts of physical organic chemistry and methods for the study of reaction mechanisms are integrated with a detailed consideration of how the structure of organic compounds determines preferred mechanistic pathways and therefore chemical properties. Prerequisite: CHEM 513 or consent of instructor.

697 Frontiers in Organic Chemistry
Offered as three one-credit parts each, focusing on a topical area of interest such as supramolecular chemistry, materials chemistry, organometallic chemistry or bioorganic chemistry. Students have the option of taking one, two or all three parts. Consent of instructor required.

699 Master’s Thesis
Credit, 10.

710 Electroanalytical Chemistry
Principles of electrochemistry and their relation to the newer electroanalytical methods. Three class hours. Prerequisite: CHEM 513 or consent of instructor.

715 Spectroanalytical Chemistry
Theory and practice of modern chemical analysis methods based upon spectroscopic measurements of atoms and molecules in solid, liquid, gas, and plasma states. Includes x-ray, optical and radio frequency techniques. Prerequisite: CHEM 513 or consent of instructor. Credit, 4.

716 Chemical Separation Methods
Methods of chemical analysis using separation techniques, emphasizing chromatography. Theory and laboratory practice of gas and supercritical fluids chromatography, liquid chromatography by adsorption, partition, exclusion, and ion exchange. Three class hours, one 4-hour laboratory period. Prerequisite: CHEM 513 or 515, or consent of instructor. Credit, 4.

721 Advanced Analytical Chemistry
With lab. Principles, practice, and use of instrumental chemical measurement systems. Emphasis on computer-based data collection and handling, including algorithms for enhancement of signal to noise ratio. Prerequisites: CHEM 513 or 515, and CHEM 519 or consent of instructor.

726 Applied Analytical Chemistry
Applications of analytical techniques to actual problems in industrial regulatory, and instrumentation development laboratory settings. The place of analytical chemistry in related disciplines. The analytical chemical academic-industrial interface. Visiting industrial seminar speakers. Format flexible. Prerequisite: CHEM 513 or 515, or consent of instructor.

728 Biophysical Chemistry
Chemical, physical, and biological properties of proteins and nucleic acids. Macromolecular structure of biopolymers; optical, hydrodynamic, and magnetic resonance techniques; multiple equilibria; relaxation kinetics, and conformational transitions. Prerequisites: BIOCHEM 523 and CHEM 471 or 475, or equivalent.

743 Crystallography and Solid State and Materials Chemistry
Crystal symmetry; the principles of X-ray and neutron diffraction techniques; methods of solving crystal structures. Bonding in solids; metals, covalent and ionic materials. The band model and solid state electronic structure. Crystal defects and non-stoichiometry. Electrical and magnetic properties of solids; superconductivity, organic conductors, ferroelectric and semiconductor devices. Prerequisites: CHEM 474 or 476 and CHEM 546 or equivalents.

756 Organic Synthesis
Important synthetic reactions, with emphasis on problems that may arise during organic synthesis. Develops students’ ability to propose own syntheses of complex molecules. Prerequisite: CHEM 551 or consent of instructor.

761 Organometallic Chemistry
Chemistry of compounds containing metal-carbon and metal-hydrogen bonds. Preparation, structure, physical properties, chemical reaction, and catalytic synthetic applications of organometallic derivatives. Topics of current interest stressed. Prerequisite: CHEM 551; may be taken concurrently.

775 Statistical Thermodynamics
Molecular theory of macroscopic properties of thermodynamic systems. Averaging; ensembles; probabilities and distribution functions; fluctuations, scattering and ensemble equivalence; quantum, classical and lattice statistics; applications such as computation of thermodynamic properties, imperfect gases, adsorption, correlation functions and Fourier transforms, polymer chain dynamics, phase transformations and radial distribution functions. Prerequisite: CHEM 476 or equivalent, or consent of instructor.

777 Chemical Spectroscopy, Technique and Applications
Techniques and applications of spin resonance spectroscopy, NMR, esr, nqr. Bloch equations, relaxation effects, chemical exchange, quadrupolar effects, solid state NMR, multidimensional NMR, Overhauser effect and the analysis of complex spectra. Emphasis on biological or polymer applications depending on instructor. Prerequisite: CHEM 476 or equivalent, or consent of instructor.

778 Chemical Spectroscopy Theory
Microwave, infrared, Raman, visible and ultra-violet spectra and structure. Molecular geometry from rotational spectra, normal coordinate analysis, anharmonicity and dissociation, hindered rotors, crystals, intensities and charge flux, vibrational dichroism, non-linear inelastic light scattering. Prerequisite: CHEM 476 or equivalent, or consent of instructor.

781 Quantum Chemistry I

782 Quantum Chemistry II
Special topics in quantum mechanics and statistical mechanics, including atomic and molecular collisions. Density and time-evolution operators for ensembles. Prerequisite: CHEM 585 or equivalent, or consent of instructor.

788, 789 Physical Chemistry of High Polymers
Structure of solid polymers, determination of molecular weights, sizes and shapes,
mechanical properties of solid polymers, colligative properties of polymer solutions, polyelectrolytes, and physical chemistry of proteins. Prerequisite: CHEM 585 or equivalent. Credit, 3 each semester.

791 Special Topics in Chemistry
Topics of current interest in various fields of chemistry. Consent of instructor required. Maximum credit, 6.

791B Main Group Inorganic Chemistry
An investigation of the descriptive chemistry of the main group elements, with emphasis on their applications in biological, materials, polymer, and environmental chemistry. Topics include the biominergeochemistry of the Group 1 and 2 metals, the solid state chemistry of Group 3-5 and 2-6 semiconductors, inorganic backbone polymers and the organometallic chemistry of the main group elements. Prerequisites: CHEM 546 or equivalent. Credit, 3 each semester. Maximum credit, 6.

891 Seminar
Conference, reports or lectures. Credit, 1 each semester. Maximum credit, 2.

892 Research Group Seminar
Discussion, oral presentations, problem solving, and reading of current literature pertinent to research interests of one or more faculty. For chemistry graduate students doing research. Graded Pass/Fail. Credit, 1 each semester; maximum credit, 4 for M.S.

896 Research Problem
Students prepare proposals for research problems primarily involving library research, not directly related to thesis topic, if latter has been selected. Credit, 4.

899 Doctoral Dissertation
Credit, 18.

Graduate Faculty
Amanda C. Seaman, Assistant Professor and Director of Asian Languages and Literature Program, B.A., Wellesley, 1988; A.M., Chicago, 1994; Ph.D., 2001.
Enhua Zhang, Assistant Professor and Graduate Program Director, B.A., Nankai, China, 1997; M.A., 2000; M.Phil., Columbia, 2003; Ph.D., 2007.
Suet-Ying Chiu, Assistant Professor, B.A., Chinese University of Hong Kong, 1995; M.A., California State, 1999; Ph.D., California at Los Angeles, 2007.
Zhongwei Shen, Associate Professor, B.A., Fudan University, 1982; M.A., California at Berkeley, 1988; Ph.D., 1993.
Zhijun Wang, Assistant Professor, B.A., Inner Mongolia Nationality University, 1987; M.A., Beijing Language and Culture University, 1992; M.A., Iowa, 1999; Ph.D., Illinois at Urbana-Champaign, 2007.

Associate Faculty
Piper R. Gaubatz, Associate Professor of Geosciences.

Adjunct Faculty

The Department of Asian Languages and Literatures offers a comprehensive course of studies leading to the Master of Arts degree in Chinese. The principal focus of the program is practical training, with an emphasis on the development of advanced linguistic skills that will enhance future work in translation, interpretation, teaching, journalism, business, or government. For those who intend to go on to further graduate study, the curriculum also allows emphasis on more traditional literary and cultural studies.

Admission
Entering students should have advanced level competency in Chinese and are expected to have completed a Bachelor of Arts degree with an undergraduate major in Chinese (or its equivalent) before matriculation with an undergraduate cumulative grade point average of 3.2 in the major and 3.0 overall (on a 4.0 scale). Students whose preparation is deficient in certain areas may be required to do remedial work after admission to the program. Such work will not be counted toward the degree.

Applicants are required to have taken the Graduate Record Examination before applying, or to take it at the earliest opportunity thereafter. Non-native speakers of English who are not U.S. citizens are required to take the Test of English as a Foreign Language.

M.A. Degree Requirements
Students are required to complete at least thirty hours of course work and six hours of Master’s Thesis. Up to six credits of appropriate course work at the graduate level from other institutions may be accepted with the approval of the graduate committee. It is expected that most suitably prepared students will be able to finish all requirements for the degree within two academic years. For students emphasizing linguistics, CHINESE 576 and 577 are required. For those emphasizing classical literature, CHINESE 552, 555, and 556 are required. For those emphasizing modern literature, CHINESE 526 and 527 are required. CHINESE 580 is required for all Teaching Assistants.

Course work is to be distributed as follows:
A. Required Courses (18 credits)
   1. 528 Chinese Language in Contexts
   2. 570 Research in Chinese Source Materials
   3. 575 Syntactic Structures of Chinese
   4. 626 Expository Writing

Website: www.umass.edu/asianlan/
5. 660 Problems and Methods in Translation
6. 691 Graduate Seminar in Chinese

B. Electives (12 credits)
To be selected from the advanced-level courses (those numbered 500 and above) existing in the department. Certain courses from other departments may also be accepted with the approval of the graduate committee.

C. Thesis (6 credits) and Examination
Before starting the thesis the student must pass a general examination, not necessarily limited to the thesis topic. The examination will be administered by a committee appointed by the graduate adviser.

All courses carry 3 credits unless otherwise specified.

526 Readings in Modern Chinese Literature I
Selected expository and critical essays, short stories, and poems by contemporary authors. Prerequisite: CHINESE 427 or consent of instructor.

527 Readings in Modern Chinese Literature II
Selected essays, short stories, and poems in Baihua by such authors as Lu Xun, Zhou Zuoren, Mao Dun, You Dafu, Shen Congwen, and Deng Ling. Prerequisite: CHINESE 427 or consent of instructor. (CHINESE 526 is not a prerequisite to CHINESE 527.)

528 Chinese Language in Contexts
Explores aspects of Chinese language as studied in traditional Chinese linguistics, historical linguistics, sociolinguistics, and Chinese dialectology. Topics include historical sources, traditional divisions, formation of the standard dialect (Mandarin), social variations and geographical distributions. Prerequisites: CHINESE 375 and 427 or consent of instructor. Conducted in Chinese.

536 Pre-Modern Vernacular Literature
Extensive reading in major pre-modern works written in the vernacular language, including short stories and novels. Difficult grammatical patterns and lexical items explained. Prerequisite: CHINESE 427 or consent of instructor.

537 Contemporary Chinese Writers
Readings in Chinese literature since 1950, with emphasis on socially concerned writers from both the People’s Republic of China and Taiwan. Includes selections in the original Chinese, and, for comparison, works written in, or translated into, English. Prerequisite: CHINESE 427 or consent of instructor.

552 Readings in Chinese Historical Texts
Advanced readings in pre-modern historical texts. Content, convention, and styles of various types of Chinese historical writings introduced. Thorough analysis of texts and Chinese historiographical and philological problems emphasized. Participation in reading, translation, and interpretation. Prerequisite: CHINESE 451 or consent of instructor.

555 Masterpieces of Classical Chinese Poetry
Critical reading and appreciation of selections from major anthologies and authors of various poetic genres written in Classical Chinese from the Zhou dynasty to the present. Prerequisite: CHINESE 451 or consent of instructor.

556 Masterpieces of Classical Chinese Prose
Critical reading and appreciation of selections from the major literary language prose forms written in pre-modern China. Includes historical and philosophical writings, rhymed prose (fu), literary criticism, the short story (chuanqi), and neoclassical essays. Prerequisite: CHINESE 451 or consent of instructor.

570 Research in Chinese Source Materials
Introduction to basic research tools necessary for the study of Chinese primary sources, including dictionaries, biographical and geographical references, indices, bibliographies, calendars, etc. Includes philological problems and exercises in use of source materials. Prerequisite: CHINESE 450 or consent of instructor.

575 Syntactic Structures of Chinese
The general nature of Chinese syntax: Mandarin in particular. Analysis of major syntactic constructions of Mandarin. Issues in Chinese linguistics. Topics of controversy on Mainland China before the Cultural Revolution. Prerequisites: two years of Mandarin or Cantonese and CHINESE 375 or consent of instructor.

576 History of the Chinese Language
Historical survey of the nature and development of Chinese grammatical and phonological structures in three stages: Archaic, Ancient, and Modern. Ability to use source materials in Chinese linguistics developed. Prerequisite: CHINESE 375 or consent of instructor.

577 Chinese Dialectology
Introduction to Chinese dialectology, focusing on geographical distribution and historical development of modern Chinese dialects. Systematic survey of phonological, lexical, and syntactic structures of the seven major Chinese dialectal groups. Reconstruction of the phonological systems of old Chinese, ca. 10th century B.C. and Middle Chinese, ca. 7th century A.D., based on comparative study of modern Chinese dialects. Prerequisite: CHINESE 375 or consent of instructor.

580 Methodology: Teaching Chinese as a Foreign Language I
Introduction to theory and research related to Chinese and other foreign language teaching methods with the emphasis on their application to Chinese teaching. Other topics include language pedagogy, lesson planning, teaching techniques, material development, testing, and teacher development. Prerequisite: consent of instructor.

581 Methodology: Teaching Chinese as a Foreign Language II
Examines research and significant issues concerning Chinese language teaching and learning, and their implications for classroom instruction. Topics include language acquisition, inter-language and error correction, testing and assessment, culture and language learning, heritage learners, learning strategies, use of technology. Prerequisite: CHINESE 580 or consent of instructor.

626 Expository Writing
Intensive study of the basic principles of composition in Chinese, and training in the writing of expository essays for practical purposes. Closely supervised writing of weekly compositions, which may include translation of English texts into Chinese. Clarity, precision, correctness, and good organization emphasized. Topics selected by students in consultation with the instructor. Prerequisite: CHINESE 526 or 527 or the equivalent, or consent of instructor.

660 Problems and Methods in Translation
Training in the translation of Chinese literature; familiarization with appropriate translation theories, reference works, dictionaries, and other translator’s tools. Selections from various literary genres, including classical poetry, modern fiction, ethnic minority folklore; theory and practice of English translators of Chinese. Discussion of specific problems in Chinese-English translation. Emphasis
Civil and Environmental Engineering

Graduate Faculty

Richard Palmer, Professor, Head of the Department of Civil and Environmental Engineering and Graduate Program Director, B.S., Lamar, 1972; M.S., Stanford, 1973; Ph.D., Johns Hopkins, 1979.


Sanjay Arwade, Assistant Professor, B.S.E., Princeton, 1996; M.S., Cornell, 1999; Ph.D., 2002.

Sergio Brena, Associate Professor, B.S., Universidad Iberoamericana, 1989; M.S., Texas at Austin, 1990; Ph.D., 2000; E.I.T.

Casey Brown, Assistant Professor, B.S., Notre Dame, 1993; M.S., Massachusetts at Amherst, 1994; Ph.D., Harvard, 2004.

Ching-Shung Chang, Professor, B.S., Chen Kung University, Taiwan, 1969; M.S., South Carolina, 1973; Ph.D., California at Berkeley, 1976; P.E.

Scott A. Civjan, Associate Professor, B.S.C.E., Washington University, 1989; M.S., Texas at Austin, 1995; Ph.D., 1998; P.E.


Don J. DeGroot, Professor, B.S.C.E., Concordia, 1983; M.S.C.E., Massachusetts Institute of Technology, 1985; Sc.D., 1989; P.E.

Sarina J. Ergas, Associate Professor, B.S., Humboldt State, 1988; M.S., California at Davis, 1990; Ph.D., 1993; P.E.

Song Gao, Assistant Professor, B.S., Tsinghua University, China, 1999; M.S., Massachusetts Institute of Technology, 2002; Ph.D., 2005.

William H. Highter, Professor, B.S.C.E., B.S., Geol., Notre Dame, 1967; M.S.C.E., Purdue, 1969; Ph.D., 1972; P.E.

Carlton L. Ho, Associate Professor, B.S., Stanford, 1976; M.S., 1980; Ph.D., 1985; P.E.

Michael A. Knodler, Jr., Assistant Professor, B.S.C.E., Massachusetts at Dartmouth, 1999; M.S.C.E., Massachusetts at Amherst, 2002; Ph.D., 2004.


Alan J. Lutenegger, Professor, B.S.Con.E., Iowa State, 1975; M.S.C.E., 1977; Ph.D., 1979; P.E.

Daiheng Ni, Assistant Professor, B.S.M.E., China, 1991; M.S.M.E., 1994; M.S.C.E., 2001; M.S.I.E., 2003; Ph.D., Georgia Institute of Technology, 2004.

David W. Ostendorf, Professor, B.S.E., Michigan, 1972; S.M., 1978; Sc.D., Massachusetts Institute of Technology, 1980; P.E.

Chul Park, Assistant Professor, B.S., Yeungnam, South Korea, 2000; M.S., Virginia Polytechnic Institute and State University, 2002; Ph.D., 2007.


David A. Reckhow, Professor, B.S., Tufts, 1977; M.S., Stanford, 1978; Ph.D., North Carolina, 1984; E.I.T.

Erik Rosenfeldt, Assistant Professor, B.S., Washington University, 1999; M.S., Duke, 2003; Ph.D., 2007.

John E. Tobiason, Professor, B.S.C.E., New Hampshire, 1976; M.S.E.E., North Carolina, 1979; Ph.D., Johns Hopkins, 1987; P.E.

Adjunct/Associate Faculty

Peggi Clouston, Associate Professor of Natural Resources Conservation.

Donald Fisher, Professor of Mechanical and Industrial Engineering.

David Noyce, Adjunct Faculty.

The Civil and Environmental Engineering Department offers the M.S. and Ph.D. degrees in Civil Engineering and the M.S. in Environmental Engineering. The Environmental Engineering Program and the corresponding degree requirements are described elsewhere in this Bulletin under the corresponding heading.

Degree Concentrations in Civil Engineering

The Civil and Environmental Engineering Department has sponsored research and academic programs in the following areas:

1. Environmental and Water Resources Engineering
2. Geotechnical Engineering
3. Structural Engineering and Mechanics
4. Transportation Engineering
Master’s Degree Requirements

Course Requirements
A minimum of 30 graduate credits is required for the M.S. degree. Of these credits no more than nine can be outside of the department, no more than six may be transferred from outside of the university, no more than six credits of Independent Study (CE-ENGIN 696) may be counted toward the degree, and at least 12 credits must be earned in 600- to 800-level courses (six credits of project or thesis may be applied to this requirement). Requirements for specific courses vary among programs. The Transportation Engineering Program requires CE-ENGIN 509, 511, 516, and 695. The Geotechnical Engineering Program typically requires CE-ENGIN 620, 622, 623 and a geosciences elective. The Structures Program requires CE-ENGIN 536, 541, 542, 549, 605, and 630. Course requirements for the Environmental and Water Resources Engineering Program are the same as those for the M.S. in Environmental Engineering and are detailed elsewhere in this Bulletin under the corresponding heading. Environmental, Structural and Geotechnical Engineering programs also require one credit of seminar.

Thesis/Project Option
Students not electing the Professional Practice option do either a thesis or a project under the guidance of a thesis/project committee chaired by the adviser. The thesis or project committee administers the student’s General Examination which consists of material presented in the thesis or project report and general knowledge in the student’s area of specialization.

Professional Practice Option
All programs in the department (Environmental, Geotechnical, Structural, and Transportation) offer a Professional Practice option for the M.S. degree. The Professional Practice option stresses practical experience and is designed for students with a bachelor’s degree in engineering who are interested in careers in practice, including consulting engineering firms, government agencies, industries, and water or wastewater utilities or authorities. Students in all areas will work together on different aspects of an engineering project (CE-ENGIN 679). The Professional Practice option is a fast-paced program that allows students to complete their degree requirements in nine months, but must be initiated in the Fall semester, and is limited to those students who are providing their own financial support. The requirements of the Environmental and Water Resources Engineering Program are the same as those for the M.S. in Environmental Engineering and are listed elsewhere in this Bulletin under the corresponding heading. For the Geotechnical Engineering Program, students must take a minimum of four Geotechnical Engineering graduate-level courses, 694 (seminar), a geosciences elective, plus four approved graduate-level elective courses. For the Structural Engineering Program, students must take: CE-ENGIN 509, 511, 516, 668, 679, 695 (seminar) along with four approved elective courses chosen among graduate-level transportation courses.

General Examination
All candidates must pass a general examination conducted by a committee of at least two graduate faculty members.

Information on the requirements for the Master of Science Degree in Civil Engineering is available from the website: www.ecs.umass.edu/ceel; email address: ceedgrad@ecs.umass.edu.

Master of Science in Civil Engineering/Master of Business Administration

For those students interested in an interdisciplinary education that will provide them with a strong foundation in business, a solid background in civil engineering, and an in-depth research or project experience, the College of Engineering and the Isenberg School of Management offer an M.S.C.E./M.B.A. dual master’s degree. In this 73-credit program (42 in Management and 31 in Engineering), students typically complete the two degrees in three years of study, and most of the required M.B.A. coursework (33 credits) in the first year. During the second and third years, students take a total of 31 credits in Engineering (10-13 core course credits, 12-15 elective credits, and a 6-credit thesis or project) as well as an M.B.A. practicum. Applicants must meet the respective admission standards for each program. The GMAT is required for the M.B.A. and the GRE is required for the M.S.C.E. degree. Students submit only one application, which is reviewed by both programs. Applicants must be accepted to both programs to enter the M.S.C.E./M.B.A. dual degree program.

Requirements for the Doctor of Philosophy Degree

Course requirements for the Ph.D. degree vary according to the degree concentration selected by the student and the student’s dissertation committee.

There are no formal course requirements for the Ph.D. degree; however, a minimum of 12 credits of coursework must be taken beyond the M.S. degree. The student’s course of study, including both technical and non-technical courses as well as the dissertation topic, is determined by the student and the Dissertation Committee. Requirements for the degree of Doctor of Philosophy concerning admission, residency, the preliminary examination, the dissertation, and the final examination are specified by the Graduate School elsewhere in this Bulletin.

A brochure containing detailed information on the requirements for the Doctor of Philosophy in Civil Engineering is available from the Civil Engineering Graduate Program Director.

Additional requirements for a Ph.D. degree with a concentration in Environmental and Water Resources Engineering can be found in this Bulletin under the heading for the Environmental Engineering Program.

All courses carry 3 credits unless otherwise specified.

509 Transportation Systems Analysis
Introduction to transportation systems analysis and modeling as applied to the urban transportation planning process, multiple transportation modes, and the larger metropolitan environment. Prerequisite: CE-ENGIN 310.

510 Public Transportation Systems
Relationship of public transportation to technological innovation; financing and regulation; supply, demand, and price considerations; performance evaluation; routing and scheduling; application of microcomputers; and project planning and design. Prerequisite: CE-ENGIN 310 or equivalent.

511 Traffic Engineering
Characteristics of traffic system components including drivers, vehicles, and roadways. Fundamental principles of traffic flow, operations, and controls. Traffic demand analysis and highway capacity analysis. Traffic engineering studies involving volume, speed, travel time, and delay.
515 **Pavement Design**
Design procedures for flexible highway pavement structures including AASHTO and the Asphalt Institute methods; determination of design parameters for mixed traffic, materials, and performance characterization; reliability of design. A design project, written engineering report, and oral presentation. Prerequisites: CE-ENGIN 310 and 320.

516 **Transportation Design**
Highway location and geometric design principles for streets and highways with emphasis on roadway safety. Includes state-of-the-art design policies and current research findings. AutoCAD and transportation design computer software used for class assignments and the class project. Students work in design teams on transportation design projects with an emphasis on creative design and problem solving through transportation systems management techniques. Prerequisite: CE-ENGIN 310.

518 **Intelligent Transportation Systems**
A review of intelligent transportation systems, technologies, and user services with an emphasis on the operation of advanced public transportation systems (APTS) and technologies including wire and wireless communication, sensors, automated vehicle location, information processing and other technological applications; user services including traffic signal priority control, en-route and pre-trip traveler information, electronic payment, and management and operations as they pertain to public transit and paratransit services in both large metropolitan areas and small urban and rural communities. Prerequisite: CE-ENGIN 310 or consent of instructor.

523 **Ground Improvement and Geoconstruction**
Engineered ground improvement; slurry trenches, dewatering systems; grouting; deep dynamic compaction, vibro compaction; stone columns; wick and vertical sand drains. Emphasizes basic principles and design methodology. Prerequisite: CE-ENGIN 320.

525 **Environmental Geotechnology**
Geotechnical engineering related to environmental issues. Topics include site investigation techniques for environmental drilling; site instrumentation procedures; groundwater sampling methods; methods of evaluating in situ and laboratory hydraulic conductivity for use in design; design of containment facilities; and current methods for addressing subsurface environmental problems. Written engineering reports. Prerequisite: CE-ENGIN 320.

535 **Matrix Analysis of Structures**
Development and use of flexibility and stiffness methods of matrix analysis for determinate and indeterminate structures. Use of computer programs for the analysis of simple structures. Prerequisite: CE-ENGIN 331.

541 **Structural Dynamics**
Behavior of structures and structural components exposed to time dependent loadings. Vibrations of systems; descriptions of dynamic systems. Prerequisites: CE-ENGIN 331 and MATH 331.

542 **Advanced Topics in Steel Design**
Expands on the basic design methods of CE-ENGIN 434. Includes non-compact and slender beam girder design, composite steel and concrete member design, overall structure considerations, and other topics, some extending on previous class descriptions and others as entirely new concepts. Prerequisite: CE-ENGIN 434.

549 **Structural Stability**

560 **Hydrology**
A quantitative account of elements of the hydrologic cycle, including precipitation, evapotranspiration, snowmelt, infiltration, and surface runoff. Basic laws from such various disciplines as physics, chemistry, meteorology, astronomy, fluid mechanics, and thermodynamics combined into simple mathematical descriptions used in the hydrologic design process. Prerequisites: CE-ENGIN 357 and M&I-ENG 230 or equivalent.

561 **Open-Channel Flow**
A rigorous mathematical study of flow in open channels, including uniform, gradually varied, rapidly varied, tidal, and flood flows. Analytical and numerical solutions to the governing conservation equations developed with the aid of the computer, and stable channel design addressed. Prerequisite: CE-ENGIN 331.

572 **Environmental Engineering Analysis**
With lab. Basic concepts of physical and chemical parameters used to measure water quality in natural aquatic systems and in treatment plants. Laboratory covers important water analysis techniques including gravimetric, volumetric, colorimetric, and alkalinity-acidity titration. Prerequisite: CE-ENGIN 370 or consent of instructor.

573 **Environmental Engineering Microbiology**
With lab. Microbiological and biochemical properties of microorganisms important in environmental engineering practice. General fundamentals of microbiology and their application to drinking water treatment and distribution, water pollution control, and natural systems. Prerequisite: CE-ENGIN 371.

575 **Advanced Solid and Hazardous Waste Management**
Introduction to municipal solid waste management and hazardous waste management. Relationship between the properties of wastes, the techniques and hardware used for waste handling and processing, and the ultimate disposal (containment) of waste and other residual materials. Remediation of contaminated areas. Design of systems for the management and disposal of solid and hazardous wastes subject to economic...
factors, safety, reliability, and ethical and social implications. Prerequisite: CE-ENGIN 371.

577 Surface Water Quality Modeling

579 Air Quality
The sources, fate, transport, and control of the major categories of air pollutants. Topics include sources and characteristics of air pollutants; atmospheric chemistry and physics; effects of air pollutants on human health and the environment; global climate change; atmospheric dispersion modeling; and design of systems for the control of gaseous and particulate air pollutants. Prerequisite: CE-ENGIN 371.

605 Finite Element Analysis
Introduction to finite element method in engineering science. Derivation of element equations by physical, variational, and residual methods. Associated computer coding techniques and numerical methods. Applications. Prerequisites: programming ability, ordinary differential equations, basic matrix algebra. Same as M&I-ENG 605.

610 Transportation Analysis and Planning
Advanced topics in transportation planning including application of the four-step planning process with transportation model analysis software, econometric model estimation and analysis, use of statistical software with transportation survey data, activity analysis, and various other transportation planning and economics topics. Prerequisite: CE-ENGIN 509.

611 Transportation Investment and Pricing Analysis
The application of economic principles to transportation investment and pricing analyses; emphasis on highway and public transportation in urban settings. Prerequisites: ECON 103, CE-ENGIN 310 or equivalents.

612 Transportation Planning and Policy Analysis
An intensive survey of current issues in transportation planning and policy. Prerequisite: CE-ENGIN 310.

614 Advanced Concepts in Traffic Safety
Advanced topics in traffic safety including both motorized and nonmotorized modes with an emphasis on the science of safety. Includes safety management systems, human factors, data needs and limitations, identification of hazardous locations, diagnosis of problems, development of countermeasures, road safety audits/reviews, and crash reconstruction. Safety modeling using the Interactive Highway Safety Design Modules and other modeling platforms incorporated as applicable. Several traffic engineering software packages also used to demonstrate relationships between traffic safety and operational efficiency.

620 Soil Behavior and Shear Strength
Fundamentals of soil behavior, soil mineralogy and structure, soil stresses, stress-strain-strength behavior of cohesionless and cohesive soils, consolidation behavior of saturated soils, and determination of consolidation and strength parameters in practice. Prerequisite: CE-ENGIN 320.

622 Geotechnical Materials Testing
Experimental investigation of the fundamental aspects of soil behavior including classification, index and engineering properties. Emphasizes experimental determination of the consolidation and stress-strain-strength characteristics of soils for design. Experiments include: classification and basic index tests, hydraulic conductivity, consolidation, triaxial tests and direct simple shear. Prerequisites: CE-ENGIN 320 and 620. Credit, 4.

623 Advanced Foundation Engineering
Geotechnical analysis and design related to shallow and deep foundations. Topics include: site investigations, bearing capacity theory; analysis and design of shallow spread footings, isolated pads and mat foundations; total stress and effective stress design of drilled shaft and driven pile foundations. Emphasis on the presentation of designs in a formal geotechnical report. Prerequisite: CE-ENGIN 620.

625 In Situ Testing Techniques in Geotechnical Engineering
The theoretical and practical aspects of in situ tests in geotechnical engineering. Tests discussed include: Standard Penetration Test, Field Vane, Piezocene, Dilatometer, Pressuremeter, and Borehole Shear. Emphasis on use of in situ test results for determining engineering properties of soil for design. Prerequisite: CE-ENGIN 320. Credit, 4.

630 Advanced Solid Mechanics
Unified treatment of the analysis of solids. Consideration of continuity, mechanical energy, stress and strain. Application to elasticity, thermoelasticity, and plasticity. Same as M&I-ENG 630.

631, 632 Civil Engineering Analysis I, II

639 Structural Mechanics of Composite Materials
Types of composite systems. Analytical models of filamentary and laminated materials. Elastic and plastic analysis of structures subject to static or dynamic loadings. Failure criteria of composites, influence of time, temperature, and moisture. Design of composite material systems. Prerequisite: CE-ENGIN 241.

643 Elasticity
General equations of the mathematical theory of elasticity in space. General formulation of basic equations and methods of solution.

646 Seismic Structural Analysis
Principles of engineering seismology, including analysis and design of structures to resist earthquake motions. Prerequisite: CE-ENGIN 541.

660 Subsurface Hydraulics
The transport of water through the unsaturated and saturated zone using rigorous mathematical theory, and analytical and numerical solutions. Topics include hydraulic properties of soils, infiltration, confined and unconfined aquifer flow, consolidations, and well hydraulics.

661 Subsurface Pollution
Transport of contaminants through the unsaturated and saturated zone using rigorous mathematical theory, and analytical and numerical solutions. Topics include the fate and transport of conservative and reactive contaminants in single or multiphase flow fields. Prerequisite: CE-ENGIN 660.

662 Water Resource Systems Analysis
Methods for designing and managing water resource systems, including optimization, uncertainty and reliability analysis, economic and pricing analysis, water demand and drought planning, and facility siting.
analysis. Applications to surface water, groundwater, water distribution, flood control, and water quality control systems.

668 Professional Engineering Practice Concepts
Discussion of the concerns and challenges of a professional engineer including project management, writing and presentation skills, negotiations, finance, ethics, organizational structure, and risk and liability. Credit, 2.

670 Transport Processes in Environmental and Water Resources Engineering
Transport of fluids and constituents in environmental systems. Advection, diffusion, dispersion, zero and first-order reaction kinetics and equilibrium partitioning processes. Mathematical models solved with analytical and numerical methods. Multi-scale application to surface and subsurface waters and the atmosphere.

671 Environmental Biological Processes
Overview of microbiology fundamentals for environmental engineering, and examination of the biological processes used in water and wastewater treatment, bioremediation and biological air pollution control. Laboratory experiments illustrate important concepts in environmental biological processes. Credit, 4.

672 Physical and Chemical Treatment Processes
Lecture and lab. Fundamentals of physical and chemical processes used in environmental engineering. Applications include processes used in the treatment of drinking waters, industrial waters and wastewaters, municipal wastewaters, and hazardous waste remediation. Credit, 4.

679 Engineering Project
For students enrolled in the M.S. Professional Practice option. Principles and techniques involved in the design of an engineered facility. May not be taken by those selecting CE-ENGIN 689 or 699. Credit, 1-5.

680 Water Chemistry
Chemical equilibrium principles of acids-bases, dissolution-precipitation, oxidation-reduction, and complexation applied to understanding the chemistry of surface waters, groundwaters, and water and wastewater treatment. Credit, 4.

689 Master’s Project
Research carried out and reported under supervision of student’s adviser as partial fulfillment of requirements for Master’s degree in civil engineering or Master’s degree in environmental engineering. May not be taken by those taking CE-ENGIN 679 Engineering Report or CE-ENGIN 699 Master’s Thesis. Credit, 1-6.

691, 692 Environmental Engineering Seminar
Presentation by the graduate student of selected current literature and research. Visiting lecturers. One class hour. Credit, 1.

693, 694 Geotechnical Engineering Seminar
Research presentation by graduate student and faculty. Visiting lecturers. Credit, 1.

693B Structural Engineering Seminar
Research presentation by graduate students and faculty. Visiting lecturers. Credit, 1.

695 Transportation Engineering Seminar
Visiting lecturers. Research presentations by graduate students and faculty. Discussion of current transportation topics. Credit, 1.

696 Independent Study
Credit, 1-6.

697 Special Topics

699 Master’s Thesis
Research carried out and reported under supervision of student’s research adviser as partial fulfillment of requirements for Master’s degree in civil engineering or Master’s degree in environmental engineering. May not be taken by those taking CE-ENGIN 679 Engineering Project or CE-ENGIN 689 Master’s Thesis. Credit, 1-6.

722 Computer and Numerical Methods in Geomechanics
Computer and numerical methods in soil mechanics, stabilization, consolidation, seepage, slope stability, stress distribution, and finite element analysis.

724 Soil Dynamics
Dynamic behavior of soils with application to problems of seismic survey, measurement of dynamic soil properties, foundation vibrations and performance under earthquake loading.

728 Geotechnical Instrumentation
Design, selection, and use of instrumentation for geotechnical engineering purposes. Laboratory and field instrumentation considered. Topics include: purpose of instrumentation, planning projects, procurement of instruments and services, measuring devices, and examples of applications. Lab demonstration.

770, 771 Environmental and Water Resources Engineering Design
Selection, evaluation, and design of environmental and water resources engineering systems. Corequisites: CE-ENGIN 671 and CE-ENGIN 672. Credit, 2.

772 Instrumental Methods in Environmental Analysis
Principles and techniques of instrumental chemical analysis, including molecular and atomic spectrophotometry, gas chromatography, mass spectrometry, and electroanalytical methods. Emphasis on solving analytical problems of trace pollutants in water and wastewater. Prerequisite: CE-ENGIN 572 or equivalent.

774 Processes at the Particle-Water Interface
An analysis of physical and chemical aspects of the behavior of particles in aquatic systems. Topics include surface chemistry, adsorption, nucleation, precipitation, dissolution, forces between interacting surfaces, and the hydrodynamics of particle transport and deposition. Prerequisite: CE-ENGIN 672. Corequisite: CE-ENGIN 680 or consent of instructor.

776 Bioremediation of Contaminated Soils and Ground Water
Application of biological processes as they are currently used to remediate conventional, industrial, and hazardous wastes. Fundamentals of microbial physiology and metabolism as applied to the major groups of hazardous chemicals. Theory and design of remediation technologies. Prerequisite: CE-ENGIN 671 or equivalent.

777 Drinking Water Indicator Organism and Pathogen Microbiology
Focus on sources, epidemiology, measurement, and indicator organisms for major groups of pathogens. Appropriate management strategies and treatment technologies for prevention of pathogen transmission also covered.

780 Mechanics of Materials
Advanced topics related to mechanical behavior of structural materials.

899 Doctoral Dissertation
Credit, 18.
Graduate Faculty


Elizabeth E. Keitel, Associate Professor and Graduate Program Director, A.B., Smith, 1969; Ph.D., North Carolina at Chapel Hill, 1977.

Brian W. Breed, Associate Professor, B.A., Emory, 1994; Ph.D., Harvard, 1999.

Debbie Felton Miller, Associate Professor, B.A., California at Los Angeles, 1986; M.A., North Carolina at Chapel Hill, 1990; Ph.D., 1995.


Anthony Tuck, Assistant Professor, B.A., Haverford, 1992; Ph.D., Brown, 1996.

Adjunct/Associate Faculty

Carlin Barton, Professor of History.

Laetitia LaFollette, Associate Professor of Art History.

The degree of Master of Arts in Teaching (M.A.T.) may be earned in Latin and Classical Humanities. The program comprises coordinated studies in classical languages and literatures, the methodology of teaching the Latin language, Latin literature, and classical humanities, courses in education, prepractica, and practica. Students in the program gain practical experience by teaching courses in Latin at the university and at cooperating middle schools and high schools in Massachusetts. They also participate in activities of local, state, and regional classical associations. Graduates of the program receive Massachusetts Initial Licensure to teach Latin and classical humanities in grades 5-12.

A total of 56 credits is required, distributed as follows: 19 credits in Latin and classical humanities; 27 credits in methodology and education; 12 credits in pre-practicum and practicum. The program requires two full years of study. Additional summer study in Italy is recommended, and scholarships are available from the department and other sources.

Candidates for admission to the program must have a strong undergraduate major in Latin or classics with an emphasis on Latin, including at least four upper-level courses in Latin, 12 credits of classical Greek, and 6 credits of Greek and Roman history. An undergraduate minor in a Romance language, particularly Spanish, is highly recommended, since many schools are looking for teachers who can teach both Latin and Spanish. Applications from minorities are very welcome.

The New England Latin Placement Service and other state, regional, and national Latin Placement services are available to graduates of the program.

All courses carry 3 credits unless otherwise specified.

Latin Education

500U Student Teaching
Credit, 6-15.

Latin

505 Oral Interpretation of Latin Literature
Practice in expressive reading of Latin texts. One class hour. Credit, 1.

591 Medieval Latin
A survey of the many styles and genres comprising Medieval Latin with attention paid to developments in syntax and morphology.

607 Teaching the Latin Language
Methods and materials for teaching the Latin language in secondary schools. Combined with prepracticum: observation and practice at high school level.

608 Teaching Latin Literature
Methods and materials for teaching Latin literature in secondary schools. Combined with prepracticum: observation and practice at high school level.

612 Advanced Prose Style
Analysis and imitation of the styles of major Latin prose authors from Cato through Tacitus.

616 Advanced Latin Grammar
Study of grammatical system of classical Latin.

620 History of the Latin Language
An overview of the major phonological and morphological developments of Latin.

625 Vergil’s Aeneid
Close reading of selections from Vergil’s Aeneid. Close analysis of texts, style, structure, content, and context of the work.
630 Satire
Reading of extensive selections from the works of Juvenal, Horace's *Satires*, and Petronius. Close analysis of texts, style, structure, content, and context of their works.

635 Lyric and Elegy
Reading of extensive selections from Latin lyric and elegiac poetry, including Catullus, Horace, Tibullus, Propertius, and Ovid. Close analysis of texts, style, structure, content, and context of their works.

640 History or Biography
Reading of extensive selections from the works of Livy, Caesar, Sallust, Tacitus or Suetonius. Close analysis of texts, style, structure, content, and context of their works.

645 Drama
Reading of extensive selections from Latin dramas of Plautus, Terence and Seneca. Close analysis of texts, style, structure, content, and context of their works.

650 Cicero's Orations
Reading of extensive selections from Cicero's orations. Close analysis of texts, style, structure, content, and context of these works.

691 Seminar: History of Latin Literature
Readings and background of selections from the beginnings to the Middle Ages.

692 Seminar: Instructional Planning and Assessment
Guidance for teaching assistants in teaching Latin at the University. *Credit, 1.*

696 Independent Study
Directed study of selected Latin texts. *Credit, 1-6.*

698A Pre-Practicum
Observation and related pre-practicum experiences in a variety of schools.

699 Master's Thesis

Graduate Faculty


Benjamin Bailey, Associate Professor, B.A., Brown, 1987; M.A., California at Los Angeles, 1996; Ph.D., 1999.

Mari Castañeda, Associate Professor, B.A., California at Los Angeles, 1993; Ph.D., California at San Diego, 2000.


Henry Geddes Gonzalez, Associate Professor, B.A., Oberlin, 1978; Ph.D., Texas, 1989.


Claudio Moreira, Associate Professor, B.A., Universidad de Campinas, Brazil, 1999; M.A., Illinois, 2002; Ph.D., 2007.


Demetria Shahbazz, Assistant Professor, B.A., Houston, 1995; M.A., Alabama, 2000; Ph.D., 2005.


Emily West, Assistant Professor, B.A., McMaster, Canada, 1997; M.A., Pennsylvania, 2000; Ph.D., 2004.

Adjunct/Associate Faculty

Barton Byg, Professor of German and Scandinavian Studies.

Catherine Portuges, Professor of Comparative Literature.

The Department of Communication offers programs leading to the M.A. and Ph.D. degrees. The M.A. degree requires 30 credits of coursework and a six-credit thesis, for a total of 36 credits. The Ph.D. degree requires a minimum of 60 credits beyond the Bachelor’s degree plus a research tool (minimum six credits, for a total of 66 credits) plus credits for the dissertation. Plans of study conforming to specific program requirements are prepared individually in consultation with faculty advisers.

Applicants to the graduate program should meet all requirements for admission to the Graduate School and should have a good undergraduate background in communication or expect to take additional coursework without graduate credit or, in some cases, with credit. Applicants are encouraged to submit writing samples directly to the department.

The graduate programs in Communication deal with communicative processes at the levels of culture, media, and representation; individuals, professionals, and groups; and institutions and social structures. Much of the faculty’s work takes place at the intersections of these levels of analysis. As committed teachers and active researchers, their perspectives and methods encompass social science, cultural, and professional orientations. The faculty develop connections between theory and practice in order to advance knowledge in the field, to promote informed public debate, and to teach students how to think.
Consistent with our understanding of graduate study, many of the most important courses are topical seminars (offered at the 600, 700, and 800 levels), the content of which varies from semester to semester. Recent offerings include: Class Cultures; Communication and Culture; Communication and Moral Orders; Issues in Information Technology; Coordinated Management of Meaning Theory; Critical Pedagogy; Information Society; Cultural Theory of Stuart Hall; Phenomenology and Communication; Cultural Industries in Latin America; Documentary Film; Ethnographic Approaches in Communication; Experience, Identity and Interaction; Feminist Film Theory; Gender and Communication; Global Culture and Communication; Intercultural Communication; Media Effects; Media Historiography; Mediation; Music, Culture and Communication; Political Economy of Media Industries; Politics of Popular Culture; Politics of Sexual Representation; Postmodernism and Media; Film Theory; Cultural Discourse; Political Economy of Media Industries; Media Literacy; Introduction to Semiotics; Asian Popular Cinema; Field Research in Cultural Studies, American Rhetorical Theory. For a more complete description of available courses, please consult the current semester schedule or the departmental Graduate Handbook.

**Note:** The Department of Communication does not offer graduate degrees in Journalism.

**All courses carry 3 credits unless otherwise specified.**

### 514 Social Uses of Language
Nature of speech and language as a social practice. Meanings of language use as formative of social and cultural life.

### 546 Film Theory and Criticism
Basic theories of film communication; various film modes and structures. Development of bases for evaluation of films according to communicative and aesthetic values.

### 611 Introduction to Theories and Concepts of Human Communication (1st sem)
Process of theory construction, theory testing, and paradigmatic change in communication. Theory relationships among normative and scientific studies. Theory types and their causal mechanisms, units of analysis, and appropriate research methodologies. Major theories compared in terms of their theoretical and metatheoretical bases. Required of all Communication graduate students; taught in fall.

### 613 Introduction to Theories of Social Interaction
Scholarly literature of interpersonal communication, including historical development and conceptualization, survey of current research and theoretical literature, and critique of methodologies and lines of development. Emphasis on reciprocal causal relationships between communication patterns and nature of the social order, and implications of this relationship for individual action and cultural change. Required of students specializing in this area.

### 620 Qualitative Methods in Research (1st sem)
Approaches to research, conceptualizations of problems, questions, and methodologies for the field of communication, broadly defined with an emphasis on qualitative, interpretive, feminist, critical, and cultural approaches. Introduction to methodological specialties of departmental faculty. Required of all Communication graduate students.

### 621 Quantitative Methods in Research (1st sem)
Introduction to the structure, process, and logic of quantitative empirical research in communication. Topics include research design, measurement, descriptive and inferential statistics, and basic multivariate analysis. Students expected to acquire an understanding of the ability to critique various methodological approaches and techniques. Fundamental concepts of data analysis; preparation for more advanced courses. Required of all Communication graduate students.

### 641 The Cinema as a Social Force
Effective and reflective roles of film in society. Emphasis on relationship of society to structure, development, function, and effects of the motion picture.

### 665 Contemporary Rhetorical Theory
Review of major contemporary approaches to rhetorical theory. Includes formalism, structuralism, phenomenology, Marxism, poststructuralism, psychoanalysis, and cultural studies.

### 691B Theories of Mass Communication
Foundation course in the history and philosophy of various approaches to mass media and technology. Covers mainstream research in direct, indirect, and limited effects models. Required of students specializing in this area.
699 Master’s Thesis
Credit, 6.

712 Political Communication
Diffusion of persuasive political communications through standard and created media. Examination of campaign techniques (i.e., research on issues and themes, electorate polling, thematic media approaches, campaign strategies) in management and administration.

720 Social Impact of Mass Media
Review of literature on social impact of mass media. Primary focus on television. Seminar: lectures and student critique of reading materials. Topics: media violence and human aggression; media socialization; mass education; mass persuasion; effects on entertainment.

722 Media Systems and Institutions
Analysis of institutionalization of mass communication process in society, including organizational entities creating message systems and nature of resultant information structures.

733 Cultivation Analysis
The theoretical assumptions and methodological procedures of cultivation analysis; how the theory developed; design and execution of cultivation studies; thorough guided secondary analysis of existing databases. Prerequisite: consent of instructor.

750 Language and Society
Relationships between language use and aspects of social structure and process. Study of origins and functions of language diversity; ways that language varieties affect communication, social identity, and social evaluation. Emphasis on social class, gender, race, and ethnicity.

781 Ethnography of Communication
Exploration of ethnographic inquiry and some of its possibilities for creating insights into human communication. Basic philosophy, theory, and methodological issues.

791 Audience Research and Cultural Studies
Focus on the relations between media (television, film, newspapers, etc.) and audiences, concentrating on theoretical and empirical work drawn from a cultural studies tradition.

796 Independent Study
Independent study in special subjects. Credit, 1-3 each semester; maximum credit, 6.

821 Seminar in Mass Communications
Revolving topics.

841 Seminar in Film
Revolving topics.

860 Seminar in Rhetorical Theory
Revolving topics.

891 Seminar in Social Interaction
Revolving topics.

899 Doctoral Dissertation
Credit, 12.

Communication Disorders
Website: www.umass.edu/sphhs/comdis/

Graduate Faculty

Jane A. Baran, Professor and Chair of the Department of Communication Disorders, B.A., Massachusetts at Amherst, 1972; M.A., 1974; Ph.D., Purdue, 1979.

Karen S. Helfer, Associate Professor and Graduate Program Director, B.S., Boston University, 1982; M.A., Indiana, 1983; Ph.D., Northwestern, 1988.

Mary V. Andrianopoulos, Associate Professor, B.S., Vermont, 1991; M.A., Utah, 1993; Ph.D., 1998.

Frances A. Burns, Assistant Professor, B.A., North Carolina at Wilmington, 1986; M.S., North Carolina at Chapel Hill, 1992; Ph.D., Massachusetts at Amherst, 2004.


Jacquie Kurland, Assistant Professor, B.A., New Mexico State, 1987; M.S., New Mexico, 1999; Ph.D., Colorado at Boulder, 2006.

Patricia A. Mercaitis, Associate Professor, B.A., Boston College, 1971; M.A., Massachusetts at Amherst, 1979; Ph.D., 1983.


Charlena M. Seymour, Professor and Senior Vice Chancellor for Academic Affairs and Provost, B.A., Howard, 1965; M.A., Ohio State, 1967; Ph.D., 1971.


Nathaniel A. Whitmal, Assistant Professor, B.S., Massachusetts Institute of Technology, 1986; M.S., Northwestern, 1993; Ph.D., 1997; M.A., Massachusetts, 2004.
Elena Zaretsky, Assistant Professor, B.A., Music Institute, Moscow, Russia, 1989; M.S., Massachusetts General Hospital Institute of Health Professions, 1994; Ph.D., Boston University, 2004.

Adjunct Faculty


Peter Bittel, Speech-Language Pathologist, The Futures Health Group, Amherst, Mass.

Myrna P. Cronen, Speech-Language Pathologist and Clinical Supervisor, Center for Language, Speech and Hearing, University of Massachusetts Amherst.

The Department of Communication Disorders offers programs leading to the M.A. degree in Speech-Language Pathology, the Au.D. degree in Audiology, and the Ph.D. degree.

Master’s Degree Program in Speech-Language Pathology

The curriculum leading to a Master’s Degree in Speech-Language Pathology is designed to provide the academic and clinical preparation necessary for the performance of scientific, competent, professional services provided by speech-language pathologists. The curriculum also allows the student to meet the academic and clinical requirements for the American Speech-Language-Hearing Association’s (ASHA) Certificate of Clinical Competence (CCC) in Speech-Language Pathology and the Massachusetts Board of Education’s requirements for teachers of children with speech, language, and hearing disorders. The program in Communication Disorders is accredited by the Council on Academic Accreditation of ASHA and by the Massachusetts Board of Education. In addition, the department’s Center for Language, Speech, and Hearing is certified by ASHA’s Professional Services Board.

A minimum of 30 graduate credits, including completion of 14 required core courses, is required for the M.A. degree (non-thesis) in Speech-Language Pathology. While all clinical practica must be taken for credit, no more than 6 credits of clinical practicum may be applied to the minimum degree requirements. In most cases, a student will take more than 30 credits before completing the graduate program.

Students who elect to do a Master’s Thesis are required to complete a minimum of 24 graduate credits (plus thesis). The reduction of the number of required credits from that required of those not engaged in thesis work may not, however, compromise students’ completion of required courses in their major area.

Students must also complete a minimum of 375 hours of supervised, direct clinical experience with individuals representing a variety of communication pathologies and ages. Clinical experience is obtained within the university’s Center for Language, Speech, and Hearing and at least two of its many off-campus cooperating programs (hospitals, clinics, schools, community centers, etc.). In order to be eligible for certification by the Massachusetts State Board of Education, students must complete at least 100 of the required 375 clinical hours in an educational setting, and must also achieve a passing score on the Communication and Literacy Skills Test of the Massachusetts Educators Certification Tests (MECT), either before admission to the program or early in their academic program. At least 30 of the required 375 hours must be obtained at the graduate level. In addition, prior to clinical assignment with specific disorders, a student must observe a minimum total of 25 supervised hours of relevant evaluation and management by a clinician holding ASHA certification.

The M.A. degree program typically requires two years of study for those who have completed all undergraduate prerequisites. Those students without the necessary undergraduate background will be required to make up their deficiencies from the undergraduate curriculum and, consequently, may take more than the average amount of time to complete their degree.

Doctor of Audiology (Au.D.) Program

The Au.D. degree program, which allows the student to meet the academic and clinical requirements for the American Speech-Language-Hearing Association’s (ASHA) Certificate of Clinical Competence in Audiology, is a four-year, full-time program. The first three years are in residence on campus, with students completing coursework, on- and off-campus clinical rotations, and a capstone research project. During the fourth year, students are placed in an intensive off-campus residency. All students must complete 17 required core courses (51 credits), 6 credits of non-departmental statistics/research design coursework, and 6 credits of non-departmental electives. Students also must design and complete a 6-credit capstone research project. During this project students work closely with a faculty member to gain experience in planning, conducting, analyzing, and writing up results of a small-scale experiment.

Ph.D. with a Clinical Track Option in Audiology

The Clinical Ph.D. program prepares students to be both clinical audiologists and academicians. Students obtain the clinical skills necessary for the professional practice of audiology as well as the research and scholarship skills required for a career in academia. The Ph.D. with a Clinical Track Option in Audiology is fully accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association (ASHA).

It is anticipated that the Ph.D. with a Clinical Track Option in Audiology will take four to five years to complete. The first three years will be in residence in Amherst, with students completing coursework, predissertation research experiences, and both on- and off-campus clinical rotations. During the fourth year students will be placed in an intensive off-campus residency. The dissertation will be completed during the fourth and fifth years.

Students enrolled in the Ph.D. with a Clinical Track Option in Audiology are required to complete the same core courses as are required of students in the Au.D. program. In addition, they must complete a minimum of 15 credits of minor-area coursework, consisting of a clearly defined area of study outside the Department of Communication Disorders. It may consist of courses entirely within another department, or of courses from different departments that conform to a defined area of study. Students must also complete 6 credits of statistics/research design coursework outside of the department. Information about advising, examination, and the dissertation process can be found in the Doctor of Philosophy (Ph.D.) section below.

Doctor of Philosophy Program

The Doctor of Philosophy program in Communication Disorders provides an education in the methods of scholarship, teaching, and research. A student should attain skills required
for the objective maintenance, dissemination, and creation of basic and applied information in the sciences of communication disorders. Pertinent experiences in the doctoral program include additional study in another field that is related to the understanding of communication disorders, study of the basic methods of scientific investigation, and experience in the activities that are most typical of persons holding a doctoral degree. These experiences include teaching, research, and writing. These skills are considered to elevate previous training and experience in providing clinical services to persons with communication disorders.

The department guidelines for doctoral study consist of procedures for planning a program of study, minimum requirements for a program plan (including course work, research, and teaching), procedures for comprehensive examination, and procedures for a dissertation. This reflects the sequence of the major steps toward obtaining the doctoral degree. Research and teaching experiences may be obtained at any point along this path. The following guidelines were developed by the Department of Communication Disorders so that they would meet the needs of the audiology and speech-language pathology profession and, also, would be consistent with the general policies for doctoral education set forth by the Graduate School of the University of Massachusetts Amherst.

A strong advisory system is maintained for all Ph.D. students in order to aid curriculum, qualifying examination, and dissertation planning. The Ph.D. student must complete graduate level course work in various areas in keeping with the following minimum requirements:

Ph.D. Program Plan Summary

I. Major Area (35 credits, minimum)
   A. The primary focus of the student’s doctoral study and research. Current specialization within either Audiology or Speech-Language Pathology.
   B. Distribution
      1. Courses — within and outside the Department of Communication Disorders as long as they are consistent with the major area. A minimum of 6 credits (excluding independent studies) must be taken within the department. All courses must carry graduate level credits.
      2. Independent Studies — a maximum of 9 graduate credits can be counted toward the major area.
      3. Dissertation Only — a maximum of 18 credits can be counted toward the major area requirement. (The Graduate School requires a minimum of 18 dissertation credits.)

II. Minor Area (15 credits minimum)
   A. A clearly defined field of study that is outside the Department of Communication Disorders.

III. Research Skills (12 credits minimum)
   A. Statistics (6 credits minimum)
   B. Optional: Competency in the use of computers (3 credits)

IV. Teaching Experience
   A. Prior to completion of the dissertation, the student must either: 1) teach one undergraduate course in the Department of Communication Disorders or; 2) participate in team-teaching at least two courses in the Department of Communication Disorders.

At the completion of the majority of course work, the Ph.D. student is given a comprehensive examination consisting of a written and oral portion. The dissertation is undertaken following successful completion of the comprehensive examination.

A dissertation prospectus must be accepted by the student’s dissertation committee prior to the start of the dissertation work, and the completed dissertation must be defended in the form of an oral examination conducted by the student’s committee.

For further information on graduate programs, contact: Department of Communication Disorders, School of Public Health and Health Sciences, 358 North Pleasant St., University of Massachusetts, Amherst, MA 01003-9296; tel. (413) 545-0131.

All courses carry 3 credits unless otherwise specified.

520 Counseling in Communication Disorders
Characteristics and types of counseling in communication disorders; emphasis on client-clinician relationship. Ms. Mercaitis

530 Neurological Bases of Speech, Language, and Hearing
Fundamentals of neuroanatomy and physiology for communicative functions including speech, language, and hearing. Prerequisite: COMM-DIS 211. Ms. Andrianopoulos

540 Introduction to Autism Spectrum Disorders
An overview of causes, characteristics, and assessment and treatment methods pertaining to autism spectrum disorders. Topics include genetic bases, early intervention, academic training, social and life skills development.

550 Nature and Needs of the Hearing Impaired
How impaired ability to communicate affects social, psychological, and educational development of hearing-impaired individuals. Consent of instructor required for non-COMM-DIS majors. Ms. Poissant

560 Language and Learning Disabilities
Learning disabilities associated with physical, psychological, and social etiologies. Problems of language development and cognitive disorders, remedial practices in reading and writing problems, and learning patterns of culturally disadvantaged. Diagnostic assessment and educational processes outlined. Ms. Zaretsky

580 Cognitive Bases of Language Functions
Introduction to neurological and cognitive processes of language comprehension and formulation. Information relevant to the diagnosis of dysfunction in aphasia and other language disorders of adulthood. Ms. Kurland

610 Phonological Disorders
Nature and treatment of phonological disorders. Ms. Velleman

611 Fluency Disorders
Review of major theories regarding evaluation and clinical management of stuttering. Ms. Mercaitis

612 Voice Problems
Voice disorders, organic and functional; symptoms, and principles and techniques of therapy and diagnosis. Prerequisites: COMM-DIS 210 and 211 or equivalents. Ms. Andrianopoulos

613 Language Disorders in Adults I
Underlying neuropathology, theory, clinical characteristics, concomitant conditions, diagnostic measures, prognosis, treatment approaches, and evidence of treatment efficacy related to acquired disorders of language in adults. Prerequisite: COMM-DIS 580 or equivalent. Ms. Kurland

614 Language Disorders in Adults II
Diagnosis and rehabilitation of communicative disorders caused by traumatic brain injury, right hemisphere stroke, and progressive neuropathologies. Prerequisite: COMM-DIS 613. Ms. Kurland

621 Studies in American Dialects
Review of literature and research in American dialectology; emphasis on procedures of diagnosis and treatment for communication
disorders among populations whose speech and language are nonstandard.

624 Motor Speech Disorders
Theory and research related to underlying pathology, salient features, confirmatory signs, and diagnostic and treatment approaches to dysarthrias and apraxia of speech in children and adults. Consent of instructor required. Ms. Andrianopoulos

630 Graduate Research in Communication Disorders
Research strategies and their applications to research problems relating to normal and pathological speech, hearing and language processes. History of research in areas relating to communication disorders; university research resources; role of statistics in speech, hearing and language research problems; evaluation of research. Ms. Velleman

631 Language Disorders in Children I
The study of theories of language and cognitive development as a framework for understanding and describing language behavior resulting from neurological, sensory, cognitive-intellectual and psycho-emotional deficits. Prerequisite: COMM-DIS 401 or equivalent. Ms. Zaretsky

632 Language Disorders in Children II
Assessment and intervention strategies for language disordered children; emphasis on language behavior relative to neurological, sensory, cognitive-intellectual, and psycho-emotional deficits. Prerequisite: COMM-DIS 631. Ms. Zaretsky

640 Advanced Diagnostic Audiology
Theories, methodologies, and procedures for special diagnostic testing; laboratory approaches. Prerequisites: COMM-DIS 311 and 313 or equivalents. Ms. Baran

641 Advanced Hearing Rehabilitation
Assessment and application of techniques of speechreading and auditory training, and total case management of hearing impaired adults. Prerequisite: COMM-DIS 313 or equivalent. Ms. Helfer

642 Hearing Aids and Amplification
Nature and types of amplifying systems employed with the hearing-impaired. Electroacoustic characteristics including gain, power, acoustic response, distortion, etc. Principles and methods of selection and usage of hearing aids. Prerequisite: COMM-DIS 640 or equivalent. Ms. Helfer

643 Hearing Conservation and Industrial Audiology
Effects of noise exposure on the functioning of the auditory system; principles of noise measurement; development of industrial hearing conservation programs. Prerequisite: COMM-DIS 313 or equivalent. Mr. Freyman

644 Educational Audiology
Investigation and evaluation of recent research and advances in knowledge concerning auditory capacities, and the management of audiological problems. Prerequisites: COMM-DIS 313 and 641 or equivalents. Ms. Poissant

645 Theories of Hearing
Current acoustic, psychophysiological, physical, anatomical, psychological and clinical aspects of audition, and the theories of hearing developed to explain them. Prerequisites: COMM-DIS 211, 311, and 313 or equivalents. Mr. Freyman

646 Assessment and Management of Balance Disorders and Tinnitus

647 Implantable Auditory Prostheses
Management of hearing loss through the application of implantable auditory prostheses. Topics include cochlear implants, auditory brainstem implants, middle ear implants, and combined acoustical and electrical stimulation strategies. Prerequisite: COMM-DIS 640. Ms. Poissant

650 Pediatric Audiology
Etiology and symptomology of hearing loss in children in regard to communication development, educational management, and aural rehabilitation of infants, toddlers, preschoolers, and school children. Ms. Poissant

651 Electrophysiological Procedures in Audiology
Principles of electrophysiological assessment of the auditory and vestibular systems; laboratory approaches. Prerequisite: COMM-DIS 640 or equivalent. Ms. Baran

691 Seminar: Communication Disorders
Analysis and discussion of major problems in field of communication disorders. One of following topics usually offered: a) dysphagia, b) communication disorders associated with aging, c) medical speech pathology, d) advanced topics in audiology, e) advanced topics in speech-language pathology. Consent of instructor required. May be repeated for credit. Maximum credit, 9.

692 Medical Audiology
Advanced principles and practices of audiology relative to differential diagnosis, otological surgery, medical intervention, and research. Prerequisites: COMM-DIS 313, 640, 641, and 642 or equivalents. Ms. Baran

696 Special Problems
Independent study in special subjects. Repetition requires consent.

697A Instrumentation in Audiology
Fundamental principles of electronic instrumentation with emphasis on clinical and research applications in audiology. Topics include elementary circuit theory, signals and systems, electroacoustic transducers, digital signal processing, spectral analysis, and principles of specifications, measurement, and calibration. Mr. Whitmal

698 Clinical Practice in Communication Disorders
Supervised clinical practice with children and adults with various speech, language, and hearing disorders; group and individual therapy techniques; on-campus and off-campus experiences.

699 Master’s Thesis
Credit, 3-6.

899 Doctoral Dissertation
Credit, 18.
Comparative Literature

Graduate Faculty

William Moebius, Professor and Director of the Comparative Literature Program, B.A., Lawrence (Wis.), 1963; Ph.D., New York at Buffalo, 1969.

Catherine Portuges, Professor and Graduate Program Director, B.A., California at Los Angeles, 1964; M.A., 1966; Ph.D., 1981.


Edwin Gentzler, Professor and Director of the Translation Center, B.A., Kenyon College, 1973; Ph.D., Vanderbilt, 1990.


Associate Faculty

Eric M. Beekman, Professor Emeritus of German and Scandinavian Studies.

Aviva Ben-Ur, Associate Professor of Judaic and Near Eastern Studies.

Barton B. Byg, Professor of German and Scandinavian Studies.

Donald Gjertson, Professor of Asian Languages and Literatures.

Daniel Gordon, Professor of History.

Arthur F. Kinney, Professor of English.

Sara Lennox, Professor of German and Scandinavian Studies.

Donald Maddox, Professor of French and Italian.

Sara Maddox, Professor of French and Italian.

Luis A. Marentes, Associate Professor of Spanish and Portuguese.

Stephen D. Miller, Assistant Professor of Japanese.

Daphne Patai, Professor of Spanish and Portuguese.

Amanda C. Seaman, Assistant Professor of Asian Languages and Literatures.

James E. Smethurst, Associate Professor of Afro-American Studies.

Robert Sullivan, Associate Professor of German and Scandinavian Studies.

James Young, Professor of English.

The Graduate Program in Comparative Literature offers opportunities for graduate study leading to the degrees of Master of Arts and Doctor of Philosophy. Areas of curricular emphasis include theories of literature and interpretation, theory and practice of translation, narrative and discourse theory, theories of literary history, canon and world literature, psychoanalytic theory, film analysis, gender studies, and a range of cross-cultural studies, from Orientalism/Occidentalism to multi-culturalism in the Americas. Students may pursue the study, and translation, of texts in Hebrew, Sanskrit, Greek, Latin, Classical Chinese, Old Irish, French, Italian, Spanish, Portuguese, German, Swedish, Danish, Icelandic, Russian, Hungarian, Arabic, Japanese, and Chinese, as well as texts in English.

Prerequisites for Admission to the M.A. or Ph.D. Program

(Beyond the usual requirements of the Graduate School.)

Undergraduate Degree

Applicants must possess a bachelor’s degree or a recognized foreign equivalent, either with a major in a language-literature field or with substantial literary studies.

Languages

All applicants must demonstrate proficiency in English and in one language other than English, and a working knowledge of a third language. Ph.D. applicants should have completed at least three years’ study of their first foreign language, and two of their second. M.A. applicants should have completed at least three years of their first foreign language and one year of their second. Knowledge of classical languages is encouraged. An entering M.A. or Ph.D. student who does not show language competence by previous study may demonstrate competence in the first and second languages by coursework, as specified in the program’s “Statement of Procedure.”

Grade Point Average

The applicant should have a grade point average equivalent to at least 3.000 out of possible 4.000.

Examinations

Applicants are required to have taken the Graduate Record Examination before applying, or to take it at the earliest opportunity thereafter. Non-native speakers of English who are not U.S. citizens are required to take the Test of English as a Foreign Language (TOEFL).

Written Work

Applicants are required to submit directly to the department a sample of their written work with their application. This should demonstrate critical handling of literary material, preferably including non-English texts. The paper need not be written in English. Essays written in a language other than English should be accompanied by an English translation done by the candidate.

The Doctor of Philosophy Degree

Qualification

Successful completion of the qualifying procedure enables the student to proceed with preparations for the Ph.D. Comprehensive Examination,
beginning with the formation of a guidance committee. The qualifying procedure involves competence in foreign languages and satisfactory performance in required coursework.

Program of Study
The balance among the main constituent elements of a candidate’s course of study will vary with individual circumstances. The following kinds of competence, however, are taken to characterize the holder of a Ph.D. in Comparative Literature: a thorough grounding in literary and social theory; a knowledge of one language and its literature sufficient to warrant the respect of specialists; a reading knowledge of three languages (ancient or modern); a wide command of the literature of one main historical period; ability to make serviceable use of at least three literatures in the original languages; and training in research methods, literary translation, and problems of criticism.

Requirements
Work in one literature requires historical coverage from the earliest literary forms of the language to the present, with emphasis either on a genre or on a major period, and a thorough reading knowledge of the language. Work in the second and third literatures requires coverage of the period or genre related to the field of emphasis in the first literature. Reading knowledge of the languages involved should be very good in the second literature, and good in the third. A minimum of 45 credit hours is required in all cases, distributed as follows: 21 graduate credits in comparative literature, 6 of which must be at the 600-800 level (excluding dissertation credits); 6 graduate credits in a major literature; 6 in a second literature studied in the original language; of the 45 required credit hours, 12 graduate credits are considered elective. One of the comparative literature courses must be 752 Theory and Practice of Comparative Literature; another must be a course that combines theoretical perspectives with practical criticism.

Comprehensive Examination
The Comprehensive Examination Committee works with the student to formulate the list of six topics on which the Comprehensive Examination is based. A topic is a conceptual issue of considerable breadth. The purpose of the individual topic is to permit the exploration of a critical problem within a broad spectrum of literary-historical expression. More than one critical approach to individual literary texts and a range of linguistic traditions should be reflected among the six topics. Each topic must be accompanied by a statement in which the scope and direction of inquiry of the topic are clearly defined.

Each topic is examined in one of three modes: by written examination, by a paper or papers (for a maximum of two topics), or by oral exam, which includes a passage for textual analysis. The examination as a whole must incorporate each of these modes. A final review of all components of the examination by the Examination Committee is required and normally accompanies the oral examination. Successful completion of this examination allows the candidate to proceed to the dissertation.

The Dissertation
The dissertation may deal with any subject in literary history, or with the comparison of texts, in the original languages of works from two or more literatures. A translation dissertation may be proposed, provided that it is prefaced by an extensive introduction, with a level of analysis appropriate to a doctoral dissertation. The introduction should deal with theories and specific problems of the translation.

The Master of Arts Degree
Two types of M.A. degree are offered in Comparative Literature. Students who do not plan to proceed to the Ph.D. will normally choose the M.A. with thesis; the M.A. without thesis may be elected as a degree plan by students planning doctoral study.

Program of Study
A minimum of 33 credit hours is required in all cases, distributed as follows: for the M.A. with thesis, 6 thesis credits, 6 graduate credits in a major literature, 3 in a second literature studied in the original language and 12 graduate credits in comparative literature; for the M.A. without thesis, 6 graduate credits in a major literature, 6 in a second literature studied in the original language, and 15 graduate credits in comparative literature. One of the Comparative Literature courses must be 752 Theory and Practice of Comparative Literature; another must be a course that combines theoretical perspectives with practical criticism.

Examinations
All candidates for the M.A. are required to take an examination that will include both written and oral portions. Candidates for the M.A. with thesis are examined for no more than four hours on their reading list and present a thesis defense of no more than two hours. Candidates for the M.A. without thesis take a written examination of no more than six hours and an oral examination of no more than two hours.

Thesis
The thesis is intended to demonstrate ability to formulate and explore a specific literary problem. The student must present a brief prospectus to the advisory committee for approval. A thesis consisting of a translation preceded by a substantial critical introduction may be approved, subject to conditions similar to those applying to doctoral translation dissertations.

All courses carry 3 credits unless otherwise specified.

513 Literary Genre: Autobiography and Gender
A major or minor category of literature, or the concept of genre itself; readings in theory and close study of representative texts from several traditions. Recent topics include Autobiography and Gender, the literary nature of autobiography and the psychology of its composition. Examples from modern European literary texts and films.

514 Modern Poetry and Poetics
Selected major authors and movements in modern poetry from Symbolism to present. Backgrounds of contemporary poetry in European and American intellectual and literary history: modern experiments with poetic form. Influence of movements such as symbolism, surrealism, modernism and postmodernism, with their relation to contemporary art and aesthetics.

515 Modern Drama
Currents in Western drama since Ibsen. Possible topics: naturalism, symbolism, neo-Romanticism, expressionism, folk drama and fantasy, epic realism, and “grotesque” or “absurd” theater.

527 Romanticism
Romanticism as an international movement in literature and the other arts. The assimilation by the arts of the newly-discovered Individualism of French and German philosophy. Rejection of mimesis for an idea of art as a synthetic, original power which gains universality through the genius of the individual creator.

529 The Symbolist Movement
The literature of England, France, and Germany in the middle and late 19th century. The concept of the imagination, and concurrent aesthetic, epistemological, and ethical questions traced primarily through poetry, but also through drama and the novel.
540 Western Literature Cross-Currents with China
Impact of Western literature on modern Chinese literature from 1915 to 1937. Selected writers and literary movements of the modern Chinese Literary Renaissance. Recent topics: the creation of a new native Chinese literature; the response of Chinese authors and intellectuals to western literature and literary theory; theories of alterity and cross-cultural image.

592 Seminar
Medieval Women Writers and Feminist Theory
Selected medieval and Renaissance women writers from the point of view of current feminist theory. Writers include Marie de France, Mechthild of Magdeburg, Margery Kempe, Angela of Foligno, Sor Juana de la Cruz, Christine de Pizan. Themes of love and desire in women’s writing; the models provided by Sappho, Plato, and the Bible; critical approaches derived from French feminism, feminist theologians, Marxist critiques, and object-relations theory.

Literature and Myth
Narrative patterns of myth and folktale in relation to the patterns of literary narratives. Emphasis on the theory of myth as it sheds light on “the order of events” and on character relationships in both mythical and literary narratives. Sumerian, Greek, and African myths; selections from theory and fiction from 1850 to the present.

595 Seminar
International Film Noir
Film noir from its American heyday (1944-1958) to the new European cinema of the sixties (Godard, Truffaut, the Cahier du Cinema) and seventies (Fassbinder and the New German Cinema). How filmic texts explore the relationship between the representation of “reality” and the technical imperatives of cinema as an artistic medium. Film noir’s displacement of social mores; their constitution of reality in the light of formalist, feminist, and psychoanalytic theory.

Psychoanalytic Narratives
Investigation of the varieties of narrative strategies used by writers, analysts, and theorists to describe the psychoanalytic experience. Texts include case histories from the view point of analyst and patient; biographical and autobiographical narratives; fiction in which primary text is the account of an analytic encounter; interpretive readings by theorists; and cinematic texts.

601 Literary Criticism I: Classic to Neoclassic
Problems in critical theory prior to modern period. Not necessarily chronological or limited to Occidental critics.

602 Literary Criticism II: Introduction to the History of Consciousness
Modern crises of consciousness, ethics, and form, as manifested in seminal works of avant-garde criticism and fiction.

612 European Epic Poetry
Literary analysis of major classical and Renaissance epics. Emphasis on their intrinsic qualities as works of art. Specific epic techniques and the epic tradition.

616 Contemporary Novel
Commitment and innovation in modern novel. Nature of literary and extraliterary influences, trends, and themes that define and establish current major traditions of the novel.

644 International Literary Relations
Cross-cultural theory and analysis. Topics and issues common to two or more different national issues common to two or more different national literatures, including the interplay of text, language, history, and national or cultural identity. Recent topics include Orientalism/Occidentalism, a study of reciprocal cultural images between West and East and their relationship to the psychology of colonialism.

691 Seminar
Advanced study of a topic or special area in Comparative Literature.

The Female Subject
Relationships between the individual subject, representation, and the “real world”; the material, social, and economic context. How the woman writer constitutes a female subject. How she is seen in relation to another, subject or object. How to find a critical vocabulary to describe the female subject, to analyze her representation and remain aware of the context in which she appears. The appropriateness of such an analysis beyond first world literature. Theoretical models and syntheses include Marxist, psychoanalytical, post-structuralist, and feminist thought, tested on specific literary texts.

Buddhism and American Culture
The mutual impact of Buddhism and American culture in 20th- and 21st-century American literature, art, music, and popular culture, studied in relation to Buddhism’s Asian roots. The theory and practice of Buddhism in 20th-century America, and exploration of its cross-cultural multidisciplinary expression, ranging from literature to politics and sports. Topics include Buddhism in popular culture, Japanese and Chinese practitioners of the Way of Buddha, the Beat Generation and Buddhism in American literature, Thomas Merton and the East, Buddhist-Jewish/Christian encounter, war and non-violence, women and Buddhism.

Literature and Music
Relations between literature and music from Plato to Samuel Beckett. Music as a social phenomenon, a pattern of feeling or understanding, and a mode of interpretation. Topics include portraits of musicians and composers in literature and film, themes of inferiority in musical settings of drama and poetry, and the literary emulation of musical structure and style (“musicality”). Some background in music history or music theory and knowledge of one modern European language helpful.

Word, Image, Book: Politics and Aesthetics
Political dimensions of image making. Readings from Plato and Derrida, and excerpts from Biblical and post-Biblical commentary. Notions of icon and iconicity, grapheme, and epistemologies of sight, Renaissance devices and emblems in relation to questions of authorship and authority, and the flourishing of medieval and Renaissance narrative painting (biblical, mythological and post-Dante and Ariosto), the interactivity of words and images in books published after 1750. Illustration in novels and collections of poetry and drama, as well as imitations in poetry and in the novel of specific paintings and drawings. The development of picture books, comics, and graphic novels.

Travel and Empire
Examines the cultures of travel—writing, photography, and filmmaking—and the tropes of imperialism from British, French, and American colonial texts, and contemporary representations.

20th-Century Theorists: Foucault and Said
A critical survey on the writings of Michel Foucault and Edward Said, who have influenced theories on the human body, ethnic identity, sexuality, the violence of the state, post-structuralism, post-colonialism, historiography, material culture, and nationalism.
The Discipline and Its Discontents
Professional seminar considering both practical matters and theoretical concerns for new and current graduate students in Comparative Literature. Faculty members are invited to speak on the course they teach, their fields of research, and their assessment of the present and future of the discipline.

692 Seminar
Aspects of Children’s Literature
Children’s literature as a new canon raising specific theoretical questions of genre, audience relationship, and cultural setting. Close reading of texts from the U.S. and abroad. Topics include the canon, narrative structure, relations between text and image, psychoanalytic and developmental modes (Winnicott, Alice Miller, Jacqueline Rose, Piaget, Vygotsky), inter-textuality (relations to folklore, traditional and modern poetry), and social and historical contexts (Darton, Zipes).

699 Master’s Thesis
Credit, 6.

703 Contemporary Theories of Literature
Intensive study of theories of literature having importance for contemporary criticism and scholarship.

750 Literary Theory: Post-structuralism Dialogue

751 Theory and Practice of Translation
Theoretical issues and practical problems raised by translation, in light of recent research. The role of translation and translated literature in cultural systems and in the history of literary development. Genre and form (poetry, dramatic literature), language register and tone, metaphor and imagery, word play. Readings in theory (Nida, Even-Zohar, Lefevere, Quine, Catford) combined with workshop practice.

752 Theory and Practice of Comparative Literature
Comparative Literature as literary theory and as academic practice. Nineteenth-century background and the rise of literary studies; traditional concepts of influence, periods, themes, genres, “extraliterary” relations, translation studies, and their development in modern theory. Questions of textuality, canonicity, cultural identity, the politics of cross-cultural literary images, meta-theory, and institutional setting as they affect current practice.

780 Bibliography and Methods of Literary Research
Introduction to bibliography and methodology of comparative studies in literature.

791 Seminar
Ulysses and the Rise of Modern Narrative
Joyce’s Ulysses in the light of the Greek, Italian, Irish, and English myths, and drawing on French, Irish, and English narrative techniques; as a new response to nationalism indebted both to Ibsen and to the Anglo-Irish Revival; as a culmination of Joyce’s own artistic experiments in Dubliners, Portrait of the Artist, and Exiles, and as a harbinger of Finnegans Wake and a post-Einsteinian world.

Comparative Directors
The cinematic culture of contemporary Eastern Europe; emphasis on feature and documentary filmmakers from the former Soviet Union, Hungary, Poland, and the former East Germany, Czechoslovakia, and Yugoslavia. Differences in theoretical, ideological, and cultural practices between East and West; intersections of history and autobiography; cinematic uses of literature by Eastern bloc artists; the visual inscription of memory, loss, and national identity; issues of gender, love, and sexuality; a comparative treatment of strategies for examining the past.

Translation Techniques and Technologies
Covers a range of theories and technologies on how to translate faster and more accurately, incorporate new technologies, and become more aware of the changing market, including multilingual word-processing, terminology database, computer-aided translation, on-line dictionaries, html codes, and Internet discussion groups for translators.

Translation and Postcolonialism
Translation as a tool in the construction of colonized cultures and as resistance to such colonialization. Strategies for communication that may help open spaces for introducing complex cultural differences.

Translation and Identity Formation in the Americas
How translation functions as a fundamental part of our cultural histories. The outdated models of translation studies scholars. How many fiction writers in the Americas, including Jorge Luis Borges, Gabriel Garcia Marquez, Julio Cortazar, Mario Vargas Llosa, Toni Morrison, and Nicole Brossard, among others, foreground the theme of translation in their work in order to explore multicultural and polylingual societies.

Advanced Translation Theory and Practice
Work on an extended translation project or a paper related to translation history or theory with a view toward publication. Students take turns presenting their work, using the class for constructive criticism, feedback, suggestions, and brainstorming. Discussion of readings in contemporary translation theory.

Ways of Worldmaking in Literary Texts
Recent concepts of worldmaking in art and literature; literary examples of interlocking and multiple worlds in the Western literary tradition from Symbolism to the present. Background in Symbolic theories of world-construction. The analysis of projected worlds of consciousness, of fused horizons, of the construction of cultural worlds, of worlds of discourse manipulated to challenge conventional world images. Attention to works that manipulate world-conventions and the problematic of linguistic representation.

Modernisms
Twentieth-century “modernism” in its various shapes, terms, and representative figures. Emphasis on the still-debated concept of modernism, in relationship to post-modernism and to continental European avant-garde movements, and the impact of Western modernism on other cultures, with guest lecturers. “Modernist” concepts of reality and representation; formal strategies including point of view and collage techniques; modernism’s relation to contemporary society. Discussion of
literary texts in conjunction with theoretical and historical concepts.

**Cinematic “I”/EYE: The First Person in Modern Film**
Studies in comparative strategies of self-representation and interpretation in works by contemporary film and video artists. A consideration of seeing and speaking subjects constructed in autobiographical visual texts; within national and ethnic cultures; and as gendered authorial voices. Oral presentations, readings, discussions, and screenings. Some background in theory, cultural studies, contemporary literary or film/video studies recommended.

**792 Seminar**

**Cross-Cultural Problems in Literary Theory: Japanese and European Narrative**
A cross-cultural problematic of the narrative voice in Japanese and European literature; reference to autobiographical writings and questions of subjectivity. Related issues include the nature and use of linguistic borrowings, and the connection between the choice of a narrative mode and the grammar and vocabulary of the language. The validity of cross-cultural criticism and the possibility of translation. Close readings and comparison of representative European and Japanese literary and critical texts.

**797 Special Problems**
Directed study of some problem in Comparative Literature. May be repeated for credit. *Credit, 2-6.*

**891 Seminar**
Intensive, advanced study of a special research topic or theoretical issue in Comparative Literature.

**894 Seminar**

**Psychoanalysis and Literature**
Psychoanalytic interpretation, its history, its contemporary theoretical foundations, its uses and misuses. Readings include selections from Freud, object-relations theorists, clinical cases, poems, and literary critics. Development of the ability to think psychoanalytically about people and texts.

**Science Fiction, Psychoanalysis, and the State**
The way psychoanalytic themes enter American science fiction between 1948 and 1960, and how such themes are used by science fiction writers of the time to express and respond to social and political tensions (e.g., McCarthyism). Works by Sturgeon, Bester, Harness, and Zelazny, in historical context and from a Lacanian psychoanalytic perspective.

**895 Seminar**

**Dissertation Research**
An overview of the state of each participant’s research, to familiarize members with the problems and possibilities of a doctoral dissertation in Comparative Literature. The group’s composition determines the nature of invitations to potential guests, or the decision to concentrate on its own members’ discussions, with topics including: preparation for paper presentations at academic conferences, potential openings for positions at colleges and universities, and opportunities for funding for fellowships, grants, and post-doctoral research.

**899 Doctoral Dissertation**

*Credit, 10.*
Neil Immerman, Professor, B.S., M.S., Yale, 1974; Ph.D., Cornell, 1980.

David Jensen, Associate Professor, B.S., Nebraska, 1986; M.S., Washington University, 1988; Ph.D., 1992.

David C. Kulp, Assistant Professor, B.S., William and Mary, 1991; Dipl.Sc., Canterbury, 1992; Ph.D., California at Santa Cruz, 2003.


Erik G. Learned-Miller, Assistant Professor, B.A., Yale, 1988; M.S., Massachusetts Institute of Technology, 1997; Ph.D., 2002.


Brian N. Levine, Associate Professor, B.S., New York at Albany, 1994; M.S., California at Santa Cruz, 1996; Ph.D., 1999.


Raghavan Mannmatha, Research Associate Professor, B.Tech., Indian Institute of Technology, 1983; M.S., Hawaii, 1986; Ph.D., Massachusetts at Amherst, 1997.

Andrew McCallum, Associate Professor, B.A., Dartmouth, 1989; M.S., Rochester, 1992; Ph.D., 1995.


Gerome A. Miklau, Assistant Professor, B.A., California at Berkeley, 1995; B.S., 1995; M.S., University of Washington, 2001; Ph.D., 2005.

J. Elliot B. Moss, Professor, B.S.E.E., Massachusetts Institute of Technology, 1975; M.S.E.E., 1978; Ph.D., 1981.


Prashant J. Shenoy, Associate Professor, B.Tech., Indian Institute of Technology, 1993; M.S., Texas at Austin, 1994; Ph.D., 1998.

Hava Siegelmann, Associate Professor, B.S., Technion, Israel, 1988; M.S., Hebrew University, Israel, 1992; Ph.D., Rutgers, 1993.

Ramesh K. Sitaraman, Associate Professor, B.Tech., Indian Institute of Technology, 1985; M.S., Maryland, 1988; Ph.D., Princeton, 1993.

Yannis Smaragdakis, Associate Professor, B.Sc., Crete, 1993; M.S., Texas at Austin, 1995; Ph.D., 1999.

David Smith, Research Assistant Professor, A.B., Harvard, 1994; Ph.D., Johns Hopkins, 2008.

Donald F. Towsley, Distinguished University Professor, B.A., Texas, 1971; Ph.D., 1975.

Arun Venkataramani, Assistant Professor, B.Tech., Indian Institute of Technology, Bombay, 1999; M.S., Texas at Austin, 2000; Ph.D., 2004.

Rui Wang, Assistant Professor, B.S., Zhejiang University, China, 2001; M.S.; 2003; Ph.D., Virginia, 2006.

Charles C. Weems, Jr., Associate Professor, B.S., Oregon State, 1977; M.A., 1979; Ph.D., Massachusetts at Amherst, 1984.


Shlomo Zilberstein, Professor, B.A., Technion, Israel, 1981; Ph.D., California at Berkeley, 1993.

Michael Zink, Research Assistant Professor, M.Sc., Darmstadt University of Technology, Germany, 1997; Ph.D., 2003.

Adjunct/Associate Faculty

George S. Avrunin, Professor of Mathematics.

Weibo Gong, Professor of Electrical and Computer Engineering.

Scott F. Kaplan, Associate Professor of Computer Science, Amherst College.

Catherine McGeoch, Professor of Computer Science, Amherst College.

Krithi Ramamritham, Vijay and Sita Vashee Chair Professor, Indian Institute of Technology.

Sami Rollins, Assistant Professor of Computer Science, Mount Holyoke College.

Lee Spector, Professor of Computer Science, Hampshire College.

Ileana Streinu, Professor of Computer Science, Smith College.

The Department of Computer Science offers the M.S. and Ph.D. degrees. Comprehensive course offerings are available, and active research is ongoing in many areas. Active collaboration is maintained with colleagues in such diverse schools and departments as Art, Management, Education, Electrical and Computer Engineering, Linguistics, Mathematics, Psychology, and Biology. Students are encouraged to take advantage of these interdepartmental links to enrich their educational experience.

The department offers a rich curriculum of courses and seminars. Most students become involved in research, and participate in individual and laboratory efforts, during the first and second year of the program. All students have access to excellent computing facilities.

To be admitted to full graduate status in Computer Science, candidates should be holders of B.S. or B.A. degrees, with good academic records and recommendations, and have either a major in computer science or exhibit a good knowledge of computer programming and college mathematics. Students are expected to have mastered the equivalent of CMPSCI 121, 187, 201, 250, and 287, MATH 131/5, 132/6, and 235/6, and STATISTC 501.

The department has the following requirements for degrees, in addition to those requirements of the Graduate School:

Master of Science Degree

A student must pass four core courses with a grade of B or better during the first four semesters. The core courses must include one course from systems, one from theory (normally CMPSCI 601 or 611) and one from Artificial Intelligence (AI), (normally CMPSCI 683). The fourth core course is chosen from a rich set of regular core course offerings. Students who took equivalent courses at other institutions can arrange to substitute other CMPSCI offerings as core courses. Thirty credits must be completed within three calendar years. A Master’s Project must also be completed.
Doctor of Philosophy Degree

1. To be confirmed in their candidacy for the Ph.D. degree, students must submit a portfolio of accomplishments, including coursework, evidence of research ability, a project demonstrating synthesis of topics in computer science, and faculty recommendations. Most students are allowed five semesters to complete their portfolios; special arrangements are made for students who enter the program with coursework deficiencies or with M.S. degrees.

2. The student must subsequently pass the dissertation proposal exam within two semesters after passing the portfolio exam.

3. In addition to the requirements for the M.S. degree, each Ph.D student must complete 18 additional course credits at the 600 level or higher (excluding CMPSCI 899), with an overall grade point average of 3.0 or better. As part of the candidacy exam, Ph.D. students must select six courses (18 credits) from the set of “core” courses and/or additional course credits at the 600 level or higher.

4. The student must complete at least 18 credits of CMPSCI 899 (Doctoral Dissertation).

5. Each student must perform the equivalent of one semester as a teaching assistant or teaching associate prior to completion of the degree.

For more detail see: www.cs.umass.edu/grads/overview.

All courses carry 3 credits unless otherwise specified.

520 Software Engineering: Synthesis and Development
Introduces students to the principal activities involved in developing high-quality software systems. Topics include: requirements analysis, formal specification methods, process definition, software design, and risk management. Prerequisite: CMPSCI 320 or equivalent.

521 Software Engineering: Analysis and Evaluation
The current best testing and analysis practices; promising new approaches, going beyond the testing of programs and modules and extending the scope to include analysis of all software products across the lifecycle and analysis of software processes. Prerequisite: CMPSCI 320.

530 Programming Languages
Practical and theoretical aspects of several currently prominent languages representing distinct paradigms, including imperative, functional and logic programming. Focus on object-oriented languages, and C++ in particular. Prerequisites: CMPSCI 287, 320, and 377. Corequisite: CMPSCI 401.

535 Computer Architecture
The structure of digital computers from the basic logic level, to the component level, to the system level. Topics include: the design of basic components such as arithmetic units and registers from logic gates; the organization of basic sub-systems such as the memory and I/O subsystems; the interplay between hardware and software in a computer system; the von Neumann architecture and its modern competitors. Prerequisites: CMPSCI 250 and 377.

551 3-D Animation and Digital Editing
Students work alone and in teams to create high-quality publishable animated pieces using three-dimensional graphics technology. Techniques include digital editing, sound, music, design, modeling, rendering, surfaces, textures, and lighting.

552 Interactive Multimedia Production
Students explore interactive authoring tools to develop presentation and training systems by using programming languages within professional packages to present graphics, animation, text, sound, and music based on user request. Prerequisites: CMPSCI 551 and consent of instructor.

572 Neurobiology
Cross-listed with BIOLOGY 572 and PSYCH 572.

575 Combinatorics and Graph Theory
Cross-listed with MATH 513. A basic introduction to combinatorics and graph theory for advanced students in computer science, mathematics, and related fields. Topics include elements of graph theory, Euler and Hamiltonian circuits, graph coloring, matching, basic counting methods; generating functions; recurrences; inclusion-exclusion; Polya’s theory of counting. Prerequisites: mathematical maturity; calculus; linear algebra; discrete mathematics course such as CMPSCI 250 or MATH 455. MATH 411 recommended but not required.

585 Natural Language Processing
Natural Language Processing techniques developed in Artificial Intelligence with an emphasis on memory oriented models and corpus-driven research. Focus on semantically oriented sentence analysis, narrative text comprehension. Prerequisite: CMPSCI 383.

589 Machine Learning
Introduction to methods permitting machines to learn: decision tree induction, cover generation, candidate elimination, artificial neural networks, inductive logic programming. Bayesian, instance-based, reinforcement, apprentice, macro, and explanation-based learning. Use of computer required. Prerequisite: CMPSCI 383.

591 Seminar on Computer Science
Conferences, reports, and lectures on topics not currently covered in regular courses. Consent of instructor required. Credit, 1-6.

596 Independent Study
Credit, 1-6.

601 Computation Theory
An in-depth introduction to the main models and concepts of the mathematical theory of computation, including computability, complexity, and logic. Prerequisites: CMPSCI 250 and 311, or equivalent.

603 Robotics
The design and analysis of adaptive, closed-loop physical systems. Focus on sensorimotor machines that interpret and manipulate their environments. Involves study of mechanisms (kinematics and dynamics), actuators, sensors (with a focus on machine vision), signal processing, optimal estimators, associative memory, feedback control theory, supervised and unsupervised learning, and task planning. Prerequisites: linear algebra and programming skills.

610 Compiler Techniques
Basic problems in the translation of programming languages focusing on theory and common implementation techniques for compiling traditional (Pascal-like) programming languages to produce assembly or object code for typical machines. Involves a substantial laboratory project in which the student constructs a working compiler for a considerable subset of a realistic programming language. Lectures augmented by an optional laboratory section covering details of the programming language to be used in the project (C), the operating system (Unix), the source language (a Modula variant) and various tools (Yacc, make, etc.). Use of computer required. Prerequisite: CMPSCI 377.
611 Advanced Algorithms
The design and analysis of efficient algorithms for important computational problems. Paradigms for algorithm design including Divide and Conquer, Greedy Algorithms, Dynamic Programming; and, the use of Randomness and Parallelism in algorithms. Algorithms for Sorting and Searching, Graph Algorithms, Approximation Algorithms for NP-Complete Problems, and others. Prerequisite: equivalent of CMPSCI 250 with an A.

620 Advanced Software Engineering: Synthesis and Development
Same topics as 520 but at a greater depth. Prerequisite: CMPSCI 320 or equivalent.

621 Advanced Software Engineering: Analysis and Evaluation
The best testing and analysis practices for software products and processes across the lifecycle, with emphasis on promising new software engineering research directions including software architectures and the analysis of concurrent, distributed, and real-time systems.

635 Modern Computer Architecture
Examines elements of modern computer architectures from the perspectives of performance, economics, and design considerations together with their implications for software support at the compiler and operating system levels. Prerequisites: CMPSCI 535 and either 377 or 410, or equivalent.

645 Database Design and Implementation
Covers topics such as object oriented, real-time, active, and temporal dbs; object management and file systems; concurrency control, recovery, transaction processing; distributed dbs; query processing; db programming languages; advanced db architectures. Prerequisite: CMPSCI 445 or equivalent.

646 Information Retrieval
Basic and advanced techniques for text-based information systems, including retrieval models, indexing and text representation, browsing and query formulation, routing, distributed information retrieval, and integration with database systems. Implementation of major elements of an information retrieval system. Prerequisite: CMPSCI 445 or equivalent.

653 Computer Networking
An introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics include: layered network architectures, applications, network programming interfaces (e.g., sockets), transport, congestion, routing and data link protocols, local area networks, emerging high-speed networks, network management, and network security. Examples drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite. A rudimentary understanding of computer architecture and operating systems helpful.

677 Operating Systems
An in-depth examination of principles of distributed operating systems. Topics include processes and threads, concurrent programming, distributed interprocess communication, distributed process scheduling, shared virtual memory, distributed file systems. MACH. Prerequisite: CMPSCI 377 or equivalent, or consent of instructor.

683 Artificial Intelligence
In-depth introduction to Artificial Intelligence concentrating on aspects of intelligent agent construction. Topics include: situated agents, advanced search and problem-solving techniques, resource-bounded reasoning, reasoning under uncertainty, perception and action, advanced planning and control, and learning.

686 Reasoning and Acting under Uncertainty
Recently developed methods that allow intelligent systems to reason and act under uncertainty. Topics include representations of uncertainty, probabilistic models, belief networks, learning probabilistic models, decision theory, sequential decision making, and models of bounded rationality. Prerequisite: an undergraduate Artificial Intelligence course or consent of instructor.

687 Reinforcement Learning
A comprehensive introduction to reinforcement learning, an approach to artificial intelligence emphasizing learning from interaction to achieve goals in stochastic environments. Focus on algorithms that learn what actions to take so as to optimize long-term performance. Covers Markov decision processes, dynamic programming, temporal-difference learning, Monte Carlo learning methods, eligibility traces, the role of neural networks, and the integration of learning and planning. Prerequisites: basic probability theory and programming skills. A prior course in artificial intelligence recommended.

689 Machine Learning
Introduces and explores methods that permit programs to learn. Topics include: knowledge acquisition, learning from examples, generalization and specialization, discovery systems, theory formation, connectionist learning, genetic algorithms, macro learning, language learning, explanation-based learning, and computational learning theory. Prerequisite: CMPSCI 383 or 683.

691 Seminar on Computer Science
Conferences, reports, and lectures on topics not currently covered in regular courses. Consent of instructor required. Credit, 1-6.

701 Advanced Topics in Computer Science
Advanced Topics in Computer Science Master’s Project: Advanced research project in Computer Science. Consent of instructor required. Credit, 6.

710 Advanced Compiler Techniques
Advanced compiler optimization for imperative languages. Topics include data-flow analysis, program representation, global optimization, interprocedural analysis, register allocation, and scheduling. Prerequisite: CMPSCI 410 or 610 or equivalent. Prerequisite: CMPSCI 410 or 610.

711 Parallel Algorithms and Architectures
An introduction to parallel algorithms, emphasizing theoretical formulations and developments. The design of application-oriented algorithms in varied environments: idealized shared-memory algorithmic paradigms that ignore communication costs, distributed-memory simulations of shared memory, distributed-memory algorithmic paradigms. Concepts illustrated via important applications. The design of systems-oriented algorithms for: task scheduling, load balancing, message routing, and latency hiding. Prerequisite: CMPSCI 611 or equivalent.

715 Cryptography and Network Security
Cryptography including public-key cryptography, Diffie-Helman, RSA, attacks on these; algorithms for factoring and discrete log; DES and related attacks; key-escrow systems. Network security including Kerberos, Needham-Schroeder, authentication issues. Prerequisite: CMPSCI 611 or consent of instructor.

720 Topics in Software Engineering
Current topics in program development. May include program development methods, automated validation systems, testing
systems, and program verification techniques. Prerequisite: CMPSCI 520.

735 Advanced Computer Architecture
Survey of recent research literature in the field of computer architecture. Topics may include massively parallel systems, heterogeneous processing, hardware/software co-design, special purpose architectures, benchmarking, architecture research tools, optical processing, etc., as appropriate. A group project is required in which a design is proposed with preliminary evaluations developed to support the proposal. Prerequisite: CMPSCI 635 or equivalent.

741 Complexity Theory
The study of the resources required to solve problems in various models of computation. Sequential computation: Turing machines, non-determinism, alternation, algebraic automaton theory. Parallel computation: Boolean circuits, branching programs, uniformity, lower bounds for circuit models. Descriptive complexity. Possible optional topics depending on student interest: approximation of NP-complete problems; interactive proofs, nonuniform finite automata, dynamic complexity. Prerequisite: CMPSCI 601 or equivalent.

745 Topics in Database Systems
Current topics in database systems. May include semantics-based concurrency control, new correctness criteria, transaction processing on parallel database platforms, real-time, active, temporal, and multimedia databases. Prerequisite: CMPSCI 445 or equivalent.

777 Advanced Operating Systems
Topics in architecture-OS interface, microkernels, distributed shared memory, OS-language interface, object-oriented OS, real-time, multimedia, OS-network interface, parallelism in I/O, support for wireless-mobile computing, fault tolerant OS, and case studies of commercial kernels. Prerequisites: CMPSCI 535 and 677 or equivalent.

791 Seminar on Computer Science
Conferences, reports, and lectures on topics not currently covered in regular courses. Consent of instructor required. Credit, 1-6.

899 Doctoral Dissertation
Credit, 18.

Related Courses

Electrical and Computer Engineering
660 Computer Graphics I
661 Advanced Computer Graphics and Computer-Aided Design
668 Computer Architecture

Linguistics
603 Generative Phonology
604 Syntactic Theory

Mathematics
645, 646 Differential Equations and Dynamical Systems I, II
651, 652 Numerical Analysis I, II

Philosophy
513, 514 Math Logic I, II

Psychology
617, 618 Applied and Basic Cognition I, II
630 Physiological Psychology
711 Sensory Processes
714 Perception
731 The Neuroanatomical Basis of Behavior

Statistics
515, 516 Introduction to Statistics I, II
607, 608 Mathematical Statistics I, II

Graduate Faculty


David M. Kotz, Professor and Graduate Program Director, A.B., Harvard, 1965; M.A., Yale, 1966; Ph.D., California at Berkeley, 1975.

Michael Ash, Associate Professor, A.B., Princeton, 1991; Ph.D., California at Berkeley, 1999.

M.V. Lee Badgett, Associate Professor, A.B., Chicago, 1982; Ph.D., California at Berkeley, 1990.


Gerald Epstein, Professor and Co-Director of the Political Economy Research Institute, B.A., Swarthmore, 1973; M.P.P., Princeton, 1975; Ph.D., 1981.


Fidan Ana Kurtulus, Assistant Professor, A.B., Chicago, 2000; Ph.D., Cornell, 2008.

Woojin Lee, Assistant Professor, B.A., Seoul National, Korea, 1987; M.A., 1989; Ph.D., California at Davis, 1997.


Arslan M. Razmi, Assistant Professor, B.S., Engineering and Technology, Pakistan, 1995; M.S., Texas at Austin, 1996; Ph.D., American, 2004.

Lisa Saunders, Associate Professor, B.S., Old Dominion, 1979; Ph.D., California at Berkeley, 1987.

Peter Skott, Professor, cand. scient. oeconom., Aarhus, Denmark, 1981.

Mwangi wa Githinji, Assistant Professor, B.A., City College of New York, 1989; M.A., California at Riverside, 1991; Ph.D., 1997.

Fields of Concentration

Programs of graduate study in economics are offered in the following fields of specialization: Comparative Economic Systems; Econometrics; Economic Development; Economic History; Growth and Distribution; Industrial Organization; International Economics; Labor Economics; Macroeconomic Theory; Marxian Economic Theory; Microeconomic Theory; Political Economy.

Master of Arts Degree Program

Entrance and Admission Requirements

All entering students must have completed at least one semester each of intermediate micro theory and intermediate macro theory, two semesters of calculus, and one semester each of linear algebra and statistics. All applicants must take the Graduate Record Examination General Test; the GRE Subject Test is not required. Foreign applicants, in addition, must take the Test of English as a Foreign Language (TOEFL) and achieve a minimum score of 213 on the computer-based test, 550 on the written version or 79 on the iBT version. Applications are accepted for fall semester admission only.

Degree Requirements

All candidates for the M.A. are required to complete 36 graduate credits subject to the following restrictions: 12 credits must be earned in the 700 to 800 series; candidates must take one semester each of Macroeconomics, Political Economy, Economic History, and Mathematical Methods, plus two semesters of Microeconomics and Econometrics; 21 of the credits must be taken within the Department of Economics. The candidate must earn grades of B- or better in the required courses, and maintain a 3.000 average overall.

Doctor of Philosophy Degree Program

Entrance and Admission Requirements

Requirements are the same as for the M.A. program. Applications are accepted for fall semester admission only.

Degree Requirements

Ph.D. candidates write comprehensive examinations. Course work in mathematical methods, economic theory, economic history and econometrics is required. Students are required to complete course work in at least two fields.

All courses carry 3 credits unless otherwise specified.

503 Advanced Microeconomic Theory

Detailed examination of selected topics: consumer behavior, production, capital, income distribution, market structure, general equilibrium, game theory and coalition formation. Not available for Ph.D. credit. Prerequisite: ECON 203.

504 Advanced Macroeconomic Theory

Comparison of major schools of macroeconomic thought and their application to current economic trends and policy debates. Not available for Ph.D. credit. Prerequisite: ECON 204.

505 Advanced Marxian Economics

Marxian conceptual framework developed and applied to study of social formations and to further elaboration of Marxian value theory. Not available for Ph.D. credit. Prerequisite: ECON 305.

511 Money and Banking

Advanced examination of development and operation of United States monetary and banking systems. Problems of achieving full employment and price stability through monetary controls. Not available for Ph.D. credit. Prerequisites: ECON 103 and 104.

515 Economic Theories of the State

Connections between public issues: inflation, ecological deterioration, regional and class inequalities, budget crises, and historically evolving relations between governmental and economic institutions. Not available for Ph.D. credit. Prerequisites: ECON 203, 204, and 305.

531 Structure of American Industry

Market competition and economic development in American industries. Social effectiveness of industry analyzed through measures of industrial structure; and market performance. Not available for Ph.D. credit. Prerequisite: ECON 103.

567 Latin American Economic Development


582 Urban Economics

Current urban problems, their causes, and alternatives for their solution. Urban public finance, location theory, land use, housing, transportation, and the environment. Prerequisite: ECON 103. Not available for Ph.D. credit.

601 Microeconomic Theory

Theory of the consumer, firm, industry, and their interactions. One semester terminal course. Prerequisite: ECON 203. Not available for Ph.D. credit.

605 Macroeconomic Theory

Systematic development of static and dynamic theories of aggregative economic behavior and their applications. One semester terminal course. Prerequisite: ECON 204. Not available for Ph.D. credit.

691 Seminar in Economic Issues

Topics may vary from year to year. Not available for Ph.D. credit.

699 Master’s Thesis

Credit, 6-9.

700 Microeconomics of Coordination and Conflict

Introduces microeconomic concepts relevant to the coordination of social interactions with particular attention to conflict, cooperation, collective action, competition, and coordination failures.

701 Microeconomic Theory

Systematic development of theory of the consumer, firm, and industry, and their interactions through markets. Prerequisite: ECON 303.

702 Game Theory

Addresses contemporary issues in game theory and the microfoundations of economic institutions. Prerequisite: ECON 751.

703 Introduction to Economic History

Introduction to economic history. Topics: transition from feudalism to capitalism in Europe; slavery and the southern U.S. economy; rise of large-scale firms; depression and instability in the 20th century.
Prerequisite: Economics graduate student status or consent of instructor.

705 Macroeconomic Theory
Systematic survey of theories of aggregate economic behavior that have had widespread influence in the economics discipline. Keynesian, neoclassical, New Classical, and New Keynesian approaches considered. Introduction to models of economic growth, unemployment, and inflation dynamics. Prerequisite: ECON 204 and ECON 751 or equivalent preparation in mathematical methods.

706 Advanced Macroeconomic Theory

707 History of Economic Thought
Alternative concepts of economics and radically different economic theories have always contested for hegemony within economics. Examines pre-classical, classical, Marxian, neo-classical, and Keynesian theories to stress their differences and conflicts.

708 Political Economy I
Marxian theory. Topics include historical materialism, class, value and surplus value, the labor process, accumulation and crisis. Additional topics vary with instructor.

709 Political Economy II
Presents leading and contending Marxist theories of society and knowledge. Class and value analysis of capitalist institutions, markets, and economy. Comparison between capitalist and non-capitalist societies examined.

710 Political Economy III
Current issues in political economy, focusing on race and gender inequalities. Consideration of Marxist, feminist, institutionalist and neoclassical approaches. Some attention to empirical and econometric research. Prerequisite: ECON 708 or equivalent.

711 Money, Credit and Financial Markets
Considers a range of questions in which financial structures play a central role, including monetary theory and financial regulation; the politics of central bank policy; the theory of saving and investment; and development banking and public credit allocation policies.

712 Monetary and Fiscal Policy
Analytical treatment of effects of government and central bank policies intended to achieve price stabilization and economic growth. Prerequisite: ECON 511 or consent of instructor.

713, 714 Public Finance
Theory of public goods and nonmarket allocation. Normative models of public expenditure and taxation. Integration of equity and efficiency considerations in evaluation of tax expenditure programs. Prerequisite: ECON 701 or consent of instructor.

721 International Finance
Analysis of the political economy of foreign exchange markets, adjustment mechanisms, speculation, capital flows, transfer problems and relationship between balance of payments correctives and domestic policy goals. Prerequisite: ECON 705 or consent of instructor.

722 International Trade Theory
The theory and practice of international trade, winners and losers from liberalization, mainstream and heterodox theories of trade and development, trade policy, the impact of trade agreements on growth and distribution.

731 Industrial Organization
Theories of firm and market organization, cooperation and competition. Empirical analysis of changes in firm and market structure in historical and contemporary industries worldwide. Prerequisite: ECON 701 or consent of instructor.

732 Industrial Regulation
Public policies toward monopoly power. Survey of literature on antitrust, regulation, and deregulation. Reviews lending techniques and cases. Prerequisite: ECON 203 or consent of instructor.

741 Collective Bargaining

743 Wage Theory and Wage Relationships
Theoretical and institutional study of theories of wages and wage structure. Prerequisite: ECON 330.

746 Comparative Labor Movements
Labor movements in various countries; analysis of their similarities and differences. Prerequisite: ECON 330.

747 Manpower Development
Critical examination of current manpower and problems. Quantity and quality of manpower resources, problems of labor employment and mobility. Adjustment policies and research tools reviewed. Prerequisite: ECON 330.

751 Mathematical Methods for Economists
Develops mathematical skills required in macroeconomics, microeconomics, econometrics, and most fields of applied economics. Includes optimization techniques and dynamics.

752 Econometrics
Application of modern statistical methods to micro- and macroeconomic theory formulated in mathematical terms. Prerequisite: ECON 751 or equivalent.

753 Applied Econometrics
Examines econometric techniques by observing how practitioners have utilized econometrics as a tool for analyzing substantive questions.

763 European Economic History
The Atlantic economy and slave trade. Development of capitalism in Britain, France, Germany, Russia. Industrialization and its consequences. Interactions between European and non-European economies, including trade, foreign investment and imperialism, migration.

764 United States Economic History
Evolution of the U.S. economy from colonial times, including slavery, the development of capitalism, large corporations, trade unions, the Great Depression, and the changing role of the state.

765 Economic Development: Structural Problems
Concept of economic development and structural changes needed in underdeveloped countries to permit development. Prerequisite: 15 hours of economics.

766 Economic Development: Policy Issues
Policy decisions involved in efforts of underdeveloped countries to induce development. Prerequisite: ECON 765.

773 Theories of Economic Systems
Theory of alternative economic systems, of national economic planning, and of resource allocation under different systems.

781, 782 Labor Economics
Theoretical and empirical analysis of labor market issues primarily using tools.
developed in microeconomics and econometrics. First semester: a general survey of neoclassical, institutionalist, and Marxian theories and empirical work on wage determination. Second semester: an intensive analysis of selected topics. Prerequisites for 781: ECON 701 and RES-ECON 702 or consent of instructor. Prerequisite for 782: ECON 781 or consent of instructor.

785, 786 Political Economy of Capitalism
Mutual interaction of social relations of production, forces of production, and class. Roles of the state, surplus and capital accumulation, imperialism, sexism, racism in development and maintenance of capitalist system.

791 Seminar in Economic Issues
Topics may vary from year to year.

796 Special Studies in Economics
Credit, 2-9 each semester.

797A Special Topics — Labor Markets, Distribution, and Macroeconomic Activity
Focuses on mass unemployment, examining the classic work of Marx, Keynes, and Kalecky, the contemporary Marxian and Keynesian contributions, the unemployment/inflation trade-off, including the "natural rate of unemployment" and NAIRU literature. Empirical examples taken from advanced and developing economies.

797B Special Topics — Communism, Capitalism and the USSR
Present forms of capitalism and communism, including private, state, market, and democratic. Focus on the rise and fall of the U.S.S.R. to illustrate these different forms within one society. Prerequisite: ECON 709 or consent of instructor.

797C Special Topics — General Equilibrium and Welfare Analysis
Analysis of Walrasian general equilibrium, including its existence, uniqueness, stability and optimality properties. Imperfect competition, the role of money capital, and the assumption of fixed-factor supplies also considered. Prerequisite: ECON 701.

797D Special Topics — Theoretical Institutional Economics
For advanced students wishing to pursue research and reading in the analysis of institutions, their consequences and their evolution including the distribution of property rights, systems of economic governance, the evolution of preferences, and the economics of communities.

797E Special Topics — Political Economy of the Environment
Application of political economy to management of natural resources and environmental quality. Topics include distribution, valuation, property rights, globalization, and selected policy issues.

797F Special Topics — Advanced Marxian Economics
Extends value and surplus value theory to study industrial, merchant and financial enterprises, state, households, globalization, and socialism and communism. Examines interactions among such enterprises, households, and state.

797G Special Topics — Macroeconomic Theory III
Formal macroeconomic models within a broadly behavioral and structuralist tradition, including Keynesian and neo-Marxian theories. Topics include unemployment, business cycles, money and finance, and economic growth.

797H Special Topics — Political Economy of the Environment
Development of models of economic processes; emphasis on analysis in depth. Topics may vary from year to year. Credit, 3 each semester.

797I Special Topics — Open Economy Macroeconomics
Examines linkages between growth, distribution, real exchange rates, prices, interest rates, development, and related macroeconomic phenomena. Studies the political economy of trade and investment liberalization using mainstream and heterodox models. Develops the tools required to analyze issues in an open economy context.

801 Economic Theory Workshop
802 History and Development Workshop
803 Labor Economics Workshop
804 Political Economy Workshop
851, 852 Seminar in Quantitative Economics
For advanced students with interest in econometrics. Lectures on advanced topics, and discussion of econometric and other empirical studies by members of the seminar. Prerequisite: ECON 753 or consent of instructor. Credit, 3 each semester.
Graduate Faculty

Christine B. McCormick, Professor and Dean of the School of Education, B.A., Purdue, 1977; M.S., 1979; Ph.D., Wisconsin at Madison, 1981.

Linda L. Griffin, Professor and Associate Dean for Academic Affairs, B.S., Black Hills State, 1976; M.S., Iowa State, 1980; Ph.D., Ohio State, 1991.

Marjorie Magouirk Colbert, Senior Lecturer and Associate Dean, B.S.E., Kansas, 1973; M.S.E., 1981; Ph.D., Wisconsin at Madison, 1994.


Flávio S. Azevedo, Assistant Professor, B.S., Catholic University of Rio de Janeiro, 1985; M.S., Texas A&M, 1995; Ph.D., California at Berkeley, 2005.


John C. Carey, Professor, B.A., King’s College, 1974; M.S., Wisconsin, 1977; Ph.D., 1979; Ph.D., Wyoming, 1984.


Kathleen S. Davis, Associate Professor, B.S., Eastern Illinois, 1971; M.S., National-Louis University, 1991; Ph.D., Colorado at Boulder, 1996.


David R. Evans, Professor, B.A., Oberlin, 1959; M.Sc., Illinois, 1961; Ph.D., Stanford, 1969.


Rebecca Gajda, Assistant Professor, B.A., Massachusetts at Amherst, 1991; M.A., Northern California, 1997; Ph.D., Colorado State, 2001.


Claire E. Hamilton, Associate Professor, B.A., Massachusetts at Amherst, 1981; M.Ed., 1986; Ph.D., California at Los Angeles, 1994.


Denise K. Ives, Assistant Professor, B.S., Brigham Young, 1994; M.A., Saginaw Valley State, 2002; Ph.D., Michigan State, 2008.

Bailey W. Jackson, Associate Professor, M.Ed., Massachusetts at Amherst, 1972; Ed.D., 1976.


Lisa A. Keller, Assistant Professor, B.S., Saint Michael’s College, 1993; M.S., Massachusetts at Amherst, 2002; Ed.D., 2002.

Michael P. Krezmien, Assistant Professor, B.A., Chicago, 1995; M.A., Texas at Austin, 2001; Ph.D., Maryland, 2007.

Richard T. Lapan, Professor, B.A., St. Anselm, 1972; M.A., Duquesne, 1974; Ph.D., Utah, 1987.


Sandra R. Madden, Assistant Professor, B.S., Western Michigan, 1987; M.A., 1993; M.S., 2003; Ph.D., 2008.


Howard A. Peelle, Professor, B.S., Swarthmore, 1965; Ed.D., Massachusetts at Amherst, 1971.

Margaret E. Pierce, Assistant Professor, B.A., Swarthmore, 1995; Ed.M., Harvard, 1998; Ed.D., 2006


Masha K. Rudman, Professor, B.A., Hunter, 1953; M.S., 1956; Ed.D., Massachusetts at Amherst, 1970.


Cristine A. Crispin Smith, Assistant Professor, B.A., California State at Chico, 1978; B.A., California at Santa Cruz, 1983; M.S., Cornell, 1985; Ed.D.; Massachusetts at Amherst, 1997.


Craig Wells, Assistant Professor, B.S., Castleton State College, 1993; M.S., Wisconsin at Madison, 2000; Ph.D., 2004.

Ryan S. Wells, Assistant Professor, B.S., Iowa State, 1995; M.A., Iowa, 2004; Ph.D., 2008.

Kim X. Whitehead, Lecturer, B.S., Morgan State, 1974; M.S., Johns Hopkins, 1982; Ph.D. Maryland at College Park, 1996.


Ximena U. Zúñiga, Associate Professor, M.E., Universidad Católica de Chile, 1979; M.A., Michigan, 1982; Ph.D., 1992.

Adjunct/Associate Faculty

Gary D. Malaney, Coordinator, Student Assessment, Research, and Evaluation Office.

Linda Marchesani, Manager, Training and Development.

Thomas Murray, Senior Research Fellow, School of Cognitive Science, Hampshire College.

Mathew L. Ouellet, Associate Director, Center for Teaching.

J. Michael Royer, Professor of Psychology.

Mei-Yau Shih, Coordinator of Teaching Technologies, Center for Teaching.

Martha L.A. Stassen, Director of Assessment, Office of Academic Planning and Assessment.

Beverly Woolf, Research Associate Professor of Computer Science.

Education

The School of Education is dedicated to enhancing the practice of education through research that informs both the preparation of educational professionals and the development of public policy that affects education. Our approach is shaped by our fundamental commitment to social justice and diversity and by our belief in the essential importance of national and international perspectives as we approach the improvement of education.

The School of Education is a National Council for the Accreditation of Teacher Education (NCATE) approved comprehensive professional school. It is organized into three major departments: the Teacher Education and Curriculum Studies Department, the Student Development and Pupil Personnel Services Department, and the Educational Policy, Research and Administration Department. The School offers graduate programs leading to the degrees of Master of Education (M.Ed.), Doctor of Education (Ed.D.), and Doctor of Philosophy (Ph.D.) in School Psychology. It also awards a Certificate of Advanced Graduate Study (C.A.G.S.). Although graduate students are admitted to and administratively attached to specific departments, they are encouraged to develop, under faculty supervision, programs of study that draw upon the resources of the entire University. Graduate programs in the School of Education provide opportunities for advanced study and research in education and foster the development of innovative responses to challenges in the field of education.

Graduate program concentrations are designed to meet licensure guidelines, licensing requirements, professional association recommendations, School and University requirements, and individual student’s goals.

Current information on courses offered is available from the departments or the School’s Website: www.umass.edu/education/.

All licensure programs are approved by the campus Teacher Education Coordinating Council and the Massachusetts Department of Education. For further information on licensure opportunities, contact the Educator Licensure Office, 130 Furcolo Hall, tel. (413) 545-2701.

Teacher Education and Curriculum Studies Department

The Teacher Education and Curriculum Studies Department is committed to the preparation and ongoing professional and intellectual development of teachers, teacher educator researchers, and educational specialists in Pre K-12 and post-secondary school settings. The department focuses on providing instruction, conducting research, and offering service that supports its commitment to preparing educators, examining curriculum frameworks and school organizational patterns, and developing educators who through their leadership contribute to equity and excellence in education in Massachusetts and throughout the nation.

The department offers doctoral concentrations that integrate course work, clinical experience, and research in the areas of:

- Child and Family Studies
- Language, Literacy, and Culture
- Mathematics, Science and Learning Technologies
- Teacher Education and School Improvement

The department also offers Master’s concentrations in:

- Bilingual/E.S.L./Multicultural Education
- Child Study and Early Education
- Elementary Teacher Education
- Reading and Writing
- Secondary Teacher Education
- Learning, Media and Technology

Through the department’s academic programs, graduate students may also pursue state-approved educator licensure in Early Childhood Education, Elementary Education, Reading Specialist, ESL, and in middle/secondary academic subject areas including English as a Second Language (PreK-6, 5-12), English (5-8, 8-12), History (5-8, 8-12), Mathematics (5-8, 8-12), Biology
Student Development and Pupil Personnel Services Department

The Student Development and Pupil Personnel Services Department focuses on the development of the individual student within the context of a variety of formal educational settings. Research and scholarship are linked to the study of individual students and their relationships and interactions in educational systems, families, and communities.

Graduate students participate in the development of research-based model programs and develop a deeper understanding of individuals and groups in formal educational settings. The department is home to a Ph.D. program in School Psychology and doctoral (Ed.D.) concentrations in Social Justice Education and Special Education. The graduate program in School Psychology and graduate concentrations in the areas of School Counselor Education, Special Education, and Social Justice Education are offered for students pursuing a Master of Education (M.Ed.) degree or a Certificate of Advance Graduate Study (C.A.G.S.). Graduate students may also pursue state-approved pupil personnel service licensure in the following areas:

- Teacher of Students with Moderate Disabilities
- School Guidance Counselor
- School Psychologist

Doctor of Education Degree Program

The Doctor of Education (Ed.D.) is a school-based degree awarded to individuals who successfully complete one of the department-based doctoral concentrations. All Ed.D. students develop expertise in human development, social justice issues and education, pedagogy, philosophy of education, and educational research. In addition, students develop expertise in a specific educational discipline.

The primary purpose of Ed.D. programs is to prepare educational leaders who will advance educational theory, practice, and policy through scholarship and disciplined inquiry. Graduates assume leadership roles in university, educational agency, and K-12 settings.

Doctor of Philosophy in School Psychology Degree Program

The Doctor of Philosophy (Ph.D.) degree is granted to those who successfully complete the American Psychological Association (A.P.A.) accredited School Psychology Program. All courses in the A.P.A. program must be graded with the exception of the practicum and internship. A detailed explanation of procedures to be followed by doctoral candidates may be found on the School of Education’s website under Academics and Advising Guidelines.

Master of Education Degree Program

The Master of Education (M.Ed.) degree program is designed to develop early childhood, elementary, secondary, and other professional educators. In addition, this degree program provides further professional development for educational specialists in the School’s areas of concentration. Within the framework of the Master’s degree requirements of the University Graduate School and with the advice of a faculty adviser, candidates for the M.Ed. must complete a minimum of 33 graduate credits. Eighteen of these credits must be graded, 12 must be at or above the 600 level, and a minimum of 21 credits must be taken in the School of Education. Individual programs may specify a particular course sequence. The School Counselor Education concentration requires 48 credits.

A detailed explanation of procedures to be followed by Master’s candidates may be found on the School of Education’s website under Academics and Advising Guidelines.
Certificate of Advanced Graduate Study (C.A.G.S.)

The Certificate of Advanced Graduate Study (C.A.G.S.) is offered to provide an intensive cohesive program of professional development for educational specialists beyond the Master’s level. It requires an academic specific specialty area, without the extended commitment and formal examination of a doctoral program. The C.A.G.S. is not a university degree program, but a School of Education certificate program. The certificate is awarded upon completion of a 30-credit-hour program of study beyond the Master’s degree. All 30 credits must be taken at the University of Massachusetts Amherst within a four-year period, and at least 15 credits must be taken in the School of Education. A minimum of 18 credits of coursework used toward fulfillment of the C.A.G.S. requirement must be at or above the 600 level. The procedure for application to the C.A.G.S. program is described above.

A detailed explanation of procedures to be followed by C.A.G.S. candidates may be found on the School of Education’s website under Academics and Advising Guidelines.

Licensure Programs for Educational Personnel

Graduate students may pursue coursework that qualifies them for licensure in Early Childhood Education; Elementary Education; Middle and Secondary Education in English, History, Political Science/Political Philosophy, Mathematics and the Sciences; English as a Second Language; Reading Specialist, Special Education; School Guidance Counseling; School Psychology; Administrator of Special Education; and Principal.

Related programs leading to educator licensure are also offered through the Master of Arts (M.A.) degree in the Art and Asian Languages and Literatures Departments (Chinese), the Master of Arts in Teaching (M.A.T.) in Foreign Languages (French, Italian, Portuguese, and Spanish) and Classics (Latin). Music and Art students may pursue educator licensure as an additional concentration within the Master of Music and Master of Arts degrees.

The Massachusetts Tests for Educator Licensure (MTEL) are required for educational licensure in Massachusetts. The University’s policy regarding the MTEL requires that graduate candidates for licensure must pass the Communications and Literacy Skills test in their first semester of study. All candidates must pass the Subject Test required for their licensure field (if a test has been developed for that license before enrolling in the practicum).

Students who completed licensure requirements at the university in 2006-07 had the following pass rates on the Massachusetts Tests for Educator Licensure:

- Communication & Literacy Skills: Reading: 100%; Writing: 99%.
- Academic Content Areas*: Early Childhood, 93%; English, 100%; Foundations of Reading, 97%; General Curriculum, 95%; History, 100%; Music, 100%; Visual Art, 100% (*Rates for specific secondary subjects—Biological Chemistry, Earth Science, English as a Second Language, General Science, Foreign Languages (French, Italian, Portuguese and Spanish), Latin and Classical Humanities, Mathematics, Middle School Mathematics, Political Science/Political Philosophy, and Reading Specialist—are not calculated because fewer than ten students took the specific subject assessment test.)

Information on licensure programs and the MTEL is available from the Educator Information Office, 121 Furcolo Hall, tel. (413) 545-2002.

Master of Education Site-Based Pathways

The School of Education offers several site-based Pathways for Early Childhood, Elementary and Secondary Education licensure.

- Early Childhood and Elementary Education Licensure
  - Bridges/Elementary Collaborative Teacher Education Program (C.T.E.P.)
- Secondary Education Licensure
  - Bridges/Secondary 180 Days in Springfield

Bridges to the Future

Bridges to the Future is a collaborative program between the Greenfield, Gill-Montague School, Orange, and Mahar Regional School Districts, and the North Quabbin Community Coalition. It provides a rigorous, intensive, year-long experience for prospective teachers in a diverse, urban school environment. The program is designed for graduating college seniors and college graduates holding baccalaureate degrees in mathematics, the sciences, history, political science/political philosophy, or English.

The program features a year of teaching and curriculum development in a middle or high school along with courses leading to a Master of Education degree and Massachusetts Initial Licensure in the respective subject area.

Science Education Online

The School of Education, in collaboration with the College of Natural Sciences and Mathematics and the College of Natural Resources and the Environment, and the University of Massachusetts Lowell, offers a field-based and online graduate degree program in science education for elementary and middle school teachers. Courses are offered onsite at the Springfield High School of Science and Technology and through UMass Online.

This program enhances knowledge of teaching science as well as science content knowledge. The program provides a course of study that leads to an M.Ed. (33 graduate credit hours) or a Certificate of Advanced Graduate Study (C.A.G.S.), (30 graduate credit hours). In addition, this program has been approved by the Massachusetts Department of Education for Professional Licensure for the following areas:

Teachers of General Science: Grades 5-8
Teachers of Earth Science: Grades 5-8
Elementary Teachers: Grades 1-6
Teachers of General Science: Grades 1-6
Teachers of Students with Moderate Disabilities: PreK-8.

Also, a 12-credit, non-degree program is available for those already holding a master’s degree and who seek an advanced graduate degree or certificate.

The content of each course in the program is based on the National Science Education Standards and Massachusetts Science and Technology Frameworks. Courses are developed using an inquiry-based, hands-on approach and are taught by experienced and motivated science educators.
Applications

Ordinarily, applications are accepted for fall semester admission. Some concentrations also admit students for the spring semester. Additional general information on the School of Education’s graduate degree programs can be found on the website www.umass.edu/education/. Specific information on graduate degree and certification programs may be obtained by writing to the Department Offices: Teacher Education and Curriculum Studies Department (Furcolo Hall), Student Development and Pupil Personnel Services Department (Hills South), and Educational Policy, Research and Administration Department (Hills South).

School of Education Curriculum

The following courses form the foundation of the School of Education’s curriculum. To provide opportunities for individualized studies, the School also offers experimental courses, topical seminars on contemporary issues, and field experiences.

All courses carry 3 credits unless otherwise specified.

505 Documentary Filmmaking for Education
Introduction to practical filmmaking for educators and others to document their research and educational endeavors. Emphasis on making super-8 films using live-action photography and editing techniques.

510 The Teacher in the Middle and High School Classroom
Lecture, discussion, and field experience. Purpose, problems, issues, strategies and materials in the teaching of social studies, mathematics, science, or English at the middle and high school level.

511 Teaching Mathematics in the Middle and High School
Lecture, discussion, field experience. Purpose, problems, issues, strategies, and materials in teaching mathematics at the middle and high school level. Required for licensure.

512 Teaching Science in the Middle and High School
Lecture, discussion, field experience. Purpose, problems, issues, strategies, and materials in teaching science at the middle and high school level. Required for licensure.

514 Teaching History and Political Science in the Middle and High School
Lecture, discussion, field experience. Purpose, problems, issues, strategies, and materials in teaching history and political science at the middle and high school level. Required for licensure.

515 Teaching English in the Middle and High School
Lecture, discussion, and field experience. Purpose, problems, issues, strategies and materials in the teaching of English at the middle and high school level. Required for licensure.

517 Introduction to Computer Use in Teaching
Introduces novices to uses of the computer in the teaching/learning process. Credit, 1-4.

519 Education and Public Policy
Analysis of selected issues and problems concerning the interaction between education and politics at the local, state, and national levels.

522 Education for SJE Self-Awareness
Strategies for increasing social justice educators’ self-knowledge. Experiential approach leading toward self-observation and development of effective responses to social justice education classrooms and teacher training. Prerequisite: EDUC 691E.

524 The Work of Middle and High School Teachers
Introductory course in the Secondary Teacher Education concentration; required for licensure. Field-based, requiring observation in the schools.

526 Curriculum Development in International Education
Designed to assist students in preparing instructional material that will bring the world into the American classroom. Discussions range from curriculum theory to international awareness to teaching strategies.

530 Economics of Education
Study of education policy issues from an economic perspective. Education examined in terms of impact on individual human capital and lifetime success and as an ingredient for community economic development.

533 Theories and Methods for Sheltered Instruction ELL
Prepares ELL and mainstream teachers to address the challenge of helping bilingual and emergent bilingual learners to succeed in regular academic content classes.

539 Using Film and Television in Education
Explores use of creative films and videos in educational settings; techniques used by filmmakers; methods for structuring film discussions.

542 Contemporary Educational Philosophies
Assessment of currently influential educational philosophies, such as essentialism, romanticism, behaviorism, experimentation, and perennialism. Special attention given to their relevance to practice in such areas as teaching methods and curriculum planning.

553 Construction, Validation, and Uses of Criterion-Referenced Tests
Steps in test development, preparation of domain specifications, item review techniques, test assembly, standard-setting methods, assessment of reliability and validity, guidelines for conducting test evaluations, and test uses.

555 Introduction to Statistics and Computer Analysis I
Develops skills in statistical reasoning; a conceptual understanding of basic statistical procedures used in educational and social science research and computational skills necessary to carry out procedures.

556 Education for Community Development
Explores ways in which education and development function in community settings, including human and social services, self-help groups, developing country projects, and community education.

559 Curriculum Development in Multicultural Education
Curriculum theory, design, and resources for multicultural education. Students develop units that can be taught in elementary and secondary schools. Credit, 1-3.

560 Issues in Instructional Methods for Special Education
Theory, research, and practical experiences related to the education and training of special needs students. Emphasis on curriculum development, methods and materials, assessment, vocational programming, and research.
561 Science Education in the Elementary Schools
For teachers or others who wish to update their knowledge of science-related methods, materials, and curriculum. Laboratory approach.

567 Introduction to Bilingual Education
Focus on legislation, court decisions, history, case studies, standards in certification, organization models, and cultural backgrounds in bilingual-multicultural education.

568 Curriculum Development in Urban Education
Development of innovative curricula for urban schools; kinds of curriculum development relevant to inner-city environments. A post-urban internship: lectures, seminars, and field experience.

570 Professional Orientation to School Counseling
An orientation to the profession of school counseling. Information and experience on how counseling services help people understand themselves and others. Knowledge from education, psychology, philosophy, history, and sociology examined and applied to guidance and personnel programs.

582 Curriculum Adaptations and Development for Bilingual Classrooms
Examines the linguistic and pedagogical rationales for developing curricula and strategies for adapting standard curricula and materials to meet the needs of students in bilingual classrooms.

588 Teaching About the Puerto Rican Experience
For teachers, prospective teachers, and other professionals. Basic introduction to Puerto Rican history, culture, experiences in the U.S., and strategies for implementing this understanding in curriculum.

601 College Student Development Theory
Introduces theories and research on college students’ development and their college experience. Theories describing patterns of growth and development and their application in higher education.

602 Curriculum Models in Early Childhood Education
Purposes, structure, and methods of current ECE models. Beliefs regarding nature of child development and learning, and importance of education assumed by each model.

604 Technology and Educational Change
Current theory and research on educational change, focusing on change efforts made with and because of information technology.

605 Theories and Procedures of Counseling Psychology I
Counseling psychology theory, methodology, philosophies, ethics, problems, issues of school counseling, and community psychology.

606 Theories and Procedures of Counseling Psychology II
Issues in counseling psychology and human service delivery, counseling skills, techniques, and ethics.

607 Occupational Psychology and Placement
Psychological factors in career decision-making theory, job classification systems, vocational assessment, career information and placement.

609 Multicultural Group Processes
Develops a theoretical and skill foundation for working with diverse groups in educational and work settings. Explores theories of intergroup relations, group development, and leadership that facilitate understanding of intergroup biases and conflict, multicultural dynamics in diverse groups, and conflict and cooperation in group life.

610 Investigating Science Classrooms
Fosters meaningful discussions about the nature and practice of elementary and middle school science education and enables teachers to identify elements of inquiry, conduct investigations, and implement scientific inquiry in their classrooms.

611 Testing, Assessment, and Evaluation in Bilingual and ESL Education
An introduction to the field of testing, assessment, and evaluation in second language education, including bilingual, ESL, foreign language settings.

612 Educational Web Design: Creation and Evaluation
Tools and procedures required to design a website for educational purposes. Prerequisite: experience surfing the Web, using email, and using word processing applications.

613 New Developments in Secondary School History and Political Science
Comparative study and evaluation of recent programs and practices in secondary school history and political science.

616 Principles of Second Language Learning and Teaching
Introduction to the theories of second-language acquisition. Critical examination of language learning to develop the ability to analyze classroom “discurso” and to work collaboratively as an expert and leader in classroom second-language learning.

617 Law and Higher Education
Laws that apply to higher education; how courts resolve conflicts among students, faculty, and administrators. Develops skills in legal analysis, research, writing, and in practicing preventive law; cost and benefits of resolving controversies through the legal process and alternative approaches to conflict resolution.

618 Law for School Leaders
Prepares educational leaders to be informed law teachers. Focus on how courts resolve conflicts in areas such as due process, discipline, search and seizure, liability for student injury, student and teacher freedom of expression, religion and association, dress codes, restrictions on teachers’ personal lives, racial and sexual discrimination, affirmative action, academic freedom, and school rules.

619 Qualitative Research Methods in Education
Introduction to the assumptions, language, logic, and methods of qualitative inquiry in educational settings.

620 Supporting L2 Literacy Development
Provides beginning and experienced teachers with theory and practice required to support academic secondary language literacy development.

622 Theories of Educational Equity
Theory and history of the idea of educational equity, causes of inequity, and equity as a policy goal. Includes application to K-12 schooling, higher education, and international contexts.

623 Project Planning and Proposal Development for Nonformal Education
For those who are or plan to be program personnel or consultants in nonformal education and human service programs. Planning and proposal development and how to improve its contribution to program success.

624 Contemporary and Historical Constructions of Social Justice Education
Theoretical issues related to manifestations of oppression with focus on social
constructions of race, gender and sexuality, and disability.

625 Staff Development Plans and Procedures
Construction and implementation of staff development models for school inservice; human/social services; business; nonprofit organizations; education in developing countries. Includes political, financial, ideological issues.

626 Social Theories in Education
Social theories and their contributions to education theory and practice. For doctoral students seeking a comprehensive introductory course in theoretical foundations in education.

627 Curriculum Design and Instruction for Social Justice Education
Theories and methods of instructional design, classroom teaching, and reflective practice in social justice education in K-16 settings.

628 Prevention and School Psychology: Foundations, Methods, and Applications
The multidisciplinary field of prevention science, its concepts, methods, research base, and applications, particularly as they apply to education, school psychology, and children's development. Principles and core elements of evidence-based interventions used to prevent or address problems in children and adolescents.

629 Policy Issues in International Education
An introduction to critical issues in education in the Third World. Content includes systems, problems, and innovations in formal and nonformal education in selected countries; roles of education in development; and international aid.

631 Laboratory in Developmental Counseling/Therapy
Interviewing and counseling psychology skills using systemic training frameworks with video practice.

632 Principles of Educational and Psychological Testing
Provides students with a solid foundation in educational and psychological testing and measurement skills.

634 Strategies for Institutional Change I
Basic theories of organizational behavior and change. Examines such strategies as action research, strategic planning, and negotiation, emphasizing the role of different kinds of leadership in the process of change.

635 Issues in Literacy Program Development
Analysis of basic concepts and issues related to adult literacy efforts in Third World and domestic settings. Identification of approaches and needs for planning, implementation, and research in field of adult literacy.

636 Professional Seminar in Education Administration
An orientation to the Graduate School and the Doctoral Program in Policy and Leadership Studies. Also prepares first-year doctoral cohort members in the development of skills in reading, writing, research, and presentation/discussion, contextualized in a set of seminal works in the field of educational administration and leadership.

637 Nonparametric Statistical Analysis in Education and Psychology
Inferential procedures that do not assume normality. Introduction of procedures that allow analysis in designs involving more than two categorical variables or that involve two categorical variables or that involve repeated, unordered qualitative variables. Prerequisite: EDUC 555 or equivalent.

638 Collaboration for Student Achievement
How to capitalize on the power of interorganizational and interpersonal collaboration so as to increase student achievement, empowerment, and performance.

639 School Counseling Curriculum: Development and Implementation
Development and implementation of school counseling curriculum in the broadest sense, from classroom guidance materials to systemswide proactive interventions.

640 Materials Development for Formal and Nonformal Education
Introduction to the design and production of a wide range of nonformal education materials. Emphasis on low-cost, simple technology (e.g., basic graphics, posters, games, simulations, popular theater, puppetry, hexagons, silkcreen) for use in nonformal education field settings.

642 Principles and Practices of Student Affairs Administration
Overview of the history, philosophy, theory, and professional practice of student affairs administration in American higher education. Emphasizes roles and responsibilities of effective administrators, and application of theory to practice.

646 Leadership for Curriculum and Instruction
The philosophy, principles, and practical application of learning theory, differentiated instruction, and performance assessment.

647 Methods and Materials in Special Education
Special needs strategies, programs, and materials. Students analyze and develop materials for cognitive language, motor, self-help, socialization, and emotional development, including Individual Education Plan.

648 Oppression and Education: Social Justice Education Foundations I
Historical and sociocultural contexts of the specific manifestations of oppression and social liberation movements. Examines disciplinary underpinnings of social justice education; content roots in cognitive, developmental and social psychology; anthropology; and sociology; and pedagogical roots in experiential education; feminist pedagogy; group dynamics; and critical pedagogy. Develops social justice education teaching materials and/or interventions.

649 Training for Nonformal Education
Skills needed to design and implement training programs for personnel in nonformal education, human services, and community development. Provides some direct experience in designing and conducting training exercises and assessing their outcomes. Emphasis given to non-classroom settings with cross-cultural components.

651 Teaching Mathematical Problem Solving
Problem-solving modes demonstrated, critiqued, and discussed. Related issues in mathematics education. Reflection on cognitive processes; connection to NCTM standards.

652 Planet Earth
Designed to give in-service and pre-service teachers hands-on knowledge of the Earth as a system. Focus on the interactions among the atmosphere, water (hydrosphere), soils and rocks (lithosphere), and the biosphere.

653 Collaborative and Integrative Teaching Strategies in Special Education
Dabased methods and materials for mainstreaming mild to moderately handicapped students into multiple learning environments and methods for developing
cooperative professional relationships with regular classroom teachers.

654 Policy Studies in Educational Administration
Overview of K–12 education policy at the local, state, and national levels in the United States. Additional emphasis on the ethical dimensions of the choices administrators make in implementing policy.

656 Introduction to Statistics and Computer Analysis II
Basic statistical techniques for conducting research. Topics include analysis of variance and covariance, multiple comparison procedures, multiple regression analysis, analysis of categorical data. How to analyze data using computer programs such as SPSS. Prerequisite: EDUC 555 or consent of instructor.

658 Knowledge and Skill Application Lab
Students encounter well- and loosely-structured tasks requiring the application and integration of knowledge and skills gained from principal preparation program courses, and receive individualized, growth-oriented feedback.

659 School Management
A core course required for students seeking a principal license. Integrates leadership with management skills: managing operation, resources, and governance structures; establishing successful, orderly, safe, and fiscally responsible educational environments; and working collaboratively and productively with all stakeholders.

660 Language and Literacy Instruction for Students with Disabilities
Identifies the theories of language acquisition, normal language development, and language disorders. Examines language assessment strategies, select assessment and intervention strategies appropriate for integrated settings, and conducts two language samples.

661 Educational Research Methods I
Essential skills for conducting empirical research studies in the field of education.

662 Integrated Methods
A constructivist approach used to explore critical topics and methods in education that are directly linked to a practicum experience. Topics include focused classroom and student observations, classroom management, Massachusetts Curriculum Frameworks, lesson planning and implementation, assessment practices, special education, and instructional technology.

663 Single-Subject Research Design in School Psychology
Advanced knowledge in methods and procedures for evaluating treatment outcomes using single-subject research designs. Topics include assessment, experimental design, and data evaluation.

664 Research in School Psychology and Group Design
Single-subject group research design. Sampling, interview and questionnaire construction, statistical methods, and development of research proposal. Credit, 1-3.

665 Organization for Curriculum Development: Basic Principles in Curriculum and Instruction
Procedures and criteria for curriculum development. Determining goals, creating and organizing learning opportunities, and evaluating effectiveness of curricula.

667 Theories of Discovery and Learning in Science and Education
Discovery processes in science and in science students; nature of reasoning, learning, and understanding through mental models. Research studies of factors affecting learning processes. Conceptual change and cooperative learning methods.

668 Learning Disabilities in Children and Youth
Introduction to causes and characteristics of learning disabilities and educational programs and strategies for learning disabled children and youth. Includes overview of assessment techniques and current research.

669 Policy and Legal Perspectives in Special Education
Historical and legal landmarks in special education from a national and international perspective. Sociological, philosophical, and cultural perspectives addressed. A field component, introduction of the IEP, and the community special education approach.

670 Language and Language Learning
Basic concepts from sociolinguistics and psycholinguistics; emphasis on topics having pedagogical implications for teaching reading, writing, and language in elementary and secondary schools.

673 Advanced Child Development
Theories and findings of modern developmental psychology and their implications for educational practice. Child development examined from biological-evolutionary, cognitive, social-emotional, cultural, and ecological perspectives. Empirical data for children’s development through childhood and adolescence into adulthood analyzed and critiqued from theoretical, methodological, and cultural frames of reference. Implications for educational practice explored.

674 Leadership in Higher Education
Analysis of major issues central to an understanding of the possibilities and problems of leadership in higher education.

677 Foundations of Bilingual/ESL/Multicultural (BEM) Education
Introduction to multicultural education including historical and cultural dimensions of racial and cultural minorities, biases in schooling, philosophies of cultural pluralism, and implementation strategies.

678 Cultural Studies and International Development
Examination of the central issues in cultural studies in the context of international development education, with primary stress on the relationship between knowledge and power to confront and critique notions of intellect and institution.

679 Assessment of Special Needs Children and Youth
Identifies the issues in early childhood assessment and the types of norm-referenced and criterion-referenced assessment development scales, formal and informal observation techniques, and team process issues.

681 Teaching of Reading and Writing on the Secondary Level
Principles, methods, and materials for teaching reading and writing to adolescents and adults. For teachers of reading, writing, and subject areas in secondary schools, colleges, and adult education programs.

684 Reading, Writing, Language, and Thinking
Contributions of cognitive, linguistic, and sociocultural theories to understanding reading and writing processes. Implications for reading, writing, and language instruction.

685 Developmental Psychopathology
Introductory overview of major dysfunctional behavior syndromes commonly encountered in educational and mental health settings. Topics include early detection, classification, referral, and remediation of behavioral problems.
687 Language Development and Literacy
Current theory and research on children’s development of oral and written language and its implications for reading, writing, and language instruction. EDUC 670 or 684 recommended.

688 Multicultural Counseling in Schools
Theories of social identity development in a family systems frame. Focus on skills and critical consciousness needed for multicultural counseling in schools, including analysis of one’s own ethnic and racial heritage.

691E Social Justice Issues in Education
An introduction to the dynamics of oppression at the individual, institutional, and sociocultural levels. Examines closely two specific forms of oppression in relationship to students’ identities; privilege and disadvantage related to social identity and social group membership. Core concepts include social power, privilege, dominance and subordination, prejudice, discrimination, and liberation.

701 Practicum in School Guidance
Individualized instruction and supervision in individual counseling. All students counsel clients at an off-campus agency or school. Credit, 3-9.

702 School-Based Consultation
Focus on the application of current theories and research related to the practice of the school psychologist as a consultant in the school setting.

703 Administration of Guidance and Psychological Services in Schools and Communities
Administration of counseling psychology and pupil, personnel, and community programs in terms of personnel, functions, facilities, institutional integration, and data processing.

704 Issues of Gender in Science and Science Education
Issues of gender relative to the participation of all individuals in science activity; historical and ongoing structures, policies, and practices that influence legitimacy and participation; and the intersection and relationships between social groups.

705 School Psychology Educational Assessment
Review of personality, visual-motor, achievement and interest tests—and their interpretation, selection, and administration. Standardization, reliability, and validity; case-study procedures; ethical considerations; and problems in human assessment. Knowledge of elementary statistics helpful.

706 Workshop in Science Education
Selected problems in curriculum and instruction in science. Credit, 3-6.

708 School Psychology Cognitive Assessment
Instruction and personal supervision in administration, scoring, and interpretation of most used psychological tests such as the WISC-R, WAIS-R, WPPSI-R, and Stanford Binet. Prerequisite: EDUC 705.

709 Seminar on Reading
Content varies each semester. For doctoral students to explore current issues and research on reading in depth.

710 Seminar in Mathematics Education
Survey of recent developments in elementary mathematics education and their implications for exploring mathematics in elementary and middle schools. Emphasis placed on NCTM Standards and the impact of technology on the learning and teaching of mathematics.

711 Recent Developments in Secondary Mathematics
Critical evaluation of current literature, research, and studies in curriculum and teaching of secondary school mathematics.

712 Advanced Methods in English
Critical evaluation of current literature, research yearbooks, and experiments in curriculum and teaching of English. Prerequisites: EDUC 515 and teaching experience.

713 Developmental Foundations of Social Justice Education
Factors that contribute to identity development as distinctive from cognitive or psychosocial identity, as derived from social identity groupings and played out in unequal social statuses.

716 Workshop in Reading Instruction
Seminar for advanced M.Ed. and C.A.G.S. students to explore holistic literacy evaluation, teacher-researcher theory and practice, and professional writing. Emphasis on implementation of teacher-researcher project.

718 Action Research in Schools
Introduction to the theory and practice of action research in schools and other informal and formal educational settings. Involves qualitative action research study.

719 Theory and Practice of Nonformal Education
Nonformal and popular education approaches to human development programs, particularly in international settings. An introduction to the basic philosophical and conceptual works in the field, including the theories of Freire, Illich, and others. Assumptions and theories of nonformal and popular education to practice in adult basic education, community, and health education; critical issues in the planning and implementation of nonformal education.

720 Theories of International Development for Educators
Examines capitalist, socialist, and humanist theories of social and economic development. Identifies the assumptions, underlying values, and operational principles characteristic of specific theories and explores their implications as international educators. A theoretical perspective for analyzing the role played by education in different development perspectives.

721 Research Methods in International Education
Introduction to research methods; students enabled to design and carry out field studies in international education. Techniques used in various social sciences; examples of their application to problems in international education. Survey methods, attitude and value analysis, interviewing and participant-observation techniques and research design. Models of design and techniques presented for critique. Each student sets up a research design and method outline for a specific project.

722 Research on Teacher Education
Research and overviews of initial and in-service education of novice and veteran teachers. Typical topics include induction programs, peer coaching, mentoring programs for new teachers, programs for experienced teachers, and evaluation of pre- and in-service programs. Prerequisite: EDUC 791A.

725 Recent Developments in Secondary Science
Critical evaluation of current literature, research and studies in teaching and learning secondary school science.

726 Introduction to Educational Leadership and Administration
An introduction to basic concepts, skills, strategies, and research related to leading and managing schools. Topics include
organizational culture and models of decision making, leadership, learning, and instruction.

729 Public School Finance
Economics of public education, sources of school revenue, taxation, and federal, state and local plans of school fiscal support. Prerequisite: EDUC 726.

730 Research on Teaching
Examination of the ecology of the classroom. Typical topics include a historical perspective on research on teaching, research on effects of teaching, teachers' knowledge, research on teaching specific subjects and grade levels, and responding to students' alternative conceptions of subject matter.

731 Structural Equations Modeling
For advanced doctoral students in education, psychology, and sociology. Techniques for specifying statistical models that conform to theory, fitting the models to data, testing the fit of the models and, based on the analysis, either rejecting or modifying the theory. Prerequisite: EDUC 771 or consent of instructor.

732 Behavior Analysis in Applied Settings: Theory, Research and Practice
An introduction to the field of applied behavior analysis applied to education, including conceptual foundations, methodology, applications.

733 Seminar in International Education
An integrating core experience for doctoral students focusing on international education. Current issues and areas of competency needed in the field.

734 Understanding Research in Language, Literacy and Culture
An introduction to the ways in which researchers interested in the intersection between the fields of language, literacy, and culture approach the activity of conducting, reading, and writing research.

735 Advanced Theory and Practice of Testing I
Theory of mental tests beginning with the classical test theory model and including such topics as reliability, validity, item analysis and test development.

736 Advanced Theory and Practice of Testing II
Introduction to modern test theory, often called item response theory. Topics include shortcomings of classical models and methods, basic concepts and item response theory models, parameter estimation, goodness of fit procedures, and specific applications including test development, detection of biased test items, test score equating, large-scale assessment, score reporting, and computer-adaptive testing. Prerequisite: EDUC 555.

737 Educational Media Theory
Research and theoretical aspects of media in education systems; special reference to philosophies, learning systems, and communication models which relate to the teaching-learning situation.

738 Survey of Mathematics and Science Education Research
Nature of understanding and sense making in science and mathematics, various theories of learning, process versus content goals, social versus cognitive views of learning, and inquiry versus directed teaching methods.

741 Principles and Practices School Psychology
Exploration of literature and methods in cross-racial counseling. Attention to specific methods of working in cross-racial situations and the development of inter-racial communication workshops. Credit, 3-6.

742 Problem Solving Methods for School Improvement
Examines assumptions regarding human nature and development, school reform, and problem solving. Builds collaborative problem solving and conflict resolution skills, comparing expert approaches with those used by average educational leaders.

746 Social Justice Education (SJE) in Schools
The integration of SJE as a pedagogical approach to teaching as content, and teacher competencies most appropriate for the SJE learning environment. Students integrate their knowledge of social justice education with classroom pedagogy, curriculum content, and teacher style/competence. Prerequisite: EDUC 691E.

748 Community Colleges in America
Study of the evolution of variant forms of two-year degree-granting institutions, with attention to related philosophical and social issues.

752 Gender Issues in International Education
Examines gender discourse in the field of Third World development, its historical trajectories, various phases and trends, and its effects on gender relations.

755 Curriculum, Methods and Programs in Urban Education
A survey of curriculum techniques, methods, materials, and programs related to teaching urban children. Students develop innovative methods and curricula for urban schools.

758 School Personnel Administration
Staff development and reflection. Adult development, personnel selection, orienting new teachers, mentoring, supervising and evaluating teaching, collective bargaining, arbitration, coping with incompetent staff, and building a learning community. Prerequisite: EDUC 726.

760 Special Education Organization and Management
Organization and management dimensions of special education administration internal to the school system. Concepts and theories for analyzing and understanding the principles and criteria.

762 School Psychology Social and Behavioral Assessment
Analysis of behavioral observation and assessment used to develop recommendations for school and community personnel. Overview of research-evaluating techniques.

765 Pre-Professional Internship in School Psychology
How to deliver psychological services: 300 hours of field work in a school setting. Wide range of professional experiences. Credit, 6.

766 Multicultural Organizational Development
Introduction and integration of the core elements of MCOD, organization development, and databased systems change, social justice and social diversity in schools and/or school systems. Prerequisite: EDUC 691E.

771 Applied Multivariate Statistics I
Matrix algebra, nature of multivariate distributions, tests of hypothesis on mean vectors, regression analysis including multivariate regression models, correlation techniques, applications to issues in educational research. Computers used extensively to analyze data taken from existing research studies. Prerequisites: EDUC 555 and 656.

772 Applied Multivariate Statistics II
Matrix algebra, linear models, profile analysis, analysis of multivariate experimental designs, discriminant, canonical,
and components analysis. Prerequisite: EDUC 771. Credit, 3-6.

775 Historical Foundations of Psychology and Education
The historical development of psychology as a field of study and its relationship to educational practice in the school setting. From the ancient Greeks to Wilhelm Wundt, to the work of John Dewey and William James in relation to educational practice.

776 Theory of Communication for Bilingual Education
Linguistic, psychological, and sociocultural aspects of communication; analysis and exploration of fundamental aspects of theory of communicative competence; emphasis on implications for bilingual schooling.

778 Higher Education Management Systems
Management issues in higher education. The general field of organization and management theory; situating management theory within higher education institutions; the distinct, overlapping, and sometimes conflicting roles and responsibilities of particular administrative positions within a college or university.

782 Teacher Education in Developing Countries
The unique challenge of designing teacher education systems, conceived broadly as teacher development and support, in low-resource contexts, with emphasis on Africa, Asia, and Latin America.

783 Diagnosis of Reading and Writing Difficulties
Diagnosis and treatment of reading and writing difficulties. Theory and interpretation of diagnostic procedures. Prerequisites: EDUC 670, 681, 684, or consent of instructor.

784 Issues in Children's Literature
Advanced seminar. Participants investigate references and children’s books dealing with issues of social significance, including death, old age, sexism, racism, divorce and war.

789 In-Depth Interviewing and Issues in Qualitative Research in Education
Theoretical and practical questions in phenomenological in-depth interviewing. For those interested in gaining experience with qualitative research in education using interviewing methodology. Project-centered course.

804 Cultural Perspectives on Educational Management
Explores definitions of culture and how cultural beliefs, values, and practices shape managerial work in education. Theories of culture and education management frame discussions of cross-cultural management practice.

807 Seminar in School Counseling
Designs and research on counseling and mental health services, professional and ethical standards, issues in cultural, political, and historical contexts of helping. Consent of instructor required (Doctoral Section).

808 Program Planning, Implementation and Evaluation in Special Education
Program philosophies, goals, objectives, strategies, activities, and evaluation, as well as personnel administration, staff management, and budget planning.

815 Researching Language, Literacy and Culture in Education: Ethnographic Perspectives
Ethnographic theory, methods, and techniques of researching language, literacy, and culture in educational settings. Students conceptualize and conduct a full ethnographic study and learn how to use reflection on the fieldwork experiences to construct (or deconstruct) and articulate the theoretical basis, methods, and findings of their research.

816 Technology and Educational Development
Modern technology and educational innovations and their adaptations to problems of developing countries. Students design a project for implementing specific innovations in context of a particular country.

817 Techniques of Educational Planning for Developing Countries
For advanced doctoral majors in educational development. Basic techniques of educational planning as currently used in Europe and developing countries. Students carry out a planning exercise for a given school system.

818 Alternative Approaches to Education
Various conceptions of rural development and the processes that affect it. Agrarian reform movements and traditional approaches to rural development provide examples and case studies used to analyze the different approaches to development problems in rural areas. Develops strategies to address specific problems and gender issues in rural development.

819 Alternative Research Methods for International Education
Historical and theoretical grounding in non-positivistic research approaches. Alternative research methodologies include feminist research methods and issues, discourse analysis and deconstruction as post-modern research approaches, and participatory action research approaches as emerging from a post-colonial historiography.

820 Research Practicum in Education
Education problems examined in varied field settings. Alternative solutions contemplated in the context of schools, state agencies, and federally sponsored projects.

821 Advanced Validity Theory and Test Validation
The major theories regarding the concept of “test validity” and major practices involved in validation.

830 Internship in School Psychology, Pre-doctoral
Supervised on-the-job counseling experience. Includes direct counseling, individual supervisory conferences, writing case reports, and analysis of taped counseling sessions. Consent of instructor required. Credit, 1-9.

836 History, Culture, and the Social Sciences Methods: the Education and Development of Children
The historical, philosophical, and cultural foundations of the development of young children and their families.

837 The Influence of the Social Context of Schools and the Politics of Reform on Teaching and Learning
The social context of U.S. schools and the myriad issues that underlie the call to “leave no child behind.”

838 Seminar in Science Education
Current literature and research in science education; researchable problems and research strategies which may be applicable.

844 History of Higher Education in America
Role of the college and university in American society, past and present. Meaning of a college education at various periods in American life.

845 Current Issues in Higher Education
Current issues confronting institutions of higher education and their policy implications. Prevailing viewpoints, problems, and opportunities associated with these issues.
846 The Academic Profession
The most current research and literature on faculty issues in higher education. Prerequisite: EDUC 692D or 844.

851 Principles of Supervision
Principles and problems of supervision and the exercise of educational leadership to improve instruction in elementary curriculum and secondary school content fields.

856 Principles of School Law
A comprehensive overview of legal issues emanating from the governance of U.S. schools. The extent to which federal and state governments exercise control over the education of children; the rights of students, teachers, and parents. Conflicts regarding religion and schools, community and parental curriculum prerogatives, special education law, and the question of teacher liability.

862 Educational Planning and Evaluation
An introduction to the field of education evaluation. Prepares for practical experiences in evaluation research projects. Key issues in the theory, methods, and practice of effective evaluations. Concentrates heavily on participatory evaluation.

863 Administration Field Experience
Part of a structured sequence of courses and field experiences leading to licensure. Supervised field experience in administrative activities. Credit, 1-12.

865 Theory and Research in Educational Leadership
Historical development of administrative theory. Emphasis on its contribution to research and development in educational administration.

866 Curriculum Development: Theory and Practice
Needs of children and society, modern programs, procedures for developing curricula and improving current offerings in a school. Includes clinical involvement in curriculum development in cooperating schools.

868 Advanced Seminar in Curriculum and Organizational Theory
Relationship between theory and practice in curriculum and organization. What organizational theory suggests for implementing school improvement. Emphasis on analysis and creation of leadership behavior.

869 Evaluation of Curriculum Programs
Role of evaluation in curriculum development and development of evaluative instruments. Nature of educational environment of schools; need for determining what makes a compelling curricular program. Prerequisites: EDUC 665 and 866.

870 Special Problems in International Education
For intermediate and advanced graduate students undertaking a study or project in international education. For those interested in examining a specific problem or subfield not covered in an existing course, or those wishing to combine a field project with analytical study relating experience to literature. Activities designed and contracted with individuals or small groups according to need. Credit, 1-6.

871 Design and Evaluation of Education Programs
Theories for program design, rationale, and evaluation. Takes a problem-based approach in which instruction is structured around the design and evaluation of model programs.

873 Seminar for Resource Personnel
Development of leadership skills for advanced graduates in the Integrated Day approach who act as advisers and resource people in the field. One year. Credit, 1-6.

880 Current Issues Facing Special Education Administrators
Contemporary issues facing administrators. Topics include special education finance, law, and policy.

881 Comparative Education
Processes and problems of educational development in selected areas throughout the world. Interrelationships between education and culture, in a multicultural context. Historical antecedents recognized, with major emphasis on cultural forces responsible for contemporary educational practices.

886 Group Counseling in Schools
Theory and practice in group counseling, with special emphasis on individual needs, group processes, and societal/community context. Focuses on the facilitation of positive interaction for educational and therapeutic groups. Knowledge and practical skills for working with students, teachers, administrators, and families at the elementary and secondary levels.

888 Participatory Action Research Methods
An approach to research and evaluation; theories and ethical issues; practice using specific methods; learning to choose an appropriate method for particular contexts and goals.

899 Doctoral Dissertation
Credit, 18.

Human Development

570 Child Development
Current concepts, themes, and theories in child development. Theories include psychodynamic, cognitive, biological, ethological, and moral development. Traces natural course of development from the beginning of human life to adolescence, by focusing on major developmental agenda for each stage. Prerequisite: SOCIOL 101, PSYCH 101, or consent of instructor.

600 Infancy: The First Stage of Development
Development from birth to age three discussed from classic psychoanalytic and psychodynamic perspectives. Contemporary research from biological, developmental, cultural, and ecological perspectives.

610 Language and Cognitive Development
Language and cognition from the development point of view. Emphasis on relationship between language and thought and changes in that relationship in the course of cognitive growth. Prerequisite: HUMANDEV 570 or equivalent.

660 Theories of Human Development
Major theories of human development. Emphasis on psychological theories and concepts. Relevance and relationship of biological, social, and anthropological concepts. Prerequisite: HUMANDEV 570 or equivalent.

670 Human Development in Adolescence and Young Adulthood
Human development during second decade of life. Emphasis on biological, psychological, and sociological aspects. Theories of adolescent development. Prerequisite: HUMANDEV 570 or consent of instructor.

773 Research and Theory in Early Childhood and Family Studies
Methods and techniques for studying developmental processes from birth to early childhood.
Requirements for the Doctor of Philosophy Degree

Ph.D. degree candidates are required to register for a minimum of 18 credits of E&C-Eng 899 (Doctoral Dissertation) and a minimum of twelve credits (four courses) from the student’s chosen core area. Residence, dissertation, preliminary and comprehensive examination requirements are described in the General Information section of this Bulletin. Information on requirements for the Ph.D. degree in Electrical and Computer Engineering is available on the departmental website at www.ecs.umass.edu/ece. Specific requirements for the Preliminary Comprehensive Exam are also available. A master’s degree in a field closely related to Electrical and Computer Engineering is generally required for admission to the Ph.D. program.

Requirements for the Master of Science Degree

Students entering the M.S.E.C.E. degree program in Electrical and Computer Engineering (ECE) are assigned to a faculty member who acts as their program adviser. For the non-thesis option, students select, in consultation with their adviser, a unified program consisting of a minimum of 30 graduate credits (10 courses, 7 of which must be in ECE), normally from courses chosen from the fields of engineering, mathematics, physics, and computer science. For the thesis option, students complete a Master’s thesis (E&C-ENG 699, minimum of 9 credits) in addition to 21 graduate credits (7 courses, 5 of which must be in ECE). Students select a major thesis adviser, usually after one semester of study, and in consultation with the thesis adviser, submit a proposal for thesis research to their thesis committee.

Candidates who have previously obtained an M.S. degree in a field closely related to Electrical and Computer Engineering are not eligible for admission to the M.S.E.C.E. degree program. Similarly, students admitted to the Ph.D. degree program will not be allowed to transfer to the M.S.E.C.E. degree program if they already have
an M.S. degree in a field related to Electrical and Computer Engineering. Detailed information on the requirements for the M.S. degree in Electrical and Computer Engineering is available on the departmental website at: www.ecs.umass.edu/ece.

Research Programs in Electrical and Computer Engineering

The Electrical and Computer Engineering Department is conducting active research and has supporting academic programs in the following areas:
1. Computer and embedded systems
2. Embedded security
3. Computer architecture
4. Real-time and fault-tolerant computing
5. Computer networks
6. VLSI design
7. Computer-aided design and test
8. Computer algorithms
9. Communication and signal processing
10. System modeling
11. Wireless systems
12. Microwave engineering
13. Remote sensing
14. Weather radar
15. Radar networks
16. Antennas and propagation
17. Theoretical and computational electromagnetics
18. Terahertz, millimeter and microwave circuits and devices
19. Physics of semiconductor devices
20. Physics of information processing
21. Computational electronics
22. Nanoscale fabrics and architectures

All courses carry 3 credits unless otherwise specified.

558 Introduction to VLSI Design (1st sem)
With lab. Introduction to VLSI design and custom design methodology in MOS. Topics include: MOS devices and circuits, fabrication, structures, sub-system and system design, layout, CAD techniques, and testing. Prerequisites: E&C-ENG 212 and 232 or equivalent. Credit, 4.

559 VLSI Design (2nd sem)
Lab. The design of very large scale integrated circuits. Experience in VLSI design through team projects emphasizing issues involved in the design of an entire custom chip. CAD tools used in the design process, resulting in specification of circuitry suitable for fabrication. Prerequisite: E&C-ENG 558.

563 Introduction to Communications and Signal Processing (1st sem)
Continuous-time (CT) and discrete-time (DT) signals and systems. DT processing of CT signals. DT and CT random processes and noise models. Analog communication systems and their performance in noise. Digital filter design methods. Prerequisites: E&C-ENG 313, 314.

564 Communication Systems (2nd sem) 4 cr
With lab. Waveform coding, source coding and data compression. Pulse modulation systems; signal spaces, optimal receivers, probability of error. Baseband and bandpass data transmission. Introduction to channel coding. Prerequisite: E&C-ENG 563.

565 Digital Signal Processing (2nd sem) 4 cr

568 Computer Architecture
Quantitative study of pipelined processor architectures, memory hierarchy, cache memory, Input/Output, RISC processors and vector machines. Prerequisite: E&C-ENG 232.

571 Microelectronic Fabrication (2nd sem)
With lab. Semiconductor instructional processing laboratory (SIPL) and lectures. Principles and practice of modern microelectronic silicon device processing. Theory and practice of basic processing technology including photo-lithography, oxidation, diffusion, thin film deposition, ion implantation, packaging, yield, and process integration. State-of-the-art laboratory fabrication of working microelectronic devices and process simulation techniques. Prerequisite: E&C-ENG 344. Credit, 4.

572 Optoelectronics (1st sem)
Theory and applications of modern optoelectronic components such as waveguides and optical fibers, photodetectors, light emitting diodes, and semiconductor lasers. Emphasis on the physics and operating characteristics of optoelectronic semiconductor devices. Prerequisite: E&C-ENG 344.

580 Feedback Control Systems
With lab. Time domain and frequency domain analysis and synthesis techniques for linear continuous-time feedback control systems. Topics include benefits and costs of feedback, modeling of dynamic systems, steady-state and transient performance, stability, PID control, root locus, frequency response, Nyquist stability criterion, and introduction to loop-shaping. Prerequisite: E&C-ENG 313 or consent of instructor. Credit, 4.

584 Microwave Engineering I (1st sem)
With lab. Electromagnetic theory applied to microwave propagation in waveguides, coaxial lines, microstrip lines, and striplines. Microwave circuit theory applied to matching networks and passive microwave devices. S-parameters, ABCD parameters, couplers, and equivalent circuits. Prerequisite: E&C-ENG 333. Credit, 4.

585 Microwave Engineering II (2nd sem)
Analysis and design of passive microwave devices, including resonators, filters, and ferrite devices in various transmission-line media. Noise and noise effects in detectors, mixers, and modulators. Introduction to FET amplifier design. Prerequisite: E&C-ENG 584.

597LL/697LL Trustworthy Computing
A layered approach to network security, with focus on the various security characteristics of wired and wireless networking at different layers of the network protocol stack. Topics include basic security concepts (e.g., cryptography), system security vulnerabilities, mechanisms for detection and prevention of attacks. Open to seniors or graduate students.

603 Probability and Random Processes
Elementary probability theory including random variables, p.d.f., c.d.f., generating functions, law of large numbers. Elementary stochastic process theory including covariance and power spectral density. Markov processes and applications. Prerequisite: E&C-ENG 314 or equivalent.

604 Linear Systems Theory
Matrix analysis, state variables, state space techniques for continuous time systems, matrix fraction descriptions. Controllability, observability, realization theory. Feedback and observers. Stability analysis.

606 Electromagnetic Field Theory
Physical and mathematical techniques for solving practical electromagnetic problems
quantum electronic devices. Prerequisite: E&C-ENG 607.

634 **Optimal Control Systems**
Mathematics background and basic techniques in the optimization of static, dynamic, and combinatorial systems. Basics of linear programming, calculus of variation, optimal control, dynamic programming, neurodynamic programming, random search, simulated annealing, genetic algorithms, ordinal optimization.

645 **Digital Communications**
Introduction to digital communications at the graduate level. Signaling formats, optimal receivers, and error probability calculations. Introduction to error control coding, source coding, and information theory. Prerequisite: undergraduate probability.

655 **Fault Tolerant Systems**
Reliability and fault tolerance techniques for commercial and special purpose computer systems. Failure models and statistics, testing, redundancy techniques, error correcting codes and self-checking circuits, reliability modeling, case studies. Prerequisites: E&C-ENG 314 and 568 or equivalent.

658 **VLSI Design Principles**
A graduate version of E&C-ENG 558. Topics in synthesis cover high-level synthesis, decision diagrams, multi-level logic, and sequential optimization. Topics in verification include symbolic techniques, combinational equivalence checking, and functional test generation. Prerequisite: undergraduate digital logic design.

665 **Algorithms**
Introduction to the design and analysis of algorithms. Topics include basic algorithmic paradigms (e.g., divide-and-conquer, dynamic programming, the greedy approach and randomization), their application to core problems in graph theory and optimization, and analysis of time and space complexity.

666 **Digital Computer Arithmetic**
Principles of algorithms for fast execution of arithmetic operations in digital computers. Basic operations in fixed-point, floating-point and unconventional number systems. More complex function evaluation, including trigonometric functions. Prerequisite: E&C-ENG 568 or equivalent.

667 **Synthesis and Verification of Digital Systems**
Modern techniques and algorithms for synthesis and verification of digital systems. Topics in synthesis cover high-level synthesis, decision diagrams, multi-level logic, and sequential optimization. Topics in verification include symbolic techniques, combinational and sequential equivalence checking, and functional test generation. Prerequisite: undergraduate courses in digital design and hardware organization.

671 **Computer Networks**
Fundamental concepts and systems aspects of computer networks. Topics include a review of the layered Internet architecture and encompass router design, lookup and classification algorithms, scheduling algorithms, congestion control, wireless protocols, and network security. The key technical and research questions in computer networks and the necessary analytical, simulation, and measurement techniques.

673 **Simulation and Evaluation of Computer Systems and Networks**
Simulation techniques. Random number generators. Basic statistics for analysis of simulation results. Techniques for speeding up simulation. Simulation of processors,
cache memory, and computer networks. Elementary queueing theory and Markov chains. Prerequisites: E&C-ENG 314 or equivalent; undergraduate course on computer architecture.

683 Active Microwave Circuits
Theory and techniques used in the design of modern microwave and millimeter wave active circuits. Emphasis on amplifier and oscillator circuits using devices such as FETs, HEMTs, HBTs and optoelectronic devices. Modern reference material used as much as possible. Prerequisite: E&C-ENG 585.

684 Microwave Metrology
Lecture, laboratory. Metrology fundamentals. Advanced microwave measurement techniques including error correction, de-embedding, and noise effects in amplifiers and oscillators. Prerequisites: familiarity with microwave CAD software, basic microwave theory.

685 Microwave Devices
Microwave solid-state devices and their applications. Transfer-electron devices, IMPATT diodes, GaAs, MESFETs, Schottky diodes, oscillator and amplifier circuits.

686 Introduction to Radar Systems
Introduction to fundamentals of radar systems. Radar range equation, critical radar components, and system performance. Detection, modulation, noise, and propagation effects. Prerequisite: E&C-ENG 584 or equivalent.

687 Antenna Theory and Design
Analysis and synthesis of antenna elements and arrays. Topics include linear antennas, self and mutual impedances, aperture, travelling wave, and broadband antennas. Prerequisite: E&C-ENG 334 or equivalent.

697A Advanced Computer Networks and Wireless Systems
A broad overview of the technical aspects of mobile computing and wireless communications covering their major building blocks: mobile applications, mobile computing platforms, wireless networks, architectures, and security. The wireless networks discussed with a review of wireless communication principles, wireless LANs with emphasis on IEEE 802.11, Bluetooth, sensor networks, UWB (Ultra Wideband), cellular networks ranging from 1G to 5G, wireless metropolitan area networks, and satellite communications.

697AB Security Engineering
Introduction to the new area of security engineering, a multi-disciplinary field combining technical aspects of applied cryptography, computer engineering, and networking as well as issues from psychology, sociology, policy, and economics. Examples drawn from recent research on campus and elsewhere. Several guest lectures presented by experts in the related disciplines. Prerequisite: senior or graduate standing in ECE or Computer Science.

697D Power Systems
Fundamentals of power systems. Includes three-phase circuits, transformers, AC machine fundamentals, transmission lines, power system representations, introduction to power flow studies. Prerequisite: E&C-ENG 212 or equivalent.

697FK Signal Processing
Introduction to signal processing, covering fundamentals of discrete-time signals and systems, design and implementation of signal processing systems, discrete-time random processes and applications, and adaptive signal processing. Prerequisites: undergraduate-level courses in signals and systems (equivalent to E&C-ENG 313) and probability (equivalent to E&C-ENG 314).

697V Radar Lifecycle Engineering
Radar systems engineering spanning needs analysis, technology readiness and risk reduction, conceptual design, detailed design and development, and production and lifecycle support. Emphasis on the system as a whole; case studies and semester-long group project. Prerequisite: E&C-ENG 584 or equivalent.

699 Master’s Thesis
Credit, 9.

723 Principles of Masers and Lasers
Quantum-mechanical description of typical maser and laser materials, fundamentals of maser amplification, analysis of maser and laser devices, review of applications. Prerequisite: E&C-ENG 607.

735 Stochastic Control Dynamic Systems
Advanced topics in modern stochastic dynamic systems: stochastic differential equations; numerical methods for SDEs; large deviation theory and its application; importance sampling; point processes; filtering in queueing networks, nonlinear filtering theory; LQG control for continuous time systems; identification theory; stochastic approximation theory.

745 Advanced Communication Theory

746 Statistical Signal Processing

784 Selected Topics in Microwave Systems
Selected topics of contemporary interest on microwave systems: advanced radars, active and passive microwave remote sensing instruments, large scale antennas, and microwave integrated circuits. Prerequisites: E&C-ENG 584 and graduate standing.

785 Selected Topics in Control Systems
Course varies according to current research trends.

786 Selected Topics in Communication Systems
Varies with research trends: signal space structures; time-frequency analysis; multiresolution analysis and wavelets; signal modeling; and spectrum estimation. Multidimensional signal processing, random processes in 2-D, fundamentals of image processing.

793, 794 Seminar in Electrical Engineering
Presentations of current research activities and literature by faculty and graduate students. Credit, 1 each semester.

899 Doctoral Dissertation
Credit, 18.
Graduate Faculty


Jenny S. Spencer, Associate Professor and Director of Graduate Studies, B.A., Iowa, 1973; M.A., 1975; Ph.D., 1982.

Joseph Black, Associate Professor and Associate Director of Graduate Studies, B.A., Toronto, 1985; M.A., Carleton University, Ottawa, 1986; Ph.D., Toronto, 1996.

Dara Wier, Professor and Director of M.F.A. Program, B.S., Longwood College, 1971; M.F.A., Bowling Green, 1974.

Jenny Adams, Associate Professor, California at Los Angeles, 1992; A.M., Chicago, 1994; Ph.D., 2000.


Suzanne Daly, Assistant Professor, B.A., Pennsylvania, 1993; M.A., Columbia, 1995; Ph.D., 2002.


Tanya Fernando, Assistant Professor, B.A., Chicago, 1991; M.A., New York University, 1995; Ph.D., Chicago, 2005.


James A. Freeman, Professor, B.A., Amherst, 1956; Ph.D., Minnesota, 1968.


Stephen J. Harris, Associate Professor, B.A., Bishop’s University, 1988; M.A., Ottawa, 1991; Ph.D., Loyola, 1998.

Anne Herrington, Professor, B.A., Susquehanna, 1970; M.A., Vermont, 1974; Ph.D., Rensselaer Polytechnic Institute, 1983.

Haivan Hoang, Assistant Professor, B.A., California at Berkeley, 1996; M.A., California State University at Hayward, 1999; Ph.D., Ohio State, 2004.


Ruth Jennison, Assistant Professor, B.A., Bryn Mawr, 1996; Ph.D., California at Berkeley, 2004.


Donna LeCourt, Associate Professor, B.S., Fitchburg State, 1985; M.A., Washington State, 1987; Ph.D., Ohio State, 1993.


Rachel Mordecai, Assistant Professor, B.A., Brandeis, 1990; M.A., University of West Indies, 1997; Ph.D., Minnesota, 2007.


Hoang Phan, Assistant Professor, B.A., Chicago, 1998; Ph.D., California at Berkeley, 2004.


David Toomey, Assistant Professor, B.A., Hamilton College, 1978; M.A., Massachusetts, 1986; Ph.D., Virginia, 1998.


James E. Young, Professor, B.A., California at Santa Cruz, 1973; M.A., California at Berkeley, 1976; Ph.D., California at Santa Cruz, 1983.


The Department of English offers programs and concentrations leading to the degrees of M.A., M.F.A., and Ph.D. Application forms should be obtained from and returned to the Graduate School. Deadline for applications is January 15, although applicants are encouraged to submit manuscripts to the M.F.A. Program earlier.

Master’s Degree Programs

For students who specify their candidacy in a doctoral degree program, the following is required for a master’s degree:

1. Ten graduate courses successfully completed with a cumulative average of 3.5 or above. Of these ten courses, two may be taken in a department other than English.
2. Proficiency in a foreign language.
3. Performance in an advising session.

For students who specify their candidacy in a terminal master’s degree program, the following is required:

1. Ten graduate courses successfully completed with a cumulative average of B or above.
Of these ten courses, two may be taken in a department other than English.

2. Proficiency in a foreign language.

For students who choose to write a master’s thesis, the following is required:
1. Eight graduate courses, as defined by the regulation (in 1.) above;
2. Proficiency in a foreign language;

Master of Fine Arts in English
The University of Massachusetts Amherst M.F.A. Program for Poets and Writers is dedicated to the creation of new and important writing. For almost half a century, it has been a place for writers to concentrate on their work and to write their books. The program provides opportunities for writers to gain experience in the fields of literary publishing, scholarship, arts administration, and the practice of teaching. Graduates of the program make significant contributions to contemporary letters through the publication of their work and in their roles as publishers, editors, educators, and in various fields in which writing and imagination are central.

The program is built around intensive writing workshops, seminars, private conferences, independent study, internships, and the completion and presentation of a book-length manuscript. M.F.A. candidates may specialize in poetry or fiction. Usually a three-year program, the degree requires 60 credit hours:
1. A minimum of four writing workshops
2. A minimum of three courses in modern and contemporary poetry and fiction
3. Six or more thesis credits
4. With the balance of their credits hours, all writers pursue an individualized course of study designed to make the best use of their time in the program.

Admission is based on writing samples and other standards. For more information, visit the program website: www.umass.edu/english/eng/mfa/mfaindex.html.

Doctor of Philosophy Program
Time required to complete the doctoral program is normally four years beyond the master’s degree.

For students in the doctoral program, the following requirements are in addition to those for the master’s degree:
1. Recommendation for the doctoral program by the committee for the advising session;
2. Six courses, of which at least four must be seminars or the equivalent, with a cumulative average of B or above;
3. Successful completion of the language requirements;
4. Residence for one year;
5. Satisfactory performance in the Ph.D. examination;
6. Satisfactory completion of a dissertation;
7. Some teaching experience.

All courses carry 3 credits unless otherwise specified.

502 Old English
Basic course in the Old English language; attention to grammar and reading early great poems.

505 Beowulf
Intensive study of the Old English epic, including questions of interpretation, prosody, and oral presentation.

521 Old Irish
Basic course in the Old Irish language. Class time divided equally between translation and grammar.

699 Master’s Thesis
May be repeated by M.F.A. candidates for a total of 18 credits. Credit, 3-9.

706 Middle English Literature
Representative poems, verse plays, and selected prose, exclusive of Chaucer.

708 Chaucer
Chaucer’s Canterbury Tales and the critical problems implicit in his works.

709 The Works of Chaucer’s French and Italian Periods
The complaints, the dream-visions, the later short poems, Boethius, and Troilus as combinations of medieval art and thought with pre-Renaissance motifs.

711 Technical Writing
Prepares students, trained in literature and rhetoric, to teach the communication skills essential to technical writing.

712 Writing and the Teaching of Writing
Methods, theories, and techniques of teaching prose composition.

713 Studies in Film
The uses of film in an English Department. The application of film terminology, theory, and aesthetics. The rhetorical elements of film and their relationship to other forms of communication. The relationship of film to print literature. Procedures for setting up film-related courses, obtaining films, and teaching film as film and as an extension of traditional literature.

721 The 18th-Century Novel
Readings in the English novel to the late 19th century, from Richardson to Conrad, with attention to some ten representative novels.

730 Literature of the 16th Century
Christian and humanist ideals reflected in the poetry of Skelton, Wyatt, Surrey, Sackville, Raleigh, Sidney, and Spenser.

731 The English Bible as Literature
The several main genres of Biblical literature in their historical setting. Principles in interpretation; the literary influence of the Authorized Version.

732 Shakespeare
Close examination of Shakespearean plays representing the characteristics of his dramatic art.

734 Elizabethan and Jacobean Drama
Representative plays by Shakespeare’s contemporaries, 1580-1642; emphasis on works by Marlowe, Jonson, Beaumont and Fletcher, and Ford.

737 Literature of the 17th Century
Readings in 17th-century prose and poetry from Donne to Marvell; analysis of the more significant areas of thought and style.

738 Milton
The major and some of the minor works; related studies in Milton scholarship and criticism.

740 Literature of the Restoration and 18th Century
Readings in English poetry and prose from Dryden to Burns, emphasizing the major writers and including representative plays.

745 Literature of the Romantic Period
Readings in the major poetry, representative essays, and selected critical writings, including Blake, Coleridge, Wordsworth, Keats, Shelley, Byron, and Hazlitt.

746 Literature of the Victorian Age

747 19th-Century British Novel
Major novelists in 19th-century Britain from Scott through Hardy.

750 Early American Literature
The major writers and intellectual movements in America during the 17th and 18th centuries.
American Romanticism
The development of American romanticism under European influence, stressing Cooper, Emerson, Thoreau, Poe, Hawthorne, Whitman, and Melville.

American Realism
The development of American realism from 1865 to 1914, stressing Twain, Henry James, Howells, and Henry Adams.

Afro-American Literature
Autobiography, poetry, and fiction by black Americans. Attention to the developing literary tradition embodied in the works of Douglass, Du Bois, Johnson, Hughes, Toomer, Brown, Hurston, Wright, Ellison, Brooks, Baldwin, Baraka, and Morrison.

Literary Criticism
Critical theory and practice with emphasis on the major philosophical critics beginning with Plato and Aristotle.

British Contemporary Fiction
British fiction from 1939 to present.

Contemporary Drama
British and American drama from 1950 to the present.

Contemporary Fiction
British and American fiction from 1945 to the present.

Contemporary Poetry
British and American poetry from 1945 to the present.

Modern Drama

Modern Fiction
Intensive study of the Modern short story and novel written within, or close to, the first half of the 20th century.

Modern Poetry
Intensive study of Modern poetry written within, or close to, the first half of the 20th century.

Imaginative Writing: Poetry
Writer’s workshop with emphasis on poetry. May be repeated by candidates for the M.F.A. for a total of 24 credits.

Imaginative Writing: Prose
Writer’s workshop with emphasis on fiction. May be repeated by M.F.A. candidates for a total of 24 credits.

Literature and Psychological Criticism
Introduction to the theory and practice of psychological literary criticism. Basic Freudian and Jungian theory and the application of that theory to literary analysis.

Folklore
Folk narrative: tale, myth, and legend in relation to written literature.

Seminar
Eight to twelve seminars per semester offered by professors in their areas of expertise.

Doctoral Dissertation
Credit, 18.

Entomology

Graduate Faculty

Stephen M. Rich, Associate Professor and Head of the Department of Plant, Soil, and Insect Sciences, B.S., St. Lawrence, 1989; M.S., Vermont, 1993; Ph.D., California at Irvine, 1997.

Benjamin B. Normark, Associate Professor and Graduate Program Director, B.A., Yale, 1985; Ph.D., Cornell, 1994.

Lynn S. Adler, Assistant Professor, B.S., Brown, 1993; Ph.D., California at Davis, 2000.

Anne L. Averill, Associate Professor, B.A., Smith, 1976; Ph.D., Massachusetts, 1985.

John P. Burand, Associate Professor, B.S., Defiance, 1972; M.S., Miami, 1974; Ph.D., Washington State, 1979.


Adam H. Porter, Associate Professor, B.S., Michigan State, 1983; M.A., California at Davis, 1986; Ph.D., 1989.


Roy Van Driesche, Research Professor, B.S., Oregon State, 1970; Ph.D., Cornell, 1975.

Adjunct/Associate Faculty

Ruth V. Hazzard, Lecturer.

Elizabeth M. Jakob, Professor of Psychology.

Norman A. Johnson, Research Assistant Professor.

A candidate for the Master of Science degree in Entomology, in addition to meeting the requirements of the Graduate School, ordinarily must complete the course requirements of ENTOMOL 326, 655 and 657 (or approved course) and related sciences or their equivalents as determined by the adviser, committee, and the student. Three graduate seminars are required. Students who are taking the non-thesis option must complete a special problems course (ENTOMOL 697A) that involves a project or research.

Requirements for the Doctor of Philosophy degree include the course requirements for the M.S. degree, Intermediate Biostatistics, Principles of Evolution, and those established by the Graduate School and the student’s committee.
Five graduate seminars are required. Interested students should contact Associate Professor Stephen Rich, the Graduate Program Director, for the most current requirements.

All courses carry 3 credits unless otherwise specified.

511 Insect Behavior (2nd sem, odd yrs)
Specific behaviors of insects analyzed from physiological, ecological, and evolutionary perspectives. Topics include communication, defense, learning, competition, spacing patterns, orientation mechanisms, dispersal and migration, host and mate finding, food selection, feeding, courtship, production of young, and social behavior. Prerequisite: PLSOILINS 326 or equivalent, or consent of instructor. Averill

523 Biological Control (2nd sem, even yrs)
Ecological principles of pest suppression via conservation, augmentation or introduction of natural enemies of insects, plants, and other pests. Biological control presented as foundation of sustainable agriculture and integrated pest management. Applications discussed for biological control in both production systems (farming, forestry) and for protection of natural ecosystems and rare species from damage caused by invasive, exotic pests. Van Driesche

572 Forest and Shade Tree Insects (2nd sem, odd yrs)
With lab. Ecology, biology and control of insects that attack shade trees, forests and forest products. A brief introduction to insects; attention to the more important forest and shade tree insects. Credit, 4. Elkinton

574 Medical Entomology (2nd sem, even yrs)
An in-depth analysis of the role of arthropods as disease vectors, including taxonomy, life history, epidemiology, and vector control, with particular focus on the major diseases transmitted by mosquitoes and ticks. Also examines how modern advances in molecular biology, immunology, genomics and theoretical population biology have improved our understanding of these systems and may lead to new intervention strategies. Rich

581 Integrated Pest Management (2nd sem, odd yrs)
Theory and application of the principles of insect, disease, and weed pest management; emphasis on insects. Focus on pest and natural enemy sampling techniques, properties of available control strategies, underlying ecological and behavioral principles, model pest management systems and societal concerns. Prerequisite: PLSOILINS 326 or equivalent or consent of instructor. Credit, 4. Van Driesche

655 Systematic Entomology (1st sem, even yrs)
Introduction to systematics: the identification of insects (primarily adult forms), current methods in systematics. Extensive insect collection required. Prerequisite: PLSOILINS 326 or equivalent. Normark

657 Insect Structure and Function (2nd sem, odd yrs)
Growth, development, and function of insects. Topics include the integument, endocrine control of growth, development, metamorphosis and reproduction, polymorphism, diapause, circadian rhythms, biological clock, photoperiodism, nutrition, respiration, circulation, excretion, and function of neuromuscular system. Prerequisites: PLSOILINS 326, BIOCHEM 420 and 421. Credit, 5.

666 Molecular and Cellular Entomology (2nd sem, odd yrs)
For students without strong background in cell and molecular biology. Basic eukaryotic genetics, cell biology and molecular biology, how molecular tools can be used in the study of insects. Prerequisites: one semester each of genetics, insect physiology. One semester of biochemistry helpful. Burand

671 Using Insects in the Classroom and Outdoor Setting: An Online Course
Provides teachers with essential background about insects for forming and answering questions. Techniques in securing information, rearing insects, and outdoor study presented. Effective use of new technologies highlighted. To check technical requirements, consult: www.umamherstonline.org/index.learn?action=Tech. Stoffolano

683 Insect Ecology (2nd sem, even yrs)
With lab. Major concepts of population and community ecology; emphasis on insects. Topics include methods for estimating density and mortality, population regulation, host-parasite models, competitive exclusion, species diversity, and insect plant interactions. Elkinton

697 Special Problems
Research on various problems and issues in entomology, contracted with individual faculty members. Credit, 1-6 per semester.

699 Master’s Thesis
Credit, 10.

792A, B Seminar
Credit, 1.

899 Doctoral Dissertation
Credit, 18.
Environmental Engineering

Graduate Faculty

(See Civil and Environmental Engineering for degrees, institutions, and years.)

John E. Tobiason, Professor of Civil and Environmental Engineering and Graduate Program Director, Environmental Engineering Program.

David P. Ahfeld, Professor of Civil and Environmental Engineering.

Casey Brown, Assistant Professor of Civil and Environmental Engineering.

Sarina J. Ergas, Associate Professor of Civil and Environmental Engineering.

David W. Ostendorf, Professor of Civil and Environmental Engineering.

Richard Palmer, Professor and Head of Civil and Environmental Engineering.

Chul Park, Assistant Professor of Civil and Environmental Engineering.

Mi-Hyun Park, Assistant Professor of Civil and Environmental Engineering.

David A. Reckhow, Professor of Civil and Environmental Engineering.

Erik Rosenfeldt, Assistant Professor of Civil and Environmental Engineering.

The Environmental and Water Resources (EWRE) Engineering Program is in the Department of Civil and Environmental Engineering (see Civil and Environmental Engineering for additional information). The objectives of the EWRE program are that graduates will: 1) enter the environmental engineering profession or continue with Ph.D.-level graduate studies, 2) be recognized by supervisors and colleagues as possessing the skills needed to successfully work in the environmental engineering profession, 3) provide service to society through involvement in professional societies, community groups, charitable organizations or similar activities, and 4) throughout their careers, use educational opportunities to continue to expand their understanding and skills in science and engineering for the protection of human health and the environment. These objectives are achieved through a program carefully prepared by students and their adviser. The basic understanding of environmental problems is obtained from a core of fundamental courses that relate theory to design practices.

Additional coursework and research opportunities are available in drinking water problems and treatment, groundwater hydraulics and quality, hazardous wastes, municipal and industrial wastewater treatment, solid wastes, water quality and pollution, water resources, and water supply.

Brochures containing detailed information on the requirements for the Master of Science degree through the EWRE Program are available from the Environmental Engineering Graduate Program Director, email: ceegrad@ecs.umass.edu. This information may also be obtained from the website: www.umass.edu/cee/eve.

Requirements for the Master’s Degree

The requirements listed here apply both to the Master of Science in Environmental Engineering and the Master of Science in Civil Engineering with a concentration in EWRE. In addition to the general Graduate School requirements for the M.S. degree, a minimum of 31 graduate credits must be earned by all degree candidates.

The Master of Science in Environmental Engineering is offered by the EWRE Program.

Students with Engineering Baccalaureate

Two options are available for students entering with an ABET accredited engineering baccalaureate: the Research option and the Professional Practice option. Students receiving financial aid must pursue the Research option. The Professional Practice option is designed to allow students to complete their degree in nine months, following a September admission. Core course requirements differ for the two options.

Core Courses

The core courses are intended to provide students with a basic technical foundation for selection of electives. For the Research option, the required C&E-ENG courses are: 670, 671, 672, 770, and 691 or 692. For the Professional Practice option, the required C&E-ENG courses are: 670, 671, 672, 679, 680, 692, and 770.

Engineering Design Credits

As a minimum, 10 graduate credits in engineering design must be earned. Design credits are obtained from the core courses and from selecting elective courses containing additional design credits.

Electives

Electives can be taken according to the student’s professional objectives. At least one of the following C&E-ENG courses must be taken: 525, 560, 577, 579, 660, 661, 680, or 776. Students may take electives from other departments; however, no more than nine graduate credits taken outside the Civil and Environmental Engineering Department can be counted towards the 31-credit requirement.

Thesis/Project

For the Research option students must complete a Thesis (C&E-ENG 699, 6 credits) or a Master’s Project (C&E-ENG 689, 6 credits).

Students with Non-Engineering Baccalaureate in a relevant science

The master’s degree graduate credit requirements are the same as those spelled out above for students with Engineering Baccalaureate. In addition, to be awarded the degree of Master of Science in Environmental Engineering, the student must satisfy, through previous or present undergraduate and graduate work, the following requirements:

Humanities and Social Science (at least 16 credits)

Mathematics (at least 16 credits beyond trigonometry)

The student must have taken courses equivalent to University courses: MATH 131 Calculus I; MATH 132 Calculus II; MATH 233 Multivariable Calculus; MATH 331 Differential Equations, and a statistics course.

Basic Sciences (at least 16 credits)

Basic sciences are considered to include physics, chemistry, and selected subjects from the life sciences and earth sciences.

Engineering Science (at least 32 credits)

Engineering Design (at least 16 credits)

The engineering science and engineering design requirements are usually satisfied by taking courses in the Civil and Environmental Engineering Department.

A Civil and Environmental Engineering Capstone Design course (C&E-ENG 469) is required as part of this 16 design credit requirement.

Master of Science in Environmental Engineering/Master of Business Administration

For those students interested in an interdisciplinary education that will provide them with a strong foundation in business, a solid background in environmental engineering, and an in-depth research or project experience, the College of Engineering and the Isenberg School of Management offer an M.S.Envr.E./M.B.A. dual master’s degree. In this 73-credit program (42 in Management and 31 in Engineering), students typically complete the two degrees in three years of study, and most of the required M.B.A. coursework (33 credits) in the first year. During the second and third years, students take a total of 31 credits in Engineering (13-17 core credits, 11-12 elective
Food Science

Graduate Faculty

Eric A. Decker, Professor and Head of the Department of Food Science, B.S., Pennsylvania State, 1982; M.S., Washington State, 1985; Ph.D., Massachusetts at Amherst, 1988.


Robert E. Levin, Professor, B.S., Los Angeles State, 1952; M.S., Southern California, 1954; Ph.D., California at Davis, 1963.

Raymond R. Mahoney, Professor, B.Sc., Reading, 1967; M.S., California at Davis, 1968; Ph.D., 1976.


Lynne McLandsborough, Associate Professor, B.A., Miami (Ohio), 1986; M.S., Minnesota, 1989; Ph.D., 1993.

Yeohwa Park, Assistant Professor, B.S., Seoul National University, Korea, 1988; M.S., 1990; Ph.D., Wisconsin, 1996.


Kalidas Shetty, Professor, B.S., University of Agricultural Sciences, Bangalore, India, 1983; M.S., Idaho, 1985; Ph.D., 1989.

Adjunct/Associate Faculty

Julie Caswell, Professor of Resource Economics.

Pavinee Chinachoti, Product Service Fellow, Hill’s Pet Nutrition, Inc.

Graduate students who wish to major in food science may not be admitted to candidacy for an advanced degree until such time as the undergraduate requirements in basic sciences and department courses have been met substantially.

All general Graduate School requirements for admission and for the degree must be met with the following additional requirements:

1. All Ph.D. candidates will offer, at a minimum, 9 credits of departmental 700-level courses, 3 credits of seminar, 6 credits of 500-level or higher courses outside the department, and 6 credits of 500-level or higher taken within or outside the department.

2. The Department of Food Science requires no foreign language competency for the doctoral degree.

3. Candidates for the M.S. degree may select one of two options in order to fulfill the Graduate School requirements.

a. M.S. degree with thesis, 10 credits may be allowed for the thesis.

b. M.S. degree nonthesis, minimum 36 graduate credits.

4. Candidates for the nonthesis M.S. degree must submit at least 15 credits of 600-700 courses and 2 credits of seminar. The nonthesis option is not open to candidates holding a departmental research assistantship.

All courses carry 3 credits unless otherwise specified.

541 Food Chemistry I

Overview of the chemical, physical, and biological properties of food components including proteins, lipids, carbohydrates, and pigments. Consequences of the properties of food components and their reaction products to health and nutrition also emphasized. Prerequisite: organic chemistry.

542 Food Chemistry II

Chemistry of food products. Chemical, physical, and biological changes in foods at the cellular and molecular levels during storage and processing. Emphasis on water, muscle and plant foods, flavors, carbohydrates and browning reactions. May be taken separately from FOOD-SCI 541. Prerequisite: organic chemistry. Mr. Mahoney

561 Food Processing

Basic principles of current technology and equipment of food processing. Raw material preparation, thermal processing, dehydration, cooling, freezing, mechanical processing. Credit, 4.

566 Food Microbiology Laboratory

(1st sem) 2 cr

Laboratory exercises emphasize qualitative control and experimental approaches to food microbiology. Labs teach basic culture methods, in addition to chemical, immunological, and molecular techniques employed for the microbiological analysis of foods. Prerequisites: MICROBIO 312 and concurrent registration in FOOD-SCI 567 or consent of instructor.

567 Food Microbiology (1st sem)

Principles of microbiology applied to food manufacture. Emphasis on influence of food formulation and processing on microbial growth, methodology to detect organisms in foods, design of industrial HACCP programs, and causative agents of food-borne...
755 Elements of Food Process Engineering
Topics include unit conversion, mass and energy balance, the principles of fluid flow, viscosity, heat transfer, refrigeration, evaporation, drying. Emphasis on industrial implementations in equipment and process calculations.

580 Foodborne Disease and Bioterrorism
Principal microbiological agents responsible for food-borne diseases: their classification, physiology, epidemiology, pathogenesis, identification, and control and case histories; where applicable, relation to past and potential bioterrorism-related events. Mr. Labbe

581 Analysis of Food Products
Physical, chemical, and biological techniques in food analysis: proximate analysis, extraction, densitometry, spectroscopy, rheology, microscopy, refractometry, polarimetry, chromatography; nuclear magnetic resonance, enzymatic and immunological assays, and sensory evaluation methods emphasizing theoretical basis of measurements and laboratory calculations. Prerequisite: CHEM 312 or equivalent.

696 Research Problem
Mainly for candidates for the Master of Science degree who do not write a thesis. Original research expected. Two bound copies of a written report of the study required by the department. Credit, 3-6.

699 Master’s Thesis
Individual research. Credit, 6-10.

722 Food Biotechnology
Genetics and cellular metabolism of industrial microorganisms, vitamin production, microbial production of amino acids, lactic acid, vinegar, beer and wine; plant and animal biotechnology, diagnostic biotechnology and food safety; biotechnology of functional foods. Prerequisites: general microbiology and biochemistry. Mr. Shetty

723 Advanced Food Microbiology
With lab. Relationships of yeasts, molds, and bacteria to foods. Microbiology of refrigerated foods, mycotoxins, pectic enzymes. Immunological and PCR detection of food-borne pathogens. Prerequisites: basic biochemistry and microbiology with lab. Mr. Levin

741 Lipid Chemistry

745 Food Biochemistry
Effects of storage and processing on food quality changes at the cellular and molecular levels. Morphology, concentration, and compartmentalization of cellular components; consequences of cellular disruptions; stabilizing and destabilizing events; role of membranes and their deterioration; mitochondrial respiratory processes; biological, chemical, and physical aspects of oxidative processes and strategies to control. Mr. Hultin.

761 Physical Phenomena in Foods
Physical and functional properties of foods: origin and modification of surface forces; electrophysical phenomena; colloidal aggregates and dispersions; stability of emulsions and foams; adsorption phenomena; properties of food polymers in solution; interfacial charge effects; structure and formation of gels.

762 Food Enzymology
The nature, role, and applications of enzymes in food. Enzyme production, isolation, kinetic behavior, and stability. Factors controlling activity in foods. Use of soluble and immobilized enzymes in food processing. Effects of endogenous enzymes on food quality. Mr. Mahoney

781 Advanced Food Analysis
Instrumental methods. Infrared spectrophotometry, mass spectrometry, gas and liquid chromatography. Theory, techniques and applications. Consent of instructor required.

785 Toxicology
Evaluation of methods used to determine safety of economically important chemicals. Mechanisms of drug disposition and drug metabolism. Effect of toxic agents on bone marrow and blood cell formation. Histopathology of chemically damaged organs, neurotoxicology and genetic toxicology (DNA damage, repair and tumorigenesis). Consent of instructor required. Mr. Levin

793 Seminar
Readings, reports and discussions on current literature in area of food or nutrition. Credit, 1 per semester; maximum credit, 3.

794 Seminar

796 Research Project

896 Research Project
Consent of graduate instructor required. (Not thesis; for Ph.D. candidates only.) Credit, 1-4.

899 Doctoral Dissertation
Credit, 18.
Graduate Faculty

Paul R. Fisette, Professor of Building Materials and Wood Technology and Head of the Department of Natural Resources Conservation, A.S., Johnson and Wales, 1972; B.S., Massachusetts at Amherst, 1974; M.S., 1986.

Matthew J. Kelty, Associate Professor and Graduate Program Director, B.S., Notre Dame, 1974; M.S., New York at Syracuse, 1979; Ph.D., Yale, 1984.


David T. Damery, Associate Professor in Building Materials and Forest Products Marketing, B.S., Massachusetts Institute of Technology, 1980; M.S., Carnegie Mellon, 1988; Ph.D., Massachusetts at Amherst, 2006.


Brian C. P. Kane, MAA Assistant Professor of Commercial Arboriculture, A.B., Holy Cross, 1992; M.S., Massachusetts at Amherst, 1997; Ph.D., 2002.


Timothy O. Randhir, Extension Associate Professor, B.S., Annamalai, 1982; M.S., Tamil Nadu Agricultural University, 1988; Ph.D., Purdue, 1995.


Charles M. Schweik, Associate Professor of Public Policy and Administration, B.A., SUNY College at Potsdam, 1984; M.P.A., Syracuse, 1991; Ph.D., Indiana, 1998.

Adjunct/Associate Faculty

David V. Bloniarz, Director, U.S.D.A. Forest Service, Urban Natural Resources Institute for the Northeast.


Brett J. Butler, Adjunct Assistant Professor and Director, Family Forest Research Center, U.S.D.A. Forest Service, Northern Research Station.

Joseph S. Elkininton, Professor of Entomology.

Aaron M. Ellison, Associate Professor of Biology, Harvard Forest, Harvard University.

David R. Foster, Director, Harvard Forest, Harvard University.

David A. Orwig, Research Associate, Harvard Forest, Harvard University.

Degrees offered are the Master of Science and the Doctor of Philosophy.

For the Forestry Program, areas of specialization include hydrology/watershed management, information technology, ecology, physiology, silviculture, forest land conservation, urban forestry, policy, and forest wildlife habitat management. Requirements for the Master of Science degree in forestry include completion of a minimum U.S. Forest Service employment requirements.

For the Building Materials and Wood Technology Program, specializations include wood science and technology, product development and processing, operations research and marketing, with emphasis on structural elements, components and systems for housing. There are no set course prerequisites for entry to the program.

Students may select a nonthesis option for the Master of Science degree.

All courses carry 3 credits unless otherwise specified.

NRC 549 Ecosystem Management

The historical context and key contributing ecological concepts of ecosystem management and alternative approaches for its implementation. Prerequisite: senior or graduate status in Natural Resources Conservation or consent of instructor. Credit, 4. Mr. McGarigal

NRC 592G Introduction to GIS for Natural Resources Management (1st sem)

Introduces students to the construction, manipulation, display, and analysis of spatial information using Geographic Information Systems. Hands-on use of ArcGIS on a PC platform. Mr. Schweik

NRC 597C Case Studies in Conservation (2nd sem)

Outside speakers from a wide variety of private and public conservation organizations present case studies in conservation and land protection. Seminar presentations supplemented by class discussion and student development of a case. Mr. Kittredge

NRC 597O Watershed Management (online course) (2nd sem)

Concepts in watershed conservation with integration of biotic, abiotic, and socioeconomic components. Transdisciplinary introduction to watershed-based ecosystem management and policy. Uses online tools, interactions, threaded discussions, and class projects. Mr. Randhir

NRC 601 Research Concepts in Natural Resource Management (1st sem)

Introduction to the research process in the natural resource sciences. Focus on research philosophy, concepts, and design, progressing from development of hypotheses, questions, and proposals, to grants and budgeting, and delivery of research products as reports, publications, and presentations. Mr. DeStefano

NRC 621 Landscape Ecology (1st sem, odd yrs)

The evolving discipline of landscape ecology, with emphasis on the theoretical underpinnings, focusing on ecological scaling; landscape structure; agents of landscape structure; consequences of landscape structure to populations, communities, and ecosystem processes; landscape dynamics; and landscape management. Emphasis on modeling. Prerequisite: graduate standing
in Organismic and Evolutionary Biology, Wildlife and Fisheries Conservation, Forestry, or consent of instructor. Credit, 4. Mr. McGarigal

NRC 697B Invasion Biology
The physiological and life history characteristics of invasive species; the characteristics of habitats that affect their susceptibility to invasion; and the effects of invasion on biodiversity and ecosystem processes.

NRC 697D Social Conflict and Natural Resource Policy (1st sem)
Introduction to the social factors that influence social value formation, and how the different meanings and values ascribed to natural resources in modern society contribute to political conflicts over resource allocation and management. Develops awareness of strengths and limitations of approaches, tools, and techniques of conflict resolution in policy development. Mr. Muth

NRC 697E Human Dimensions of Resource Management (2nd sem, odd yrs)
The social, behavioral, economic, and political aspects of natural resource management. Introduction to the concept of Human Dimensions, resource management as an expression of social value, and the contemporary resource management paradigm having Human Dimensions as a central component. Review of theoretical foundation and case studies. Mr. Loomis

NRC 697M Multivariate Statistics for Natural Resources (1st sem, even yrs)
Provides natural resource scientists with a conceptual and practical working understanding of the classic multivariate statistical techniques, and a framework for choosing the most appropriate technique given the question of interest and the properties of the data set. Emphasis on ordination, discrimination analysis, cluster analysis, and canonical correlation analysis and analysis real data sets using SAS. Credit, 4. Mr. McGarigal

NRC 697P Natural Resources Policy and Administration (2nd sem, odd yrs)
The fundamental actors and institutions in the process of public natural resources policy formation at the state, national, and international levels. Focus on forestry, wildlife, and fisheries, the role of significant laws, resources management agencies, interest groups, and judicial decisions. Mr. Muth

NRC 697S Applied Biostatistics for Natural Resources (2nd sem)
Intermediate statistics using examples from ecology. Topics include ANOVA, linear regression, contingency tables and non-parametric methods. Techniques discussed in lectures and applied in laboratories. Prerequisite: introductory statistics course. Credit, 4. Mr. Sievert

NRC 697T Information Technologies in the Public and Non-Profit Sectors (2nd sem)
Information technology management issues in public and non-profit organizations. Web system development, information technology planning, and relational database applications. Mr. Schweik

NRC 697V Watershed Science and Management (2nd sem, odd yrs)
Complex interactions between biotic, abiotic, and socioeconomic components. A transdisciplinary and systems approach to watershed-scale, ecosystem-based natural resources conservation and policy. Computer modeling, case studies, project, and presentations. Cross-listed with W&FCONSV 697V. Mr. Randhir

Forestry

515 Forest Fire Management (2nd sem, even yrs)
With lab. Principles of forest fire science (fire history, weather, effects of fire on organisms and the environment, fuels). Application of fire to forest management practices. Prerequisite: FOREST 197A, Mr. Patterson

521 Timber Harvesting (2nd sem, odd yrs)
With lab. Components of timber harvesting systems; felling, bucking, primary and secondary transport. Integration of components into safe, efficient, and cost-effective harvest systems. Lab: case studies of harvest operations in the field. Mr. Kittredge

526 Silviculture (1st sem, even yrs)
Silvicultural practices used to manage forests for timber production, wildlife habitat improvement, and watershed protection. Special focus on southern New England but techniques apply to forests throughout the world. Lab involves developing silvicultural plans for project areas. Prerequisite: FOREST 212 or equivalent. Credit, 4. Mr. Kelty

528 Forest and Wetland Hydrology (1st sem)
Hydrologic structure and function of forest, wetland, and agricultural ecosystems. Changes in water flow and quality associated with land and resource use. Management approaches to prevent or reverse adverse environmental impacts. Mr. Barten

534 Forest Measurements (1st sem, odd yrs)
With lab. Quantification and assessment of resource variables, sampling theory and design of forest inventories and other resource survey techniques, field exercises in resource inventory, statistical analysis of field data. Prerequisite: introductory statistics. Credit, 4. Mr. Kelty

540 Forest Resources Management (2nd sem)
Use of forests to meet multiple objectives. Summary of forest history, policies, programs and review of traditional and contemporary forest management principles and practices. Examples, site visits and reports, interaction with practitioners and landowners, term project and presentation. Prerequisites: FOREST 526, W&FCONSV 261 or equivalents; FOREST 521 and 597 desirable. Credit, 4. Mr. Barten

577 Ecosystem Modeling and Simulation (1st sem, odd yrs)
Systems modeling and analysis used to understand the complexities of natural systems. System representations, modeling, experimentation, optimization, and policy modeling. Computer modeling using STELLA and GIS. Cross-listed with W&FCONSV 577. Mr. Randhir

587 Introduction to Digital Remote Sensing
Computer processing of digital images as a means of obtaining information about natural resources. LANDSAT images primarily used. Image processing, classification and image enhancement techniques discussed and applied. Credit, 4. Mr. Finn

597E Ecosystem Science (2nd sem, even yrs)
Studies of ecosystems focus on units of the landscape in terms of productivity, nutrient cycling, hydrology, and response to disturbance. How plant physiology, soil biology and biochemistry, and energy transformations interact to create the dynamic behavior of ecological systems. Examples focus on terrestrial landscapes and comparisons of managed and unmanaged systems. Mr. Fownes
604 Forest Stand Dynamics
(2nd sem, even yrs)
The applied study of forest successions, including ecological disturbances, regeneration, and development to the old-growth stage. Consideration of how silvicultural techniques are used to control stand dynamics to meet timber, wildlife habitat, and other management objectives. Mr. Kelty

697A Forest Ecophysiology
The effects of resource availability on plant physiological processes at the leaf, plant, and stand levels. Topics include the effects of available light, water, and nutrients on leaf development, photosynthetic performance, and biomass allocation, and implications for species growth and competition in forest overstory and understory environments.

697U Urban Forest Management
(2nd sem, odd yrs)
A multidisciplinary introduction to urban and community forest management. Includes a team studio project that identifies a community forest problem for which the class develops an interdisciplinary solution. Mr. Ryan, Mr. Kane

698 Practicum/Non-thesis projects
Credit, 4-6

699 Master’s Thesis
Credit, 6-10

703 Advanced Forest Ecology
(1st sem, even yrs)
Methods for describing and analyzing forest ecosystem structure; effects of environmental factors on forest ecosystems; forest ecosystem processes and development. Prerequisite: Introductory course in ecology. Mr. Patterson

792A Seminar
Weekly seminars by invited guests, faculty and graduate students. Credit, 1.

899 Doctoral Dissertation
Credit, 18.

Building Materials and Wood Technology

508 Wood Moisture Relations
Lecture, lab. The fundamentals of wood-water relations and their effects on product processing, quality, and in-service performance; includes the study of modern techniques in the drying of wood. Field trips. Prerequisite: BMATWT 201 or consent of instructor.

511 Wood Adhesives Technology
Lecture, lab. Adhesion phenomena and the properties of adhesives; principles of wood gluing, methods of testing glued products, evaluation of results; processes and means of control. Prerequisite: BMATWT 530.

512 Wood Protection
Lecture, lab. Study of materials and methods used to protect wood and wood products from decay, fire, weathering, and other agents of destruction; includes wood preservation and finishing. Prerequisites: BMATWT 201, 304.

530 Mechanics of Building Materials for Construction
With lab. Introduction to the mechanical behavior of building materials for students of construction technology and architecture. Basic structural concepts of statics and strength of materials addressed in a practical manner. Prerequisites: MATH 104 and PHYSICS 131.

538 Chemical Modification of Wood
Lecture. The chemical nature of wood, chemical modification of wood; chemistry of products used with wood; potential contribution of wood to energy and chemical needs of society. Prerequisites: BMATWT 201, 304. Mr. Hoadley

540 Design of Wood Structures
Principles for design of individual wood components including beams, columns, trusses, wood/steel connections, and sheathing. Prerequisite: BMATWT 530 or CE-ENGIN 241.

552 Building Materials Distribution and Sales Management
Marketing channels of distribution, wholesaling, retailing, channel design, measurement, and management in the building materials industry. Personal selling, designing, developing and directing the sales force, sales training, evaluating the sales force, and the strategic role of sales in the building materials organization. Prerequisite: BMATWT 352 or other introductory marketing course. Mr. Damery

696 Independent Study
Credit, 1-6.

French and Francophone Studies and Italian Studies

Graduate Faculty


Michael Papio, Assistant Professor and Director of Italian Studies, B.A., Florida State, 1990; M.A., Virginia, 1993; Ph.D., Brown, 1998.


Roberto Ludovico, Assistant Professor and Graduate Program Director, Italian Studies, Laurea, Università di Bari, Italy, 1993; M.A., McGill, 1997; Ph.D., Brown, 2003.


Kathryn Lachman, Assistant Professor, B.A., M.A., Yale, 1998; Princeton, 2008.


Dianne Sears, Associate Professor, B.A., Massachusetts, 1979; M.A., Yale, 1981; Ph.D., 1990.


Adjunct/Associate Faculty

Jay Berkowitz, Professor of Judaic Studies.

Daniel Gordon, Professor of History.

William Moebius, Professor of Comparative Literature.

Catherine Portuges, Professor of Comparative Literature.

Charles W. rearick, Professor of History.
Master’s Programs

The graduate program offers several options at this level for students with a variety of backgrounds and career objectives: the Master of Arts (M.A.) in French and Francophone Studies for students who have a strong preparation in French at the undergraduate level (a major or possibly minor) and who want to undertake more advanced work in French studies (French language and linguistics, literature, cultural studies or literary theory); the Portfolio M.A. in French and Francophone Studies, intended particularly for candidates whose background or objectives do not fall within the traditional pattern, which is especially appropriate for those who have a professional goal other than teaching and/or who are interested in designing a program with an interdisciplinary emphasis, or for those who have an unusual background in French, such as extensive residence and work experience in a French-speaking country, and who would like to integrate this experience with the intellectual discipline of graduate study; and the Master of Arts in Teaching (M.A.T.) in both French and Francophone Studies and Italian Studies, a pre-professional degree for those planning to teach in secondary schools.

Students whose preparation is deficient in certain areas may be required to do remedial work once admitted to the program, but such work may not be counted toward the degree. Students transferring from other institutions may be granted up to nine semester hours toward the M.A. and up to six toward the M.A.T. Students transferring from other institutions may substitute another course. Its Native French-speakers may substitute another course.

The M.A. and M.A.T. programs require a terminal examination following the completion of coursework. A brief outline of the M.A. level degree requirements follows. More detailed information can be obtained by writing to the Graduate Program Director.

M.A. Degree Requirements

The following special requirements must be met:
1. A minimum of 30 graduate credit hours (up to 6 credits may be transferred).
2. Required courses. Three of the four courses listed below:
   - FRENCHST 670 Expository Prose (3 credits)
   - FRENCHST 681 French Civilization (3 credits)
   - FRENCHST 683 Textual and Literary Analysis (3 credits)
   - FRENCHST 801 Contemporary French Literary Theory (3 credits). Specific title and content would vary.
3. Distribution requirements. Four courses, one from each of the following:
   - Medieval or Renaissance
   - 17th or 18th Century
   - 19th or 20th Century
   - Francophone Studies
4. An examination, both written and oral, based on a reading list, is given upon satisfactory completion of course requirements.

M.A. Thesis

Candidates may elect to write an M.A. thesis for six of the 30 required semester hours of credit. This option makes it possible to explore one aspect of French or Francophone literature or culture in greater depth.

A student who elects this option must have the approval of his or her M.A. adviser and of the Graduate Program Director. The thesis may be written in either French or English; the choice, requiring the approval of the thesis director, depends upon the student’s preparation and objectives.

Portfolio M.A. Degree Requirements

Students admitted to this option are expected to draw up a tentative course of study and to write a rationale. A Guidance Committee works with the student to transform the proposal into a realistic, manageable program and draws up a list of courses and independent projects to be completed for the M.A.

The Portfolio M.A. consists of 33 credits, including three for the compilation and revision of the Portfolio materials and six for the required M.A. Thesis. While no specific course is required, candidates take a minimum of one graduate course in the three basic areas of language, literature, and civilization. The Master’s examination is based on the portfolio, a reading list, courses taken, and the M.A. Thesis.

M.A.T. Degree Requirements

The graduate program offers programs of study in French and Italian language and literature combined with professional preparation leading to the degree of Master of Arts in Teaching. The primary aim of the program is to prepare students with a B.A. degree to become effective classroom teachers at the secondary school level. Students completing this approved program earn a Massachusetts Initial License (Teacher of French or Italian, 5-12).

Required coursework in French is as follows:
1. FRENCHST 670 Expository Prose (3 cr)
   - Native French-speakers may substitute another course.
2. FRENCHST 697 French and Francophone Literature and Civilization for High School Teaching (3 cr)
3. Literature, Culture and Civilization courses, of which at least three credits must be in literature and three credits in civilization. These courses include one elective. (12 cr)
4. FRENCHED 572 Methods of Teaching Foreign Languages. This course is waived for students entering the program with initial licensure or substantial teaching experience. (3 cr)
5. FRENCHED 573 Advanced Methods of Teaching Foreign Languages (3 cr)
6. FRENCHED 774 Foreign Language Research or an equivalent research course (3 cr)
7. FRENCHED 500U Student Teaching (6 cr)
8. Courses to be determined by the School of Education (14 cr).

Fifty-seven credits total (44 credits for students for whom 572 is waived).

A written examination based on a reading list of eight works submitted by the student is given during the student’s final semester.

Required coursework in Italian is as follows:
1. 18 credits of Italian studies at the 500 level. Up to six credits may be transferred with approval of the Italian graduate adviser.
2. ITALIAN 572 Methods of Teaching Foreign Languages. (3 cr)
3. FRENCHED 573 Advanced Methods of Teaching Foreign Languages (3 cr)
4. ITALIAN 500U Student Teaching (6 cr)
5. Courses required by the School of Education (14 cr).

Forty-four credits total.

French and Francophone Studies

In addition to the courses listed below, other Special Topics courses (597, 697, 797, 897; credit 1-3) may focus on major authors, literary movements, critical theory, film studies, Provençal studies, etc., depending on student and faculty interests. Independent Study courses are offered under 596, 696, 796, 896; credit, 1-6.

Courses at the 500 level are open to both advanced undergraduates and graduate students. Note: A minimum of 12 credit hours must be taken in courses at the 600 level and above for the M.A. degree.
All courses carry 3 credits unless otherwise specified.

511 Introduction to Medieval French Studies
An opportunity to master the fundamentals of Old French in such a way as to enhance the pleasure of discovering a new language and learning to read and enjoy the many literary masterpieces that illustrate it. D. Maddox

564 Literature of Africa and the Caribbean
Cultural colonization and decolonization, the Negritude movement, contemporary writing in francophone West Africa, Haiti, and the French West Indies.

584 French Canadian Literature
Canadian poets, novelists, and dramatists writing in French.

601 Literary Movements

615 Literary Aspects of Medieval Courtly Culture (2nd sem)
Organized around a specific problem or theme; study of selected lyric texts, brief narratives, and courtly romances. Covers the Tristan legend, Chrétien de Troyes, and the Vulgate Cycle. Texts available in medieval French and modern French translations. D. Maddox

617 Medieval Representations of Selfhood and Society (1st sem)
Cross-generic studies of medieval institutions and attitudes in the epic chansons de geste, the Roman de la Rose, fabliaux, chronicles, and dramatic works. Emphasis on cultural perspectives and contemporary critical issues. D. Maddox

619 Medieval Drama (1st sem)
D. Maddox

624 Renaissance Prose
Selected texts by François Rabelais and Michel de Montaigne. Baillargeon

627 Renaissance Poetry
Representative poets of the 16th century. Attention to the Petrarchan tradition; the Pléiade; women poets. Baillargeon

629 French Theater from the Renaissance to the Classical Age
Major trends and representative plays of the period.

631 17th-Century Comic Vision
A cross-generic study of the representation of the writer at work and the interrelationship between literature and society in Molière’s time. Emphasis on works by Molière, La Fontaine, Bussy-Rabutin, Mme de Sévigné.

632 17th-Century Tragic Vision

634 17th-Century Philosophers and Moralists
The writers most important in classical thought, especially Descartes, Pascal, and La Rochefoucauld.

644/645 18th-Century Literature I, II
Variable topics, including chief writers and thinkers of the Age of Enlightenment; the satirical novel and the sentimental novel, and readings in the French theater from Le Sage to Beaumarchais.

656 19th-Century Realist and Naturalist Novel
Focus on the works on Flaubert, Zola, Maupassant, etc.

657/658 19th-Century Poetry I, II
Variable topics. Focus on major figures from the romantic movement through symbolism.

665/666 The Contemporary Novel
Readings in the nov el of social concern, the novel of personal and aesthetic concern, and the novel concerned with the human condition, tradition, and innovation.

667/668 Contemporary French Poetry I, II
Variable topics; major French poets from the turn of the century to surrealism and from surrealism to the present. Sears

669 20th-Century Theater
Major currents of modern French theater from symbolism to theater of the absurd as seen in representative plays. Sears

670 Expository Prose (1st sem)
Practice in the skills of expository writing in French through the composition of frequent short essays on a range of literary and intellectual topics.

671 Graduate Reading Course
Lamb

681 Issues in Contemporary French Civilization (2nd sem)

683 Textual and Literary Analysis
Combines theory and practice. Explores the potential for textual analysis based on literary texts from several different periods and genres, and in relation to a number of contemporary theoretical perspectives: feminism; Marxism, postcolonial studies; psychoanalysis; reader-response and reception theory; structuralist poetics and semiotics. Of particular interest to graduate students in the humanities and social sciences.

695 Culture and Marginality in Early Modern Europe
Study of the myths, mentalities, and popular traditions that thrived on the margins of Renaissance culture, using concepts in economics, ethnography, linguistics, psychoanalysis, and literary theory. Topics include witchcraft, popular cosmology, heresy, obscure private lives, and the “carnivalesque.” Taught in English. D. Maddox

697 Colette, De Beauvoir, Duras
Study of three major 20th-century French women writers. Topics include autobiography, mother-daughter relationships, aging, and political engagement. Sears

697R Le recit d’enfance
Bouvier

699 Master’s Thesis
Credit, 6.

771 History of the French Language
The French language from the Middle Ages to the present. Fundamentals of early French; dialects; popular idioms; the emergence of Modern French; French in the Francophone world; theories of language change; currents in French linguistics; today’s French in politics, commerce, and the media. D. Maddox

780 Bibliography and Methods of Literary Research
Required of candidates for the Ph.D.

791, 792, 793, 794, 795 Seminar
Credit, 1-3.

801 Contemporary French Literary Theory

809 Genre Course—Theater
French and Francophone theater from medieval drama to today. Wide ranges of theatrical approaches. Theater as a social commentary; relationships between theater and religion, political movements, postcolonialism, and questions of race and gender.

891, 892, 893, 894, 895 Seminar
Credit, 1-3.

897 Seminar in Rousseau and the Enlightenment
Mensah

899 Doctoral Dissertation
Credit, 18.
Courses in Preparation for Teaching

571 Applied Linguistics (French)  
French linguistics applied to teaching of French in secondary schools.

572 Methods of Teaching Foreign Languages (1st sem)  
Practice-oriented introduction; includes English. Various aspects of teaching the first level of all languages from elementary school through university. Prerequisites: senior status, fluency in teaching language and consent of instructor.

573 Advanced Methods of Teaching Foreign Languages (2nd sem)  
Practice-oriented; includes English as a Foreign Language. For advanced undergraduates, graduate students and practicing foreign language teachers. Methods of teaching foreign languages at intermediate and advanced levels. Focus on preparation of teaching materials. Prerequisite: fluency in the teaching language. FRENCHED 572 useful but not necessary.

672 Teaching Assistant Workshop I  
Training of new teaching assistants in techniques of the teaching of French. Credit, 2.

697 Practicum in French and Francophone Literature and Civilization  
Approaches to teaching literature and culture on the high school level, working with the Advanced Placement reading list and intermediate-level works. Sears

698 M.A.T. Teaching Practicum

774 Foreign Language Research  
Recent research studies in foreign language education.

Italian Studies

507 Dante and the Duecento  
Selections from the works of Dante and his contemporaries; intensive study of the Divine Comedy.

514 Prehumanism and the Early Renaissance (2nd sem)  
Literature of the 14th and 15th centuries; Petrarcha, Boccaccio, Poliziano, Lorenzo de Medici, Michelangelo.

524 The High Renaissance  
Literature of the late 15th and 16th centuries; Machiavelli, Castiglione, Ariosto, Tasso.

554 Neoclassicism and Romanticism  
The works of Foscolo, Leopardi, and Manzoni.

555 19th-Century Novel  
Development of the novel from Verga to Svevo.

559 19th-Century Theater  
Italian theater from Verga to the present.

564 Pirandello and Theatricality  
Theoretical readings on “theatricality,” from Freud, Benjamin, Kafka, Lacan, and Derrida used to deconstruct representation in terms of “repetition”. The divide between reality and illusion and madness and sanity as the fundamental deictic dilemma of Pirandello’s pathbreaking play, Six Characters in Search of an Author. Focus on its key issues in order to understand the challenges of “Pirandellian” writers Primo Levi and Antonio Tabucchi. How these writers demonstrate the impossibility of showing life’s miscellany.

565 20th-Century Novel  
Development of the novel from Pirandello to the present.

567 Modern Poetry  
Selected Italian poetry of the modern age.

569 20th-Century Theater  
Development of the Italian theater from the early grottesco to the present. Chiarelli, D’Annunzio, Pirandello and the theater of the absurd, Betti, De Filippo and others.

Graduate Faculty

Michael L. Williams, Professor and Head of the Department of Geosciences, B.S., Amherst, 1978; M.S., Arizona, 1982; Ph.D., New Mexico, 1987.

Sheila J. Seaman, Associate Professor and Graduate Program Director for Geosciences, B.A., Bryn Mawr, 1979; M.S., Arizona, 1983; Ph.D., New Mexico, 1988.


David F. Boutt, Assistant Professor, B.S., Michigan State, 1997; M.S., 1999; Ph.D., New Mexico Institute of Mining and Technology, 2004.


Christopher D. Condit, Associate Professor, A.B., William and Mary, 1970; M.S., Northern Arizona, 1973; Ph.D., New Mexico, 1984.

Michele L. Cooke, Associate Professor, B.S.E., Princeton, 1989; M.S., Stanford, 1991; Ph.D., 1996.

Robert M. DeConto, Associate Professor, B.A., Colorado, 1987; M.S., 1993; Ph.D., 1996.


Julie Graham, Professor, B.A., Smith, 1968; Ph.D., Clark, 1984.

Michael J. Jercinovic, Assistant Professor, B.S., New Mexico, 1979; Ph.D., 1988.


Lynn Margulis, Distinguished Professor, B.A., Chicago, 1957; M.S., Wisconsin, 1960; Ph.D., California at Berkeley, 1965.

Steven T. Petsch, Associate Professor, B.S., Pennsylvania State, 1994; Ph.D., Yale, 2000.


Qian Yu, Assistant Professor, B.S., Nanjing University, China, 1999; M.S., 2001; Ph.D., California at Berkeley, 2005.


The Department of Geosciences offers the Ph.D. degree and welcomes applications from qualified applicants in geology, geography, and related fields. The department also offers Master of Science degrees in Geology and in Geography.

Requirements for the Doctor of Philosophy Degree in Geosciences

The general requirements for the Ph.D. degree are those of the Graduate School. All candidates are expected to have a background approximately equivalent to this University’s M.S. degree in geology or geography, although this by no means precludes individualized programs for those entering with special strength in another discipline. All candidates should be familiar with the current M.S. degree requirements. Additional requirements for the Ph.D. are as follows:

1. Course work or independent study deemed necessary to prepare the candidate for the preliminary comprehensive examination. A program of study must be approved by the faculty.

2. Ph.D. candidates are expected to gain some experience in teaching.

3. Qualification at the journal level in one foreign language. By Graduate Council ruling, English is a foreign language if the candidate’s native language is not English. The language requirement can be fulfilled either by appropriate course work or examination.

4. Enrollment in the Seminar GEO-SCI 791A Developing a Research Proposal during the first semester of residence.

5. Passage of a preliminary comprehensive examination based upon a research proposition.

6. Participation in each semester of residence in GEO-SCI 701 Professional Seminar, and at least one oral presentation of research results in this seminar.

7. The departmental requirement for Ph.D. dissertation credits is a minimum of 10 and a maximum of 27.

These requirements are implemented with the aid of a Guidance Committee. Full details of the program are contained in the graduate student manual available in the department.

Master of Science Degree in Geography

The general requirements for the M.S. degree are those of the Graduate School as stated in the Graduate School Bulletin. In addition the following are required:

1. The M.S. degree requires 30 graduate course credits of which 22 must be in Geography (including thesis credits).

2. GEO-SCI 1604 Geographic Theory and Analysis, a one-term seminar normally taken during the first term in residence.

3. One graduate course in methodology and techniques (not necessarily limited to courses offered in the Geography Program). Eligible courses include those primarily concerned with cartography, computer methods, statistics, survey research, geographic information systems, remote sensing, or photogrammetry. Other methodology courses may be approved to meet this requirement upon request to the Geography faculty. This requirement may not be satisfied through an independent study or special problems course.

4. Additional courses in at least four subfields selected from the following list:
   a. Climatology
   b. Geomorphology and Quaternary Studies
   c. Land and Water Policy and Natural Hazards
   d. Cartography and Spatial Data Analysis (also satisfies Requirement 3: “Methodology and Techniques”)
   e. Urban and Economic Development Studies
   f. Social and Behavioral Studies.

Up to two subfields may be waived by the faculty based on upper-level undergraduate or graduate courses previously completed by the student with a grade of B or better. Courses taken at the graduate level in other departments may satisfy up to two subfields upon written request to the Geography faculty.

5. Each entering student will be interviewed by the faculty and assigned a temporary adviser. The student will work out with the adviser a proposed program of study. Progress in that program will be reviewed each semester by the faculty as a whole. Any deficiencies in the student’s preparation for graduate study will be identified at the beginning of the student’s program and appropriate courses may be required.

6. A candidate may elect a program with or without a thesis. The former is appropriate for those with strong focused research interests, and the latter for those wishing to emphasize breadth of geographic and interdisciplinary knowledge.
The thesis is encouraged by the faculty for most students. No later than the end of the third semester, a student must have either a thesis or nonthesis proposal approved.

If the thesis option is selected, the candidate must deliver an informal lecture on the subject of such thesis in the Department Seminar (GEO-SCI 388) or equivalent forum. The candidate must also pass an oral thesis examination (defense).

If a nonthesis option is selected, the student must propose by the end of the third semester a major paper, set of papers, or equivalent project satisfactory to his/her adviser and at least one additional Geography faculty member (who will constitute the student’s Graduate Committee). In addition to completing such paper or project, the student must pass a General Examination administered by at least three members of the Department Graduate Faculty. A general examination may be administered either orally or in writing or both, and must include questions from at least two subfields selected by the student from the list in item 3 above.

7. Under the thesis option, no more than 6 credits, in addition to thesis credits, may be earned through independent studies (596, 696 ...) or special problems (597, 697 ...) courses. Under the nonthesis option, no more than 12 credits may be earned in such courses.

8. Under the thesis option, the student may elect to register for as many as 10 thesis credits (GEO-SCI 699), which will be counted toward the 30 required graduate credits. No thesis credits will be accepted under the nonthesis option. (N.B. The Graduate School Regulations require that at least 6 credits be earned at the 600-800 level for the thesis option and 12 credits at that level for the nonthesis option.)

All courses carry 3 credits unless otherwise specified.

Geosciences

513 Crystal Chemistry of Rock-forming Minerals (1st sem)
Crystal structures, site populations, compositional variations, polymorphism, structurally related physical properties, and classification of rock-forming silicates and oxides at upper undergraduate level. Prerequisites: GEO-SCI 311 and 321 or equivalent. Credit, 1-2.

515 X-Ray Fluorescence Analysis
Theoretical and practical application of x-ray fluorescence analysis in determining major and trace element abundances in geological materials. Prerequisite: Analytical Geochemistry, or consent of instructor. Credit, 2.

517 Sedimentary Geochemistry (alt 1st sem)
With lab, field trip. Applications of geochemistry to the study of modern sedimentary environments and sedimentary rocks. Geochemistry of carbonates and evaporites. Use of stable isotopes in paleoenvironmental analysis. Oxidation-reduction processes and their significance for rock formations. Geochemical transformations during burial of sedimentary sequences and the formation of petroleum. Prerequisite: GEO-SCI 445 or equivalent; college chemistry recommended.

519 Aqueous and Environmental Geochemistry (alt 2nd sem)
With lab. Chemical processes affecting the circulation of chemical compounds in natural waters. Geochemistry of precipitation, rivers, lakes, groundwater, and oceans; applications of thermodynamic equilibria to predicting composition of aqueous systems. Behavior of trace metals and radionuclides in near surface environments. Prerequisite: CHEM 111, 112 or consent of instructor. Credit, 4.

521 Petrography (2nd sem)
With lab. Identification of minerals in thin section; common igneous, sedimentary and metamorphic rocks in thin section; routine petrographic calculations and measurements; introduction to petrogenetic theory. Examination of selected igneous and metamorphic rocks in the field. Prerequisite: GEO-SCI 321 or equivalent training; GEO-SCI 513 recommended also. Credit, 3-4.

531 Tectonics (alt 2nd sem)
Past and present mechanisms of global tectonics, including mountain building, ocean basin structure, continental drift, mantle processes, continental evolution, structural geology and petrology of Earth’s crust, and the tectonic history of selected key regions of the globe. Prerequisites: GEO-SCI 321, 431. Credit, 4.

539 Advanced Geological Mapping (1st sem)
Complete series of operations required for publication of a geological map: field location and drawing of contacts, collection and interpretation of field notes, data reduction, drafting, and methods of reproduction. Two afternoons per week in the field. Prerequisites: GEO-SCI 321, 431 or equivalent training.

541 Paleocology
Survey of theoretical paleontology, including functional morphology, large-scale changes in environmental history, and community changes through time. Prerequisite: GEO-SCI 341. Credit, 2.

551 Geometrics (alt yrs)
Design of geological experiments; collection and analysis of quantitative data in geology.

560 Geomorphology (2nd sem)
Earth surface processes and resulting landforms. Includes physical and chemical weathering, hillslope, fluvial, eolian, and coastal processes and their relationships to landforms. Field trips by arrangement. Prerequisites: at least 12 credits in geology, physical geography, or related fields; first-year courses in physics and chemistry recommended. Credit, 4.

563 Glacial Geology (1st sem)

567 Planetary Geology (alt 2nd sem)
Geology of solar system. Emphasis on the solid bodies, age, sequence of events, composition, surficial and internal geologic processes. Geologic mapping of selected portions of Moon, Venus, and Mars using recent imagery from the space program. Consent of instructor required.

571 General Geophysics (1st sem)
Physics of the earth and the gravitational, magnetic, electrical, and seismic methods of geophysical exploration. Laboratory problems and computations. Prerequisites: GEO-SCI 321 and 331, or consent of instructor.

573 Environmental Geophysics (2nd sem)
Application of seismic, gravity, magnetic, and electrical methods used in geophysical exploration. Field techniques, data compilation, and basic interpretations used to support shallow subsurface studies and environmental or hydrologic programs. Lectures, laboratory and field problems. Prerequisite: GEO-SCI 571.

575 Paleomagnetism
Lecture, seminar. The magnetic field recorded in rocks. Rock magnetism, description of the earth’s magnetic field, lab
587 Hydrogeology (2nd sem)
With lab. Basic principles of theoretical and practical hydrogeology. Topics include the hydrologic cycle, principles of groundwater flow, groundwater hydraulics, occurrence of groundwater in geologic materials, aquifer analysis, field methods, introduction to groundwater modeling, and chemistry of groundwater. Prerequisite: one year of geology; introductory calculus course recommended. Credit, 4.

591A Analytical Geochemistry
A review of modern analytical techniques widely used for the chemical analysis of geological samples. Topics include optical emission and absorption spectrometry, X-ray fluorescence and diffraction analysis, neutron activation analysis, and mass-spectrometric isotope dilution analysis. Emphasis on the principles of these techniques, the sources of error, and the role they play in analytical geochemistry. GEO-SCI 321 or 415 recommended. Enrollment limited.

591G Granites and Rhyolites (1st sem)
Survey of the origin of granites, which make up much of the Earth’s continental crust, and of their volcanic equivalent (rhyolites) which are erupted from the most explosive volcanoes on Earth. Topics include chemistry and physics of highly viscous magmas, their plate tectonic association, and economic importance. Prerequisite: GEO-SCI 321 or equivalent.

591V Volcanology
Systematic discussion of volcanic phenomena, types of eruptions, generation and emplacement of magma, products of volcanism, volcanic impact on humans, and the monitoring and forecasting of volcanic events. Case studies of individual volcanoes illustrate principles of volcanology; particular attention to Hawaiian, ocean-floor, and Cascade volcanism.

615 Organic and Biogeochemistry
The cycling and distribution of “life elements” (C, O, N, S, P) and compounds in modern and ancient marine and terrestrial settings. Emphasis on the transfer of compounds from the biota to their surroundings. Topics include: anthropogenic influence on biogeochemical cycles, importance of microbes in geochemistry, utility of biomarkers in reconstructing paleoecosystems and paleoenvironments. Prerequisite: one year of college chemistry, or GEO-SCI 415 or consent of instructor. Organic Chemistry highly recommended.

617 Geochemistry Seminar
A topic of general interest for reading and discussion. Previous topics included: geochemistry of carbonate rocks; geochemistry of lakes; groundwater geochemistry. Offered at irregular intervals. Credit, 1-3.

621 Sedimentary Petrology (2nd sem)
With lab. Analysis of sedimentary structures; petrology of sandstones; heavy-mineral analysis and interpretation. Petrology of carbonate rocks. Prerequisite: GEO-SCI 445 or consent of instructor.

627 Clay Petrology (alt 1st sem)
With lab. Structure and composition of clay minerals; their formation in the weathering zone; mechanisms of transport and distribution in sedimentary environments; clay minerals in paleoenvironmental and paleoclimatic reconstructions; early and late-stage diagenesis of clays in marine and nonmarine environments. Prerequisite: GEO-SCI 445 or consent of instructor.

631 Brittle Fracture Analysis
Study of faults, dikes, joints, veins, solution surfaces, and other fractures using field, analytical, and numerical techniques. Principles of rock fracture mechanics used to analyze these features. Applications of fracture analysis include: contribution of fractures to the flow of fluids in the upper crust, evaluation of rock excavation stability, and assessment of seismic hazards associated with active faults. Prerequisite: GEO-SCI 431 or equivalent. Credit, 4.

633 Structural Geology of Metamorphic Rocks (alt 1st sem)
Detailed structural analysis of deformed rocks with emphasis on interpretation of structural features in the field. Graphical and digital analysis of structural data. Class meets one full day per week in the field. One or two key research areas in western New England investigated. Prerequisite: GEO-SCI 431 or equivalent. Credit, 4.

658 Paleoclimatology (1st sem)
Methods used in reconstructing climate before the period of instrumental records and their application in understanding late Quaternary climatic fluctuations. Topics include dating methods, ice core studies, palynology, ocean core studies, terrestrial geological and biological studies, dendroclimatology, and historical climatology. Prerequisites: GEO-SCI 354, 458, or consent of instructor.

662 AdvancedGeomorphology (alt 1st sem)
Selected topics and current problems in geomorphology. Prerequisite: GEO-SCI 560 or consent of instructor.

671 Advanced Geophysical Interpretation Techniques (2nd sem)
Qualitative and quantitative interpretation of aeromagnetic and gravity data. Two- and three-dimensional analyses used in the development of geologically meaningful models. Prerequisites: GEO-SCI 571 or 573 and consent of instructor.

673 Earth Physics (alt 2nd sem)
Introduction to physics of the earth as determined from seismological, heat flow, gravity, and paleomagnetic data and their relationship to observed geological phenomena. Prerequisites: GEO-SCI 571 and consent of instructor.

687 Advanced Hydrogeology (1st sem)
Advanced groundwater hydrology and contaminant hydrogeology. Includes the application of field techniques, analysis of field data, and use of analytical and numerical models in the investigation of groundwater problems. Introduction to Visual MODFLOW and other groundwater models, including development of conceptual models from geologic data, laying out grids handling boundaries, sources and sinks, transience, calibration and sensitivty. Prerequisite: GEO-SCI 587 or consent of instructor.
697 Special Problems  
Credit, 2-6.

697A Symbiosis (alt 2nd sem)  
Genetics and biochemistry of symbiosis. Emphasis on experimental analyses of intracellular associations. Implications of the establishment of interspecific associations for the evolutionary history of life and the origins of higher taxa as documented in the fossil record. (Additional laboratory project, 1 cr.)

697B Protists (alt 2nd sem)  
Genetics, biochemistry, evolution, and ecology of eukaryotic microorganisms and their descendants, exclusive of animals, plants, and fungi. Importance of algae, amebomastigotes, ciliates, slime nets, slime molds, and other major groups of protists in illustrating fundamental principles of genetics, chromosome structure, cell motility, mechanisms of differentiation, and sexuality. Credit, 4.

697E Evolution (alt 2nd sem)  
Evolutionary history of microbes, plants, and animals as inferred from their genetics, biochemistry, molecular biology, morphology, and fossil record. Emphasis on the origin of biochemical pathways, metabolic modes; appearance of higher taxa correlated with changes in the global environment through geological time, and molecular biology in the reconstruction of phylogenies.

698 Practicum in Geology  
Credit, 2-6.

699 Master’s Thesis  
Credit, 1-10.

701 Professional Seminar  
Results of new research by students, faculty, and visitors. Credit, 1 each semester.

723 Igneous Petrology (alt 2nd sem)  
Examination of the genesis and evolution of magmas in various tectonic environments of the Earth, approached through theoretically and experimentally derived phase equilibria of liquid/crystal systems, isotopic relationships, trace and rare earth element geochemistry, and case studies of naturally occurring igneous systems. Prerequisite: GEO-SCI 321 or consent of instructor.

725 Metamorphic Petrology (alt 1st sem)  
Introduction to phase equilibrium in mineral systems; emphasis on metamorphic reactions. Review of theoretical and experimental data and natural occurrence; their bearing on metamorphic processes and on mapping of metamorphic mineral facies. Prerequisite: GEOLOGY 521 or consent of instructor.

731 Strain and Fabric Analysis (alt 2nd sem)  
Strain measurement and analysis in the field and in the laboratory. Deformation mechanisms of minerals and rocks. Interpretation of macroscopic and microscopic fabric elements. Timing of deformation, recovery, alteration, and metamorphism. Prerequisites: GEO-SCI 431 and calculus. Credit, 4.

735 Seminar in Northern Appalachian Geology (both sem)  
Stratigraphy, structure, petrology, and geophysics of Northern Appalachians and current research being conducted in the region. Prerequisite: GEO-SCI 431 or equivalent. Credit, 1-3.

749 Sedimentology Seminar  
Deposition and diagenetic processes in terrigenous and carbonate environments and interpretation of the rock record. Credit, 1-3.

763 Seminar in Quaternary Geology  
Current work and publications in paleoclimatology, paleoceanography, isotopic geochemistry, glacial and climate history. Studies of related fields, such as archaeology, early man, geochronology, palynology, plant geography, and paleontology. Consent of instructor required. Credit, 1-3.

765 Organic Geochemistry Seminar  
Review and discussion of current literature in the field of organic geochemistry. Studies of related fields, such as analytical chemistry, environmental geochemistry, paleoenvironmental reconstruction, paleoecology, Credit, 1. (Mandatory Pass/Fail.)

787 Hydrogeology Seminar  
Review and discussion of current research in hydrogeology, environmental soil and water sampling, groundwater chemistry, analytical and numerical modeling, isotope hydrology, fluid flow in fractured rock, surface and borehole geophysics, geostatistics, environmental monitoring and remediation, and related topics. Prerequisite: at least one 500-level course in hydrogeology. Credit, 1.

791-795 Seminars  
Credit, 1-3.

796 Seminar  
Credit, 1-6.

797 Special Problems  
Credit, 1-3.

821 Petrology Seminar  
Discussion of literature from the fields of igneous and metamorphic petrology and related aspects of mineralogy. Credit, 1-3.

831 Structural Geology Seminar  
Review and discussion of current literature in the fields of structural geology and tectonics. Prerequisite: at least one graduate course in structural geology. Credit, 1-3.

892P Seminar in Planetary Geology (both sem)  
Discussion of recent literature concerning the geology of the terrestrial planets and moons. Prerequisite: consent of instructor. Credit, 1.

891-895 Seminars  
Credit, 1-3.

896 Independent Study  
Credit, 1-6.

897 Special Topics  
Credit, 1-3.

899 Doctoral Dissertation  
Credit, 10.

Geography  

530 Population and Environment  
Population-resource relationships in context of social science theory and debates over sustainability, theories of population change, political economy of resources, institutional factors in resource management and carrying capacity concepts applied to conditions in Africa, Asia, and Latin America.

560 Geomorphology (2nd sem)  
Earth surface processes and resulting landforms. Includes physical and chemical weathering, hillslope, fluvial, eolian, and coastal processes and their relationships to landforms. Field trips by arrangement. Prerequisites: at least 12 credits in geology, physical geography or related fields; first-year courses in physics and chemistry recommended. Credit, 4.

596 Independent Study (both sem)  
For development of special student interests, research projects, and work related to the Master of Science degree. Credit, 1-6.
592B The Human Impact on the Natural Environment
Cultural and historical geography, cultural ecology, political ecology, and environmental history used to explore the diverse, regionally variable, and historically dynamic processes and conditions that have shaped past and present human impacts on the environment. Topics include the roles of indigenous land use and colonial settlement in the environmental history of New England and New Zealand, the destruction and conservation of tropical rain forests in Asia, Latin America, and Africa, and Himalayan environmental change and conservation.

594S Indigenous Peoples and Conservation
Indigenous peoples' conservation values and practices and their importance for global conservation. Emphasis on indigenous knowledge, cultural values, sacred places, community management of natural resources, and the role of indigenous peoples in the establishment and management of new kinds of inhabited national parks and protected areas.

604 Geographic Theory and Analysis (1st sem)
Advanced survey of the development of theoretical and analytical approaches in geography emphasizing philosophy of science and current approaches and methodologies. Practical discussions and exercises in framing research projects, and proposal, grant, and thesis writing. Students lead discussions in their areas of specialization. Primarily for entering graduate students in Geography.

626 Spirit of Place (2nd sem)
The meaning of place in our lives. Why some people are attracted to particular kinds of environmental settings, while others are drawn to very different kinds of places. How those who think seriously about places ranging from the sacred to the profane have attempted to capture or describe a "sense" or "spirit of place" in their writings and research.

662 Advanced Geomorphology (alt 1st sem)
Selected topics and current problems in geomorphology. Prerequisite: GEO-SCI 560 or consent of instructor.

666 Water Resource Policy (2nd sem)
Public programs for management of land/water interface—common law doctrines, flood insurance, wetlands, coastal zone management.

670 Housing and Urban Development
Seminar on the analysis of contemporary urban development issues from a geographical perspective and survey of recently published work in the field. Topics include changing urban systems and structures, transportation, housing, and social and economic factors. Students carry out individual or group research projects. Topical focus varies each year.

688 Field Methods and Analysis
The design and implementation of geographic field research programs, collection and storage of data, and preliminary data analysis techniques. Includes matters of problem definition, data needs, choice of research methods, logistics and management, and organizing for analysis and writing. Prerequisite: GEOGRAPH 604 or consent of instructor.

692W Visual and Graphic Thinking (2nd sem)
Themes dealing with the visualization of knowledge from a visual, graphic, and spacial perspective, including spatial intelligence, creative thinking, analytical graphics, multidimensional thinking, and visual explanations of complex phenomena. Various preexisting frameworks presented and used to generate new models and ways of approaching information.

697 Special Topics
Credit, 1-3.

699 Master's Thesis
Credit, 10.

792 Seminar
Credit, 1-6.

896 Independent Study
Credit, 1-6.

GERMANIC LANGUAGES AND LITERATURES

Graduate Faculty


Kyle Frackman, Lecturer, B.A., Hamline, 2001; M.A., Massachusetts at Amherst, 2004; Ph.D., 2009.

Sherrill Harbison, Lecturer, B.A., Oberlin, 1965; Ph.D., Massachusetts at Amherst, 1996.


Adjunct/Associate Faculty
Sky Arndt-Briggs, Adjunct Faculty.
Ulrike Brisson, Adjunct Lecturer, Languages, Literatures and Cultures/German.
Eric Einhorn, Professor of Political Science.
Stephen Harris, Associate Professor of English.
Jon Berndt Olsen, Assistant Professor of History.

James Young, Professor of English.

The graduate program in German and Scandinavian studies offers both degrees of Master of Arts (M.A.), and the Doctor of Philosophy (Ph.D.), each divided into three optional tracks. An M.A. student may choose gender studies, film studies or literary and cultural studies as an emphasis. (For information on teaching certification in combination with the M.A. degree, contact the Graduate Program Director.) Ph.D. candidates...
choose among the specializations in Modern German and Scandinavian Studies, Medieval Literature or Germanic Philology.

Reflecting the recent dramatic changes in Europe, the move toward globalization and changes in the fields dealing with the languages, literatures, and cultures involved, the graduate program has strengthened the interdisciplinary basis of its offerings. Courses dealing with issues of representation, historical investigation, and social science methodology are being introduced in combination with literary and cultural studies related to many historical periods. For additional information, visit the department website at www.umass.edu/germanic or contact the Graduate Program Director.

Master of Arts Degree

The M.A. degree is designed to be meaningful in itself and a foundation for further progress toward the Ph.D.

Prerequisites for admission to the M.A. Program include a relevant bachelor’s degree (or equivalent such as Vordiplom or Zwischenprüfung) and indication of ability to do successful graduate work in German studies. Deficiencies in background and insufficient command of spoken or written German must be remedied before the M.A. is granted.

The three-track Master of Arts degree is dedicated to providing a sound background in the field of German and Scandinavian studies with broad opportunity for interdisciplinary work. Reflecting faculty research strengths in the department, the University and the Five Colleges consortium, the three tracks are Gender Studies, Film Studies, and Literary and Cultural Studies.

Language Requirement

For the M.A. degree, proficiency in German is required.

Program of Study

Ten courses (30 credit hours) with at least a 3.0 grade average are required of all M.A. candidates by university regulation. Full-time students are normally expected to take a minimum of three courses in each semester. (Courses taken as auditors are not counted among the minimum three.) Those holding teaching assistantships are expected to complete their course requirements for the M.A. within four consecutive semesters of the regular academic year. Of the ten courses required for an M.A. degree, six must be taken in German and Scandinavian Studies. Outside courses must be approved by the student’s adviser and the Graduate Program Director.

To provide a solid basis in the tools of the profession and the foundations of scholarship in German studies, M.A. students are required to take the following courses:

- 583 Methods of Teaching German
- 585 Structure of German
- 601 Middle High German

Additional courses should be selected in consultation with the student’s adviser to form the basis for the Master’s exams. By end of the first semester in the program, a student should have arranged for a faculty member qualified in the appropriate track above to serve as adviser for the M.A. The adviser assists the student in designing a program of study and selecting courses. Within the student’s track (gender studies, film studies, or literary and cultural studies), the M.A. exams are to cover three mandatory areas: the history of the student’s area of concentration, methods applicable to its analysis, and an analysis of works appropriate to it.

Ph.D. Program

The Ph.D. Program provides a more advanced course of study and requires a greater degree of individual work than does the Master’s Program. Admission requirements are a Master’s degree or equivalent (e.g., Staatsexamen) in German studies or a related field, and a demonstration of scholarly potential. The Ph.D. candidate specializes in one of three major areas—Modern German Studies, Medieval Literature, or Germanic Philology—and within the chosen area is encouraged to concentrate on particular fields of interest. The Ph.D. requires at least eight courses (24 credits) beyond the M.A. degree.

Modern German and Scandinavian Studies

The structure of the Ph.D. Program allows for a great deal of individual flexibility in defining study areas and the opportunity for interdisciplinary work. To coordinate an individualized course of study that also provides a good familiarity with principal issues of the field, Ph.D. students should choose an adviser by the end of their first semester in the program. Courses should be chosen by the student in consultation with the adviser and Graduate Program Director in order to provide the basis for comprehensive examinations, reflecting expertise in the knowledge areas and practices of the discipline, and a foundation for dissertation work. Demonstration of these skills is then provided by the four comprehensive examinations, usually scheduled for the student’s fourth semester of Ph.D. work.

Areas of examination: Four areas are determined by candidates in consultation with their adviser and are subject to the approval of the Graduate Program Director. These areas may include: a literary period, a genre or theme (over two centuries), an author, or another topic, issue, or problem (e.g., film, literary theory, feminist theory, German women writers, the German Lied, exile literature, or theories of resistance).

Parallel to their coursework in modern German studies, students are also expected to explore the cultural, historical, and linguistic precedents in the ancient, medieval, and early modern period. To do so, students must take at least three courses treating language and literature before 1700, at least one of which must be in the language and literature of the Middle Ages. The customary pattern for this is:

- 601 Middle High German plus at least two of the following three options:
  - One course in Germanic philology (702 Old High German, 703 Gothic, 704 Old Norse, 705 Old Saxon, or English 702 Old English, or French 511 Old French);
  - One course in medieval literature (715 The Heroic Epic, 716 The Courtly Lyric Epic, 717 The Courtly Epic, 718 Narrative and Didactic Middle High German Literature);
  - One course in the literature of the 15th, 16th or 17th century (730 Literature of the 15th and 16th Centuries, 733 17th Century Poetry and Prose, 734 17th Century Drama).

With approval of the Graduate Program Director, component courses may be substituted or an equivalent course taken at another institution. The remaining courses will be chosen from the courses in German Studies offered by the department in consultation with the adviser and the Graduate Program Director. If a candidate’s field of specialization necessitates taking courses in other departments, approval must be sought from the adviser and the Graduate Program Director.

Medieval Literature and Germanic Philology

The university and the Five Colleges, in addition to their strengths in Modern German Studies, offer excellent resources for the study of languages, literatures, and cultures of the Middle Ages and earlier periods. Both literary and cultural studies and work in historical linguistics provide students with avenues to explore the origins of modern languages as well as cultural phenomena such as ubiquitous literary tropes, narratives of history, concepts of nationhood, and ethnic and gender identity.

The following courses are required:

1. 702 Old High German
2. 703 Gothic, or 704 Old Norse, or 705 Old Saxon, or English 702 Old English, or French 511 Old French.
3. Two courses in German literature from the 15th century to the present.
In general, it is expected that the remaining courses will be chosen from the medieval literature courses offered by the department, or relevant courses in, for example, History, Philosophy, Music, or Art History.

**Germanic Philology**

The normal program requires the completion of four courses in philology above 700, one course in linguistics, one course in medieval literature, and one course in modern literature.

**Language Requirement**

Candidates for the Ph.D. will be required to show advanced proficiency in one foreign language (other than German or English) pertinent to their field of specialization.

The university has a partnership agreement with the universities of Baden-Württemberg. Students may enroll in any of the universities of Baden-Württemberg at any time during their graduate studies.

**Note:** All teaching assistants doing coursework for the M.A. or Ph.D. participate in a one-credit practicum each year to enhance their teaching skills and to participate in coordination of the language program. For details, refer to the Teaching Assistant contract and the Graduate Employee Organization regulations.

*All courses carry 3 credits unless otherwise specified.*

**583 Problems and Methods of Teaching German**

Introduction to varied methods of teaching a foreign language based on recent developments in the theory of second language acquisition and proficiency-oriented approaches to language learning. Prerequisite: advanced proficiency in German.

**584 History of German**

Introduction to history of the German language.

**585 Structure of German**

The phonology, morphology and syntax of German.

**597 Special Topics**

**German Film Studies**

An overview of German film history, an introduction to methodology in film studies, and the major contemporary issues in German film studies. Familiarization with resources and methods for teaching a college-level course in German film studies and preparation to undertake graduate research projects in the field. Case studies include “Berlin to Hollywood,” a survey of German film; fascism and film; history and film; the cinema of the German Democratic Republic.

**Jews and German Culture**

An exploration of antisemitism and philo-semitism from the enlightenment to the post-Holocaust present, alongside a study of Jewish acculturation in the German-speaking lands. Topics include assimilation, dissimulation, Zionism, modernism, and the Holocaust.

**1968 and Film Culture**

Includes reference to the “40th anniversary” commemorations and current academic study of “1968” as an international cultural phenomenon. Focus on the film culture of the year itself. Topics traced through 1968 film examples include the civil rights movement, the anti-war movement, the student movement, and struggles over popular culture and media representation.

**597 Special Topics in Scandinavian Studies**

**Nordic Voices: Love and Nature in Scandinavian Writing**

Readings, in translation, by writers of the Nordic countries, examining their distinctive view of nature, human love, and their societies’ accommodation of these strong and unpredictable forces. H.C. Andersen, Ibsen, Strindberg, Undset, Hamsun, Dinesen, Laxness, others.

**Scandinavian Mythology**

The myths and religion of the Scandinavians during the first millennium. Nordic beliefs and stories explored through written sources, archaeology, and visual arts. Taught in English.

**Ultima Thule: Polar Exploration and the Heroic Imagination**

How early polar expeditions were planned, executed, and endured; explorers’ interaction with indigenous populations, especially in Greenland; and the spectacular, dangerous and life-sustaining landscapes today profoundly threatened by global warming.

**Vikings and Their Stories: Saga Literature**

Readings, in translation, of Old Icelandic sagas—fiction narratives about families, battles, and politics in a pre-Christian blood-feud society. Discussed in terms of literary, historical and cultural context.

**601 Middle High German**

Aims to develop a thorough knowledge of the Middle High German language and to introduce students to medieval literature, culture, and society. Basic MHG phonology and grammar based on selected medieval texts, used to draw some conclusions about the wider context of the Middle Ages and develop a deeper understanding of modern Germany. Knowledge of modern German required. Course conducted in English.

**697 Special Topics**

**Studies in Modern German History**

Introduction to the social, cultural, and political history of the German lands from 1750 to the present and an intensive study of the historiography of a period or topic to be decided by the students.

**Hölderlin**

The poet’s key works as well as the author’s 20th-century reception in scholarship and the arts.

**Special Topics in Scandinavian Studies**

**Viking Revival: National Romanticism and the Nordic Ideal**

Interdisciplinary course exploring 19th-century historical consciousness, Darwinism, and the romantic imagination on the development of the “Nordic ideal,” with its disastrous political consequences in the 20th century. Uses literature, art, and music to reflect the way Scandinavians idealized the Vikings, both as part of the Romantic past and the Modernist cult of masculinity, in order to re-imagine themselves in an era of intense nationalism.

**699 Master’s Thesis**

Credit, 6.

**702 Old High German**

Grammar and reading of prose and poetry; an introduction to Old High German dialects.

**703 Gothic**

Grammar and reading of texts, consideration of historical importance of Ulflas’s biblical translation.

**704 Old Norse**

Grammar and reading of selections from the Icelandic sagas.

**705 Old Saxon**

Grammar and reading of selections from the Heliand.
715 The Heroic Epic
The “sources” and stages of development of the Nibelungenlied, the most important heroic epic in German. The meaning of the poem in the context of the early 13th century. How the epic has been understood and used since the 18th century as an instrument of nationalist politics in Germany. Knowledge of modern German very helpful. Course conducted in English.

716 Courtly Lyric Poetry
Introduction to formal study of Minnesang and Spruchdichtung from the Kürenberger to Konrad von Würzburg with emphasis on Walter von der Vogelweide and social and historical context of the period. Prerequisite: GERMAN 601.

717 The Courtly Epic
Comprehensive literary analysis of selected epics by Hartmann von Aue, Wolfram von Eschenbach, Gottfried von Strassburg. Prerequisite: GERMAN 601.

718 Narrative and Didactic MHG Literature
Didactic narrative from 11th to 13th century. Prerequisite: GERMAN 601.

742 Lessing
His literary theory in context of his time, his drama.

743 From Empfindsamkeit to Storm and Stress

749 The Classical Goethe
Major works of Goethe’s Weimar period; poetry, drama, fiction.

751 Goethe’s Faust
Comprehensive review of the Faust theme in literature, music, and film, with a thorough analysis of Goethe’s Faust.

752 Schiller
Schiller’s literary and philosophical works.

758 Early Romanticism
Philosophical background and literary works of early Romantic movement.

759 Later Romanticism
Later development of Romanticism from Brentano to Heine, including anti-Romantic tendencies of the time. Eichendorff.

763 19th-Century Poetry and Prose
Poetry by writers such as Heinrich Heine, Eduard Mörike, and Annette von Droste-Hülshoff and prose by writers such as Heinrich Heine and the writers of Biedermeier and Das Junge Deutschland.

764 19th-Century Drama
Kleist, Grillparzer, Büchner, Grabbe, Hebbel.

773 20th-Century Prose I
Early Thomas Mann and his generation.

774 20th-Century Prose II
New trends of fiction after the First World War.

775 20th-Century Drama
From Wedekind to Handke.

779 Post-World War II Literature
Literature in the shadow of the Wall: focus on paired texts of East and West German literature written from the late fifties to 1989, exploring how text is rooted in, supports, critiques, and/or subverts the social order from which it derives and how literary texts from both Germanies responded to similar issues in very different ways.

782 Special Topics in Philology and Medieval Studies

783 Special Topics in the Literature of Classicism

784 Special Topics in the Literature of Romanticism

785 Special Topics in the Literature of the 19th Century

786 Special Topics in the Literature of the 20th Century

793 Expressionism

797 Special Topics
First, Second, Third Sex: Gender and Sexual Identity in Twentieth-Century Germany
Exploration of representation of gender and sexual identity in German literary texts from World War I to the present, situated in their specific historical context.

German Studies/Cultural Studies
Focus on approaches that comprise new interdisciplinary methods under the heading of “German Studies.” Cutting-edge theory and applications, mostly developed in an Anglo-American context, that focus on gender, queer, national, race and ethnic, and postcolonial questions and how these perspectives relate to German cultural production.

888 History and Problems of Literary Criticism

891 Seminar in Philology


Hispanic Literatures and Linguistics

Graduate Faculty

Luis Marentes, Associate Professor and Director of the Spanish and Portuguese Program, B.A., Texas, 1987; M.A., 1990; Ph.D., 1994.

Frank C. Fagundes, Professor and Graduate Program Director, B.A., California at Los Angeles, 1972; M.A., 1973; Ph.D., 1976.

María Soledad Barbón, Assistant Professor, M.A., Cologne, Germany, 1993; Ph.D., 2000.


José N. Ornelas, Professor, B.A., Queens, 1969; M.A., 1972; Ph.D., City University of New York, 1976.


Margara Russotto, Associate Professor, M.A., Universidad Simon Bolivar, Caracas, Venezuela, 1983; Ph.D., Universidade de Sao Paulo, Brazil, 1987.


The Spanish and Portuguese program offers graduate work leading to the degrees of Master of Arts in Teaching, Master of Arts and Doctor of Philosophy in two fields: Hispanic Literatures and Hispanic Linguistics. Students may concentrate in Spanish, Portuguese, or a combination of both. The graduate program is committed to fostering cultural and intellectual diversity and encourages the study of all aspects of, and approaches to, Hispanic literatures and linguistics. In addition to all traditional areas of concentration, the graduate program offers areas of concentration in such fields as Hispanic Bilingualism (M.A. area of specialization, Ph.D. major and minor areas of specialization), Hispanic Women Writers (Ph.D. major and minor areas of specialization), and Literary Theory (Ph.D. minor area of specialization).

Requirements for the Master of Arts Degree

In addition to general university requirements for the degree, the following special requirements must be met:

1. A reading knowledge of two foreign languages pertinent to the student’s program at an intermediate level or one at an advanced level.

2. A minimum of 24 course credits beyond the M.A., including 9 in the major and 6 in the minor, plus SPAN 899 (12 credits minimum).

3. Two 700-level seminars (6 credits).

4. Course of Study:

   Hispanic Literatures (Spanish, Spanish-American, or Luso-Brazilian):
   A. Major Area: Four courses, covering two different areas including two courses taken for the M.A.
   B. Minor Area: Two courses, including one course taken for the M.A.
   C. Electives: All remaining credits required for the Ph.D.

   Hispanic Linguistics:
   A. Major Area: Four courses covering two (2) different areas, including courses taken for the M.A.
   B. Minor Area: Two courses, including courses taken for the M.A.
   C. Electives: All remaining credits required for the Ph.D.

5. Final written examination or oral thesis defense.

Details of both programs are available upon request from the Department’s Graduate Program Director.

All courses carry 3 credits unless otherwise specified.

512 The Spanish Language Minority in the U.S.
Literary, social, psychological and dialectical aspects of language; characteristics and values of the Hispanic minorities. Emphasis on Puerto Ricans and Cubans.

520 Spanish Literature to 1500
Spanish literature in the Middle Ages and Renaissance.

521 Spanish Medieval Poetry
Spanish epic, lyric poetry and other verse of the period.

522 Spanish Medieval Prose
Narrative, historical and didactic prose works of medieval Spain.

531 Prose of the Golden Age
Major prose works in 16th- and 17th-century Spain. Emphasis on the novel, excluding the Quijote.

532 Lyric Poetry of the Golden Age
Spanish poetry of the 16th and 17th centuries from Garcilaso to Gongora.
Drama of the Golden Age
The Spanish *comedia* during the period of maximum creation, 1556-1681.

Cervantes
Intensive study of the *Quijote*.

Spanish Literature from 1700 through Romanticism
Spanish literature and thought in the 18th century and the Romantic movement.

19th-Century Spanish Novel
Prose fiction in the second half of the 19th century.

Modern Spanish Theater
Development of the theater in Spain from the post-Romantic period to the present.

20th-Century Spanish Prose Fiction
The novel in Spain from the Generation of '98 to the present.

Modern Spanish Poetry
Poetry in Spain from Becquer to the present.

The Essay in Modern Spain
The essay from the late 19th century to the present. Emphasis on both style and content.

Spanish-American Literature to Independence
A general view; intensive study of selected major works.

Spanish-American Literature from Independence to Modernism
A general view; intensive study of selected major works.

The Modernist Movement
*Modernismo* in Spanish America, including a comparative study of its manifestations in Spain.

Spanish-American Poetry Since Modernism
Principal authors and movements of the 20th century.

Modern Spanish-American Drama
Principal playwrights and currents of the 20th-century theater.

Modern Spanish-American Prose Fiction
Spanish-American prose fiction in the late 19th and early 20th centuries.

Hispanic Literature of the Caribbean
Comparative study of development of the literature of Puerto Rico, Cuba and the Dominican Republic, and of historical, cultural and socio-political factors that shaped it.

The Spanish-American Essay
The essay in Spanish America from the Discovery to the present as a literary genre and as a reflection of the various processes that have helped to shape Spanish America and create its cultural identity.

Teaching of Spanish to English Speakers
Analysis of the major problems anticipated in the teaching of Spanish, and their solutions.

The Structure of Modern Spanish
Syntax and morphology of contemporary Spanish. Analysis of the oral and written systems from the points of view of modern grammatical theories. Structural differences between Spanish and English; problems of interference for the nonnative.

Introduction to Romance Philology
See FRENCH 583.

Hispanic Dialectology
Diachronic and synchronic survey of the dialects of Spain, Spanish America and the Hispanic Caribbean. (Area emphasized may vary.)

Bilingualism and Language Contact
Survey of the history of contact between different linguistic and cultural groups, and of the nature and consequences of the contacts. Emphasis on the Hispanic world and Spanish and Portuguese-speaking groups in the U.S.

Master's Thesis
Credit, 6.

Seminars in Early Medieval Literature
Phases of Spanish literature of the 12th and 13th centuries. Credit, 3-12.

Seminars in Late Medieval Literature
Phases of Spanish literature of the 14th and 15th centuries. Credit, 3-12.

Seminars in Golden Age Drama
Development and apogee of the Spanish *comedia* in the Golden Age. Credit, 3-12.

Seminars in 18th-Century Spanish Literature
Credit, 3-12.

Seminars in 19th-Century Spanish Prose
Credit, 3-12.
History
(University of Massachusetts Amherst/Five College Graduate Program)

Graduate Faculty


Brian W. Ogilvie, Associate Professor and Graduate Program Director, B.A., Chicago, 1990; M.A., 1992; Ph.D., 1997.


Joyce A. Berkman, Professor, B.A., California at Los Angeles, 1958; M.A., Yale, 1959; Ph.D., 1967.


Anne F. Broadbridge, Associate Professor, B.A., Massachusetts at Amherst, 1993; M.A., Chicago, 1997; Ph.D., 2001.

Richard Chu, Assistant Professor (University of Massachusetts Amherst/Five College appointment), B.A., Ateneo de Manila University, 1986; M.A., Stanford, 1994; Ph.D., Southern California, 2003.


José Angel Hernández, Assistant Professor, B.A., Texas at San Antonio, 1997; M.A., Houston, 2000; Ph.D., Chicago, 2008.


Laura L. Lovett, Associate Professor, B.A., California at Los Angeles, 1986; M.A., California at Berkeley, 1990; Ph.D., California at Berkeley, 1998.


Alice Nash, Associate Professor, B.A., Boston College, 1988; M.A., Boston University, 1989; Ph.D., Columbia, 1997.


Anna Taylor, Assistant Professor, B.A., Queensland, Australia, 1994; Honours, 1996; M.A., Texas at Austin, 1999; Ph.D., 2007.


Joel Wolfe, Associate Professor, B.S.F.S., Georgetown School of Foreign Service, 1982; M.A., New Mexico, 1984; Ph.D., Wisconsin at Madison, 1990.

Adjunct/Associate Faculty

Ernest Allen, Professor of Afro-American Studies.

Aviva Ben-Ur, Associate Professor of Judaic Studies.

Ernest Benz, Associate Professor of History, Smith College.

Jay Berkovitz, Professor of Judaic Studies.

John H. Bracey, Jr., Professor of Afro-American Studies.

Mavis Campbell, Professor of History, Amherst College.

Francis Couvares, Professor of History and American Studies, Amherst College.

Robert S. Cox, Head, Special Collections and University Archives.

Abbott Lowell Cummings, Professor Emeritus, Yale University.

Daniel Czitrom, Professor of History, Mount Holyoke College.

Jerry P. Dennerline, Professor of History and Asian Languages and Civilizations, Amherst College.

Andrew Donson, Assistant Professor of German History, Department of Languages, Literatures, and Cultures.

Joseph J. Ellis, Professor of History, Mount Holyoke College.

Catherine Epstein, Assistant Professor of History, Amherst College.

Dayo Epstein, Assistant Professor of Women’s Studies.

Lowell Gudmundson, Professor of Latin American Studies and History, Mount Holyoke College.

Jennifer Guglielmo, Assistant Professor of History, Smith College.

Holly Hanson, Associate Professor of History, Mount Holyoke College.

Thomas Hilbink, Assistant Professor of Legal Studies.

Judith Larrabee Holmes, Lecturer of Legal Studies.

Daniel Horowitz, Professor of American Studies and History, Smith College.

Margaret Hunt, Professor of History, Amherst College.

Bernie Jones, Assistant Professor of Legal Studies.

Jeremy King, Assistant Professor of History, Mount Holyoke College.

Richard Lim, Professor of History, Smith College.

Jonathan Lipman, Professor of History, Mount Holyoke College.

Frederick McGinness, Professor of History, Mount Holyoke College.

Lynda J. Morgan, Professor of History, Mount Holyoke College.
and practice of history. The program is a formal collaboration between the history departments of the University of Massachusetts and Amherst, Hampshire, Mount Holyoke, and Smith colleges. Participating faculty teach graduate courses, sit on dissertation and examination committees, and serve as advisers and mentors. Through Five College cooperation, the program offers an extensive range of opportunities for the study, teaching, and practice of history.

Hilary Moss, Assistant Professor of History and Black Studies, Amherst College.
Max Page, Associate Professor of Art.
Neal Salisbury, Professor of History, Smith College.
Martha Sandweiss, Associate Professor of History and American Studies, Amherst College.
Martha Saxton, Professor of History, Amherst College.
Robert Schwartz, Professor of History, Mount Holyoke College.
John Servos, Professor of History, Amherst College.
Manisha Sinha, Associate Professor of Afro-American Studies.
Jutta Sperling, Associate Professor of History, Hampshire College.
Carole Straw, Associate Professor of History, Mount Holyoke College.
Robert Sullivan, Associate Professor of German and Scandinavian Studies.
Kevin M. Sweeney, Professor of American Studies, Amherst College.
Susan Tracy, Professor of American Studies, Hampshire College.
James Wald, Professor of History, Hampshire College.
Frederick S. Weaver, Professor of Economics and History, Hampshire College.
James Young, Professor of Judaic Studies.

University of Massachusetts/Five College Graduate Program in History

The program is a formal collaboration between the history departments of the University of Massachusetts and Amherst, Hampshire, Mount Holyoke, and Smith colleges. Participating faculty teach graduate courses, sit on dissertation and examination committees, and serve as advisers and mentors. Through Five College cooperation, the program offers an extensive range of opportunities for the study, teaching, and practice of history.

The Doctor of Philosophy Degree Program

More complete information on graduate study in history may be found in the departmental statement, Graduate Program in History, available from the History Office. The University of Massachusetts/Five College Graduate Program in History offers doctoral work in three major areas of history: Europe, United States and Latin America. Each of these areas is divided into various fields.

Course Work
Four to eight courses in the 600-800 series, including two graduate research seminars, are generally required, the precise number depending on the field and background of the candidate.

Language Proficiency
Candidates must pass the departmental examination demonstrating reading ability in one foreign language. Students specializing in areas for which knowledge of more than one foreign language is usual for scholarly work must demonstrate reading proficiency in the relevant languages.

Preliminary Comprehensive Examination
Candidates must pass the general examination in three fields. Not more than two can be in the candidate’s area of specialization. With the approval of the major adviser and of the departmental Graduate Program Director, the candidate may offer one field in a department other than history.

Dissertation
A dissertation, based on original research and making an original contribution, is required for the fulfillment of the degree.

Residence
Minimum: full-time residence at the University of Massachusetts Amherst for one academic year.

Master of Arts Degree Program

Each M.A. candidate selects a major area of concentration from those offered by the Graduate Program in History. The M.A. areas offered include the following: United States, Latin America, Europe, Middle East, and East Asia.

Language Proficiency
All M.A. candidates must demonstrate a reading knowledge in one foreign language. U.S. history specialists may substitute proficiency in an alternative tool of research.

Course Work
1. Each student must obtain 30-32 credits, at least 24 of which must be in the 600-800 series.
2. Students may write a Master’s thesis for 8 credits as a substitute for two courses in the 600-800 series, one of which may be a research seminar.
3. At least two historiography courses are required.
4. Three courses, or two with an assistantship, is the normal load per semester.

Concentration in Public History

Available to regular M.A. candidates, this concentration develops skills in archival management, editing, and historical preservation. Candidates are required to obtain 34 credits, of which six are in designated courses from related disciplines and six in practicum/internship.

Concentration in Global History

The Concentration in Global History is available to M.A. candidates, who must complete eight courses—two in global historiography, two writing seminars, and four 600-level courses, at least two of which must be comparative or Third World courses. All other requirements for the regular M.A. apply, including the foreign language requirement. For further details, contact the Graduate Program Director.

All courses carry 4 credits unless otherwise specified.

600 European Historiography to the Enlightenment
Critical evaluation of the techniques and ideas of major historians and influential schools of historical interpretation from the Greeks through the Enlightenment. Mr. Gordon, Mr. Ogilvie, Ms. Taylor

601 European Historiography: The Enlightenment to the Present
Techniques and ideas of major historians and influential schools of historical interpretation; relation of historiography to intellectual and political history of modern Europe. Mr. Gordon, Ms. Heuer, Mr. Olsen

602 American Historiography Through the Civil War
Interpretations of major themes as developed in works of leading historians. Mr. Levy

125
603 American Historiography: 1865 to the Present
Interpretations of major themes as developed in works of leading historians. Mr. Glassberg

605 Approaches to World History
Critical evaluation of categories of analysis—periods, cultures, geographical spaces—currently employed by world historians. What is lost and what is gained by a global approach to historical problems. Ms. Wilson, Mr. Higginson

607 Latin American Historiography: Colonial Period
Techniques and interpretations developed by representative historians from pre-conquest to the wars of independence. Prerequisite: reading knowledge of Spanish or Portuguese, or consent of instructor. Mr. Hernández, Ms. Rausch

608 Latin American Historiography: National Period
Techniques and interpretations developed by representative historians from early national period to the present. Prerequisite: reading knowledge of Spanish or Portuguese, or consent of instructor. Mr. Hernández, Mr. Wolfe

611 Topics in Ancient History I
The Near East and Greece. Papers may obtain seminar credit with instructor’s approval. Ms. Barton

612 Topics in Ancient History II
Early Italy and Rome, to the end of the Empire in the West. Papers may obtain seminar credit with instructor’s approval. Ms. Barton

613 Topics in Medieval History
Continuity between ancient and medieval civilization. Prerequisites: working knowledge of Latin and one modern language (German, French, Italian) or consent of instructor. Ms. Taylor

615 Topics in the History of Early Modern Europe
The transformation of Europe in the period 1400-1800. Evolution of the state, social classes, moral codes, and mentalities. Emphasis also given to theoretical interpretation of the period as a whole. Mr. Gordon, Mr. Ogilvie

616 Topics in the Age of the Enlightenment
Movement of ideas in Atlantic civilization during the 18th century. The mind and writings of representative European and American thinkers. Emphasis on politics, religion, science, literature and the arts. Mr. Gordon

621 Topics in Recent European History
Selected topics in modern European history. Ms. Heuer, Mr. Olsen

636 Topics in Russian History
Russia in 19th and 20th centuries. Emphasis on Russian and Soviet historiography. Intensive reading and analyses of selected topics. Ms. Altstadt

646 Topics in Early American History
Colonial America from discovery and settlement of the New World through the Federalist era. Mr. Levy, Ms. Miller, Ms. Nash

648 Topics in the National Period
Basic features of American political, social, and economic history from the rise of Jeffersonianism to the Civil War. Ms. Krauthamer

649 Topics in the Civil War
Analysis and interpretation of slavery and abolition, Southern nationalism, the breakdown of national parties, causes of the war, wartime politics and the war’s impact. Ms. Richardson

650 Topics in the Gilded Age
Investigation of national reunification, Grantism, dead center politics, genteel reform, the new industrialism and business leadership, labor, and agrarian problems.

651 Topics in the Progressive Era of the United States
Emphasis on political, social, economic, and cultural aspects of the Progressive Era; analysis of interpretations of historians and others. Ms. Lovett

652 Topics in American Diplomatic History
Readings in primary and secondary sources for the study of important phases in American diplomacy.

653 Topics in the United States Between the World Wars
Major issues in American political, social, and economic life between the two World Wars. Mr. Glassberg, Mr. Appy

654 Topics in Recent American History
The political, social, and cultural history of the United States since 1930. Mr. Appy

655 Topics in United States Intellectual History
Specific aspects of such general topics as American adaptation of the European heritage, growth of the concept of Americanism, emergence of patrician leadership, achievement of realistic democracy, triumph of nationalism, assertion of individualism in a corporate society, and the scientific-humanistic culture conflict.

657 Topics in United States Urban History
Origins of the modern American city and the complex problems engendered by large-scale urbanization.

658 Topics in American Social History
Readings in the history of ordinary Americans, how they shaped and were affected by dominant political, economic, and cultural institutions and ideas.

659 Public History
An examination of the various public images and uses of history and issues confronted by historians working in museums, historic sites, oral history, historic preservation, archives and documentary film. Mr. Glassberg, Ms. Miller, Mr. Olsen

671 Topics in Modern and Contemporary Latin America
Political, economic, social, and ideological forces in history of Latin America since independence. Reading knowledge of Spanish or Portuguese desirable. Mr. Hernández, Ms. Rausch, Mr. Wolfe

676 Topics in Modern Middle-Eastern History
Readings in political, social, economic, and cultural history of the Middle East since 1800. Ms. Wilson, Ms. Broadbridge

696 Special Problems in History
Directed reading, research or writing for qualified students. Consent of instructor required. Credit, 1-6.

697 Special Topics in History
New, experimental courses that often cross conventional national and disciplinary boundaries and periods; recent offerings include Honor and Violence, Propaganda, Nationalism, and the History of the Body.

698 Practicum in Public History
Credit, 1-6. Mr. Glassberg

699 Master’s Thesis
Maximum credit, 8.

700 Seminar in Medieval History
Training in historical research. Consent of instructor required. Ms. Taylor
701 Seminar in Renaissance and Reformation
Training in historical research. Consent of instructor required. Mr. Ogilvie

703 Seminar in the Enlightenment
Training in historical research. Consent of instructor required. Mr. Gordon

715 Seminar in Social History of Early Modern Europe
Urban society of early modern Europe; evolution from town to city, political and social institutions developed by the city, impact of the city on intellectual and religious life. Mr. Gordon

716 Seminar in Modern Germany
Training in historical research. Consent of instructor required.

717 Seminar in Modern France
Training in historical research. Consent of instructor required. Ms. Heuer

718 Seminar in Russian History
Training in historical research. Consent of instructor required. Ms. Altstadt

719 European Politics and Diplomacy Since 1815
Training in historical research and introduction to relationships among European nations in a critical period. Consent of instructor required.

731 Seminar in Early American History
Training in historical research. Consent of instructor required. Mr. Levy, Ms. Miller, Ms. Nash

735 Seminar in the Progressive Era in the United States
Training in historical research. Consent of instructor required. Ms. Lovett

736 Seminar in the United States Between World Wars
Training in historical research. Consent of instructor required. Mr. Glassberg

737 Seminar in Recent American History
Training in historical research in post-World War II American History. Consent of instructor required. Mr. Appy

738 Seminar in American Diplomatic History
Training in historical research. Consent of instructor required.

739 Seminar in American Intellectual History to the Civil War
Training in historical research. Consent of instructor required.

740 Seminar in American Intellectual History Since the Civil War
Training in historical research. Consent of instructor required.

751 Seminar in the Colonial History of Latin America
Training in historical research. Consent of instructor required. Ms. Rausch

753 Seminar in Mexican History
Training in historical research. Mr. Hernandez

761 Seminar in Modern Middle-Eastern History
Training in historical research. Consent of instructor required. Ms. Wilson, Ms. Broadbridge

771 Seminar on the Art and Technique of Biography
The human side of history. An appreciation of biographical literature; how to write biography. Students read and discuss several provocative biographies to see how the professionals put their books together. Students prepare biographical accounts of historical figures, drawing from letters, diaries, private journals, memoirs, and recollections.

796 Special Problems Seminar in History
Directed research or writing for qualified students. Consent of instructor required. Credit, 1-6.

797 Special Topics Seminar in History
Training in historical research. Consent of instructor required.

899 Doctoral Dissertation
Credit, 10.

Hospitality and Tourism Management

Graduate Faculty

Haemoon Oh, Professor and Head of the Department of Hospitality and Tourism Management, B.A., Hanyang University, Korea, 1989; M.S., Nevada, 1992; Ph.D., Pennsylvania State, 1997.

Atul Sheel, Associate Professor and Graduate Program Director, B.S., Delhi University, 1978; M.S., Massachusetts at Amherst, 1986; Ph.D., 1995.


Jeffrey A. Fernsten, Associate Professor, B.S., Massachusetts, 1974; M.S., 1978; D.B.A., Nova University, 1985.

Judy K. Flohr, Senior Lecturer, B.S., College Misericordia, 1976; M.S., Purdue, 1983; Ed.D., Massachusetts, 1996.


Miyoung Jeong, Associate Professor, B.S., Kyungbook National University, Korea, 1986; M.S., Sejong University, 1990; M.S., Nevada, 1993; Ph.D., Pennsylvania State, 1998.


Master of Science Degree Program

The Department of Hospitality and Tourism Management offers a Master of Science (M.S.) degree...
in Hotel and Tourism Management (HTM). The program includes HTM courses as well as courses in Management, Marketing, Finance, Accounting, Sport Management, Education, Statistics, Regional Planning, and Resource Economics. Students may select courses from these and other departments to individually develop their particular specialty area of study.

Students are required to complete a minimum of 36 credits to fulfill the requirements for the master’s degree. The degree requirements are as follows:

1. Students must demonstrate competency in the following areas: 1) computer literacy (word processing, spreadsheet), 2) marketing, 3) economics, 4) statistics, 5) accounting, 6) finance and 7) foundations in the hospitality industry. Students lacking a basic foundation in any of these areas must complete courses to remedy such deficiencies (0-21 credits).

2. Professional Foundation (3-6 cr)
   One or two background courses in HTM are required for students without prior coursework in the hospitality field.

3. Professional Core (18 cr)
   Every student is required to take the following six HTM courses:
   - 644 Strategic Management in the Hospitality Industry
   - 666 Human Resources Management in the Hospitality Industry
   - 685 Hospitality Marketing Management
   - 691 Seminar in Advanced Financial Analysis Management
   - 694 Seminar in Research Methods and Applications
   - 697 Hospitality Industry Project (non-thesis)

4. Specialty Area (18 cr)
   Students are required to choose a specialty area based on their individual needs. The specialty area consists of: two HTM courses, two SCH-MGMT courses, and a graduate-level course from any department (with approval from the Graduate Program Director).

5. Thesis Option (6 credits)
   Students electing the thesis option may use thesis credits within the Specialty Area.

### Dual Degree Option in Hospitality and Tourism Management and Management

The department also offers a dual degree option whereby students earn both the M.S. in Hospitality and Tourism Management and M.B.A. degrees concurrently. Students complete M.B.A. and HTM core courses, electives, and a thesis or industry research project.

Students earn a minimum of 72 credits for the dual degree. The requirements are as follows:

1. M.B.A. (MANAGMNT) Core (42 credits)
   - 630 Accounting for Decision Making
   - 631 Managerial Accounting and Control
   - 632 Information Management
   - 644 Managerial Economics
   - 650 Business Data Analysis
   - 660 Marketing Management
   - 670 Production Operations Management
   - 680 Organizational Behavior and Theory
   - 689 Organizational Planning and Strategy
   - 691 Practicum
   - 691F Professional Seminar
   - 783 Business and Its Environment

2. HTM Core (15 credits)
   - 644 Strategic Management in the Hospitality Industry
   - 666 Human Resources Management in the Hospitality Industry
   - 685 Hospitality Marketing Management
   - 691 Seminar in Advanced Financial Analysis Management
   - 694 Seminar in Research Methods and Applications

3. Elective Courses (9-12 credits)
   Students may choose approved graduate-level elective courses to develop an individualized specialization.

4. Industry Research Project or Thesis (3-6 credits)
   Students choose an applied research project or thesis option.

### Hospitality and Tourism Management Doctoral Degree Requirements

The department offers a Ph.D. in Management with a concentration in Hospitality and Tourism Management. Among the requirements are the following SCH-MGMT courses:

- 883 Seminar in Tourism Management and Research
- 884 Decision Models for the Services Industry
- 885 Research in Services Marketing and Management
- 888 Seminar in Hospitality Research

Further information is available in the Management section of this Bulletin.

### Application

Application for graduate study should be made directly through the Dean of the Graduate School, as described elsewhere in this Bulletin. A complete application consists of (a) the application form, (b) two references, (c) two sets of official transcripts of all college-level work, and (d) an official score report on the Graduate Management Admission Test (GMAT). Application deadlines are found elsewhere in this Bulletin. Action is taken immediately upon receipt of a complete application by the Graduate School.

Standards for admission are consistent with those described earlier in this Bulletin. A satisfactory GMAT score, as determined by the Graduate Faculty Committee, must be obtained by all applicants. Foreign students are not exempt from this requirement. The GMAT should be taken as early as possible in order to allow time for proper consideration.

All courses carry 3 credits unless otherwise specified.

### 591 Seminars in Hospitality Management and Administration

Examination of foundation areas of critical importance to the hospitality industry.

### 600 Hospitality and Tourism Information Systems

Design and implementation of various management information systems within hospitality industry operations, and their implications for management organization, planning and control.

### 606 Hospitality Planning and Decision Models

Application of planning and decision models to management problems of the hospitality industries. Emphasis on analytical and quantitative decision models.

### 633 Tourism Policy and Development

Dimensions of tourism, markets, travel trends, Economics, social and cultural implications. Socioeconomic models and measurements of the consequences of tourism on a region.

### 644 Strategic Management in the Hospitality Industry

Top management business situations. Applications of theory and techniques from the field of strategic management.

### 666 Human Resources Management in the Hospitality Industry

Human resources management techniques in the hospitality industry. Initiating and
677 Hospitality Market and Economic Feasibility Studies
Identification and description of factors which affect a proposed new hotel or restaurant and the development of pro forma statements projecting costs and profits for such ventures.

681 Pricing Strategy in the Hospitality Industry
The concepts of microeconomics—the study of markets and pricing—as they apply in the hospitality industry. Focus on market determination, price determination, and price strategy development for hotels and restaurants.

685 Hospitality Marketing Management
Application of marketing concepts to the industry: marketing as the central orientation and philosophy of the strategic planning of a hospitality firm.

688 Hospitality Research Methods
Theory and concepts of research design and methods, data collection and processing, and statistical interpretation of results.

691 Seminar in Advanced Financial Analysis
Introduction to financial analysis tools and techniques utilized in case studies in the hospitality industry.

692J Seminar in Hospitality Education
Application of theoretical principles and concepts to hospitality education. Emphasis on the culture of higher education.

692W Seminar in Hospitality and Tourism Promotions
A variety of marketing, advertising, and promotion techniques and theories. Applied projects and research.

692X Seminar in Hospitality Investing and Financial Management
Internal control, operating ratios, financial ratios, cost-volume profit analysis, financing the hospitality industry, hotel feasibility, joint venture and equity agreements, trusts, debt financing and restructuring, franchise agreements.

693W Seminar in Tourism Marketing
Emphasis on planning and strategic issues in tourism marketing used by hospitality and tourism organizations. Class projects and research develop students’ in-depth understanding, appreciation, and application of the use of new marketing applications.

695 Seminar in Food Service in the Hospitality Industries
Scope of commercial and institutional food service industry segments, current shifts and trends, future implications. Analysis of operations, controls, and financial management utilizing selected case studies.

696 Independent Study
Credit, 1-6.

697 Hospitality Industry Project (non-thesis)

699 Master’s Thesis
Credit, 6.

Japanese
Website: www.umass.edu/asianlan/

Graduate Faculty
Amanda C. Seaman, Assistant Professor and Director of the Asian Languages and Literatures Program, B.A., Wellesley, 1988; A.M., Chicago, 1994; Ph.D., 2001.

Doris G. Bargen, Professor and Graduate Program Director, B.A., Ruhr-Universität Bochum, 1971; M.A., Massachusetts at Amherst, 1972; Ph.D., Eberhard-Karls Universität, 1978.

Bruce P. Baird, Assistant Professor, B.A., Columbus, 1992; M.A., California at Los Angeles, 1996; Ph.D., Pennsylvania, 2005.


Stephen D. Miller, Assistant Professor, B.A., Ohio State, 1971; M.A., Columbus, 1983; Ph.D., California at Los Angeles, 1993.


Zhongwei Shen, Associate Professor, B.A., Fudan University, 1982; M.A., California at Berkeley, 1988; Ph.D., 1993.


Enhua Zhang, Assistant Professor, B.A., Nan-kai, China, 1997; M.A., 2000; M.Phil., Columbia; Ph.D., 2007.

Adjunct Faculty

The Asian Languages and Literatures program offers a Master of Arts degree in Japanese designed to provide a comprehensive introduction to the literature and culture of Japan. The faculty’s diverse research specialties allow students to focus on a range of topics and periods, from the classical era to contemporary Japan, from a variety of disciplinary perspectives. Students are encouraged to continue developing their linguistic skills leading to opportunities for future
careers in such fields as translation, journalism, business, and government. For those interested in an academic career, the curriculum also allows emphasis on more traditional literary and theoretical studies.

Admission

Entering students should have an advanced level competency in Japanese language and are expected to have completed a Bachelor of Arts degree in Japanese (or a related field) before matriculation with an undergraduate cumulative grade point average of at least 3.20 in the major and 3.00 overall (on a 4.00 scale). Applicants are required to have taken the Graduate Record Examination before applying, or to take it at the earliest opportunity thereafter. Non-native speakers of English who are not U.S. citizens are required to take the Test of English as a Foreign Language.

M.A. Degree Requirements

Students are required to complete at least thirty semester hours of course work and six credits of Master’s Thesis. Up to six credits of appropriate course work at the graduate level from other institutions may be accepted with the approval of the graduate committee.

Course work is to be distributed as follows:
A. Required Courses
1. 556 Classical Japanese I
2. 570 Research in Japanese Source Materials
3. 592 Pro-seminar in Japanese
4. 592 Pro-seminar in Japanese
5. 691 Graduate Seminar in Japanese
B. Electives (12 credits)
To be selected from the advanced level courses (numbered 500 and above) existing in the department. Certain courses from other departments may also be accepted with the approval of the graduate committee.
C. Thesis (6 credits) and Examination
Before starting the thesis the student must pass a general examination, on the thesis topic. The examination will be administered by a committee appointed by the graduate adviser.

All courses carry 3 credits unless otherwise specified.

537 Advanced Modern Japanese II
Helps students to read high-quality Japanese texts in some quantity and different genres at the advanced level. Oral and written discussion of pertinent issues. Conducted in Japanese.

556 Masterpieces of Classical Japanese Literature I
Introduction to the literary language of Japan, through the study of classical grammar and the linguistic analysis of poetry and short prose.

557 Masterpieces of Classical Japanese Literature II
Critical reading and appreciation of selected major masterpieces in cultural and literary contexts; improving grammar and dictionary skills. Prerequisite: JAPANESE 536 or consent of instructor.

560 Seminar in Japanese Literature
Exploration of varied topics such as the construct of masculinity, women’s issues, warfare and its consequences, or of specific genres, such as diaries, poetry, or the theater. Emphasis on the transformation of literary forms into cinematographic expressions. Topics change from semester to semester. Course may be repeated up to four times.

570 Research in Japanese Source Materials
Introduction to Japanese resources available through general reference works, bibliography, specialized reference materials, and the Internet. Prerequisite: consent of instructor.

592 Pro-seminars in Japanese
Pro-seminars in Japanese literature and literary translation.

660 Problems and Methods of Translation
Advanced training in practical techniques associated with the translation of modern Japanese; familiarization with appropriate glossaries, dictionaries and other translator’s tools. Discussion of specific problems in Japanese-English translation and practice with a variety of prose styles used in journalistic, political, commercial, literary, and other forms of modern writing.

691 Graduate Seminar in Japanese
Topic determined by fields and interests of enrolled students. Prerequisite: consent of instructor.

699 Master’s Thesis
Credit, 6.
Adjunct/Associate Faculty

E.C. Frederick, Ph.D., Director, Exeter Research, Exeter, N.H.

David Gabriel, Ph.D., Assistant Professor, Brock University, St. Catharines, Ontario, Canada.

Daniel Grow, M.D., Medical Director, Baystate Reproductive Medicine, Springfield, Mass.

Stavroula Kali Osganian, M.D., Assistant Professor of Pediatrics, Harvard Medical School, Cambridge, Mass.

Thomas B. Price, Ph.D., Research Scientist in Diagnostic Radiology, Department of Diagnostic Radiology, Yale University School of Medicine, New Haven, Conn.


W. Scott Selbie, Ph.D., President, C-Motion, Inc., Rockville, Md.

The Department of Kinesiology offers programs of study leading to the Master of Science and Doctor of Philosophy degrees in Kinesiology. These degree programs prepare a candidate to study human movement from a multidisciplinary approach.

The areas of focus in Kinesiology include biomechanics and motor systems, physical activity and health, and physiology. Laboratories support research in each of these areas. Job opportunities are to be found in the academic community, biomedical research, the health and fitness industries, and related fields in the public and private sectors. Study provides excellent preparation for postgraduate work in the health professions.

Candidates for the M.S. and Ph.D. degrees are accepted for admission under the general regulations of the Graduate School. In addition, M.S. candidates are required to have completed courses in exercise physiology, human anatomy and physiology, kinesiology and motor control, competency in the use of standard computer spreadsheet and word processing software, and experience with electronic communication and content.

All applicants must have their scores on the Graduate Record Exam (GRE) forwarded to the Graduate School. For the M.S. program, a combined GRE score of 1,000 is required (verbal plus quantitative). For the Ph.D. program, a combined verbal and quantitative GRE score of at least 1,200 is required. For the Ph.D., an interview is required. For both programs, faculty sponsorship must be obtained prior to admission.

The M.S. program requires 32 credits. The thesis option consists of 23 course credits plus a 3-credit thesis proposal (KIN 698A) and a 6-credit thesis (KIN 699), developed in conjunction with the student’s faculty adviser. The project option includes 23 course credits plus a 3-credit project option (either KIN 697A Special Topic: Master’s Project or KIN 697B Special Topic: Athletic Trainer Project), one 500- to 800-level Kinesiology course (3 credits), and one 600- to 800-level Kinesiology course (3 credits). KIN 697A must be arranged with the student’s faculty adviser; KIN 697B is a comprehensive athletic training program determined in conjunction with the Athletic Trainer Graduate Adviser and the University of Massachusetts Amherst Sports Medicine staff. KIN 697B is available only to students admitted with Athletic Trainer assistantships, normally from the university’s Athletics Department Sports Medicine Program.

The third option is exclusively for students admitted to the M.S./Ph.D. program and consists of 23 course credits plus KIN 697S Special Topic: M.S. Research Proposal (3 credits) and KIN 697T Special Topic: Master’s Research (6 credits). For KIN 697A, 697B, 697S, 697T, 698A and 699, both a written document and an oral defense are required.

A minimum of 72 graduate credits post-baccalaureate is required for the Ph.D. degree, with a major emphasis on the research process. For example, students develop skills for critical analysis and synthesis of research, grant writing, and publication and presentation of their research.

All students are automatically considered for teaching and research assistantships. These awards are based on overall academic credentials (grades, GREs, and letters of recommendation) and relevant teaching or laboratory experiences. TAs assist with undergraduate courses, and RAs work under the direct supervision of a professor in one of the labs.

All courses carry 3 credits unless otherwise specified.

530 Mechanical Analysis of Human Motion

Topics include 2-D and 3-D kinematics and kinetics, joint power, energetics of locomotion and mechanical modeling. Prerequisites: KIN 170 or 172 and 430.

535 Muscle Mechanics and Modelling

The study of mechanical properties of human muscle and models which represent various aspects of muscle function. Topics include basic muscle structure and function, elasticity in muscle function, contractile mechanics, the Hill model, the Huxley model, and applications of muscle modelling in biomechanics. Prerequisites: KIN 430 and CMPSCI 105 or equivalents.

540 Health Behavior Change

Designed to provide useful tools for changing health-related behaviors. Opportunities to apply this information for changing a personal health behavior and the behavior of another individual. Topics include benefits of physical activity, current levels of exercise adherence, dimensions of wellness, the stages of change model, behavior modification in applied settings, and basic self-evaluation strategies. Prerequisite: KIN 340.

560 Exercise Neuroscience

The neural control of movement. Selected topics include gradation of muscular force, motor unit control principles, neuromuscular aspects of strength, segmental motor control, the organization of ballistic movements, adaptations and plasticity in the control of movement, and aging and human motor control. Prerequisites: anatomy and physiology, laboratory course in Kinesiology.

565 Movement Coordination and Perception

Mechanisms of coordination and perception in human movement. Topics include reflexes, central patterns generators, motor programs, dynamical and complex systems; computational and ecological approaches to perception; perspectives on the control of posture and locomotion; applications to motor learning, development and movement disorders. Prerequisite: KIN 460 or equivalent.

570 Pediatric Exercise Physiology

The physiological principles underlying the child’s response to exercise and the associated clinical implications. Topics include: pediatric exercise physiology; determinants of aerobic power; exercise testing in children; fitness and activity; exercise, growth and maturation; aerobic trainability of children; body composition for youth; activity and health; and childhood obesity. Prerequisite: KIN 470 or equivalent.

571 Physical Activity and Women’s Health

The relationship between physical activity and health outcomes in women. Topics include assessment of physical activity, epidemiologic methods, biology and epidemiology of cardiovascular disease, breast cancer, pregnancy, and osteoporosis.
580 Muscle Structure and Function
The effects of exercise on skeletal muscle structure and function. Topics include neuromuscular junction, muscle tendon junction, mitochondria, capillaries, sarcoplasmic reticulum, and sarcoclemma in response to use and disuse. Laboratory section deals with skeletal muscle histology, histochemistry and serum markers of muscle function. Prerequisites: histology or cell physiology or BIOCHEM 523, exercise physiology.

585 Energy Metabolism
How humans store, deliver, and use the fuel required for energy transduction. The pathways by which nutrients are stored, accessed, and oxidized to provide ATP; hormonal regulation of energy balance and substrate utilization; what factors determine the trafficking of metabolic fuels to various fates; the impact of diet composition and/or physical activity on regulation of body weight, pathophysiology of obesity, insulin resistance, and other disorders related to perturbation of energy balance and other factors. Prerequisite: KIN 470 and/or BIOCHEM 420 or graduate student status or consent of instructor.

596 Independent Study
Credit, 1-6.

597 Special Topics

J: Clinical Biomechanics
The study of forces acting on the human body in relation to clinical treatment and injury prevention. Topics include neuromuscular motor patterns; biomechanics of normal gait and posture; causes of musculoskeletal disorders; magnitude, consistency and variability of pathological gait patterns. Prerequisite: KIN 430.

M: Exercise Psychology
A general overview of how psychological factors can affect exercise and health outcomes and how exercise influences psychological parameters. Theories of health behavior, behavior change, and behavioral outcomes within the context of exercise/physical activity.

V: Survey Research in Athletic Training
Preparation for conducting questionnaire-based research projects for M.S. athletic trainer students only. Credit, 1.

600 Introduction to Research in Human Movement
The nature of research; methods of acquiring knowledge; the role of research in human performance and exercise science with emphasis on the scientific method. Credit, 1.

670 Cardio-Respiratory Exercise Physiology
Advanced study of cardiovascular and respiratory responses during exercise. Acute and chronic responses to exercise thoroughly examined and mechanisms underlying these responses critically evaluated. Prerequisite: exercise physiology with lab.

675 Exercise Physiology Seminar
Presentation and discussion of current research literature in exercise physiology. Critical evaluation of research questions, experimental design, data analysis, and interpretation emphasized. Prerequisite: undergraduate exercise physiology. Credit, 1.

696 Independent Study
Credit, 1-6.

697 Special Topics

A: Master’s Research Project
Non-thesis option, independent research project. Oral exam based on the project required.

B: Athletic Trainer Project
Comprehensive literature review and research project for M.S. athletic trainer students only.

Q: Inquiries in Kinesiology
Required for first-year doctoral students studying and preparing for the Doctoral Qualifying Exam. Designed to test each doctoral student’s general knowledge of kinesiology, including broad content areas encompassing the department’s concentrations in physiology, physical activity, and motor systems.

R: Biomechanics Journal Club
Presentation and discussion of current research literature in biomechanics and motor control. Critical evaluation of all aspects of motor systems research including relevant questions; experimental designs and protocols; modeling approaches; data collection, reduction, and analysis techniques; and interpretation of results. Prerequisite: KIN 430.

699 Master’s Thesis
Credit, 3.

730 Biomechanics
Topics include principles of data collection and analysis, high-speed video, force measuring systems, accelerometry, and A/D conversion. Prerequisites: KIN 430 and 530 or equivalent.

735 Advanced Biomechanics Laboratory Techniques
Topics include: biophysical signals, frequency content, Fourier series, Fourier analysis, principles of data collection, data smoothing, electromyography, amplifier response characteristics, software data manipulation. Prerequisites: KIN 430 and 530 or equivalent.

796 Independent Study
Credit, 1-6.

797 Special Topics

A: Muscle Adaptation
How skeletal muscle responds to various stressors such as acute and chronic exercise and myopathy. Emphasis on the mechanisms of cellular response to and recovery from perturbation. Topics also include adaptation response, hypertrophy regeneration, and atrophy. Prerequisite: KIN 580.

B: Research in Exercise Neuroscience
In-depth training in instrumentation and techniques required to conduct research. Topics include electrophysiological instrumentation, surface and in-dwelling EMG procedures, spinal reflex responses, conduction velocity measurement, and other topics. Prerequisites: KIN 560 and consent of instructor.

C: Musculoskeletal Modeling
Issues in building and using musculoskeletal models to enhance biomechanical analyses. Topics include the muscle force sharing problem, forward dynamics, simulation of movement, and motion optimization. Introduction to software useful for musculoskeletal modeling. Prerequisite: KIN 535 or consent of instructor.

F: Mechanisms of Skeletal Muscle Fatigue
Examination of the multifactorial nature of skeletal muscle fatigue, ranging from the role of the central nervous system through the function of the cell’s contractile apparatus. Prerequisite: KIN 580 or consent of instructor.

N: Nonlinear Dynamics of Human Movement
Application of nonlinear dynamical techniques and principles to the understanding of human movement. Topics include introduction to basic concepts in nonlinear dynamics, theory of linear and nonlinear oscillators, assessment of system stability, phase transitions and bifurcations. These
concepts used to investigate changes in neural and biophysical mechanisms underlying motor control of posture and locomotion; integration of locomotory, respiratory, and heart dynamics; issues related to disease and exercise. Prerequisite: KIN 735 or equivalent.

891 Graduate Seminar
Presentation of research topics conducted by master’s and doctoral students and outside speakers. Credit, 1 per semester; maximum credit, 6.

896 Independent Study
Credit, 1-6.

897 Special Topics
V: Bernstein’s Contribution to Motor Control
Insights into the different theoretical approaches to movement coordination and perception, inspired by the work of the neurophysiologist, biomechanist and movement scientist Nicolai Bernstein. Topics include dynamical systems approach, ecological psychology, and systems biology with applications to motor development, motor learning, and movement disorders. Prerequisite: KIN 565 or consent of instructor.

899 Doctoral Dissertation
Credit, 12.

Graduate Faculty


Stephanie Luce, Associate Professor, B.A., California at Davis, 1988; M.S., Wisconsin, 1992; Ph.D., 1999.

Harris Freeman, Visiting Assistant Professor, B.A., Florida, 1974; J.D., Western New England College, 1993.

Extension Coordinator
Dale Melcher, Labor Extension Coordinator.

Associate Faculty

Michael Ash, Associate Professor of Economics.

Arlene Avakian, Professor of Women’s Studies.

Paula Chakravarty, Associate Professor of Communication.

Dan Clawson, Professor of Sociology.

Alexandrina Deschamps, Associate Professor of Women’s Studies.

Gerald Epstein, Professor of Economics.

Nancy Folbre, Professor of Economics.

Lisa Saunders, Associate Professor of Economics.

Millicent Thayer, Assistant Professor of Sociology.

Glenn M. Wong, Professor of Sport Management.

Master of Science in Labor Studies

Master of Science in Labor Studies
This unique program is designed to equip students for careers in the labor movement, related social justice organizations, or further academic work. The multidisciplinary program combines coursework, labor research, and an internship in which students gain experiential knowledge of the field. Graduate courses provide not only the skills necessary to work in and with the labor movement—expertise in research, organizing, collective bargaining, and union leadership—but also an opportunity to examine the larger theoretical and strategic issues confronting workers and their unions. Students have the option of concentrating in areas including globalization, labor and communities, women and work, labor education, and strategic corporate research, in order to explore in depth these cutting-edge issues.

The requirements for the degree are:
1. Forty-two graduate credits of which no more than six may be transferred from other accredited institutions, and no more than six may be in departments other than Labor Studies.
2. An internship with a labor organization, related organization, or agency. A thesis can be substituted for the internship. Six credits are granted upon completion of the internship seminar.

Students admitted to the Master of Science in Labor Studies degree program come from a wide range of undergraduate majors in the social sciences and humanities. They also bring different kinds and levels of experience, including work in the labor movement, campus organizing, organizing against sweatshops, and other types of community-based work experience.

The core curriculum includes the following required courses: 605 Labor Research, 741 Introduction to Labor Studies, 742 Labor Law, 697 Special Topics —U.S. Labor History, Labor in the U.S. Economy, Organizing, and Collective Bargaining and Contract Administration. Electives are offered in a wide range of fields within the Labor Center. In addition, many students take up to six credits with affiliated faculty in
Economics, Sociology, History, Public Health, and other departments and programs within the University. Full-time students typically complete the program in two years. Most students do an internship in the summer between their first and second years. Students’ courses of study are planned in consultation with their advisers, to fit their individual needs and interests.

The Union Leadership and Administration Limited Residency Program

The Union Leadership and Administration (ULA) Master of Science in Labor Studies is an innovative program tailored to the needs of working union officers, staff, and activists. It offers a nonresidential degree program giving trade unionists the opportunity to study and explore the labor movement from a union perspective.

The requirements for the ULA program are the same as the core curriculum for the residential program already described, with the exception of the internship or thesis requirement. Students with extensive experience in the labor movement may waive this requirement, and receive the degree upon completion of thirty-six graduate credits. Courses are taught during ten-day sessions in the summer and winter. Participants take two intensive courses during each session, including a reasonable amount of reading, writing, and other participatory exercises. Students complete a written project upon returning home. Six credits are earned by completing a final paper in the last semester of the program, and students may transfer up to six credits from other graduate programs. Full-time students typically take classes twice a year for two and a half years, and complete the degree in three years.

All courses carry 3 credits unless otherwise specified.

605 Labor Research
The principles and techniques of labor advocacy research. Includes survey research, qualitative methods, and corporate research techniques.

677 Labor Relations in the Public Sector
Labor relations processes in federal, state, and local government. Special attention to statutory requirements.

679 Women and Work
The role of women in the work force and in the trade union movement with historical, social, and economic emphasis.

696 Independent Study
Topic not covered by other course work. Consultation with faculty member required.

696D Internship Seminar
Research and writing seminar. Focus on writing and editing skills, student presentations of research, and peer review. Credit, 6.

697A Special Topics: Advanced Research Methods
Develops substantive research skills in the areas of corporate and industrial analysis to inform union strategy development in support of organizing, bargaining, corporate, sectoral, and regional campaigns and strategies.

697C Special Topics: U.S. Labor History
Examines development of capital-labor relations, U.S. unions, labor relations systems, and working class culture from the early 1800s to present.

697E Special Topics: Labor Education
Models of labor education including popular education, union skills training, and other educational approaches designed to empower workers and build their unions. Hands-on experience in curriculum development as well as critical analysis of materials.

697F Special Topics: Labor in the U.S. Economy
Introduction to labor economics. Addresses issues such as income inequality, poverty, unemployment and underemployment, declining real wages, bargaining power, and capital flight.

697H Special Topics: Organizing
Introduction to the principles and practices of union organizing. Topics include theories of organizing, internal and external organizing, and a case analysis of current organizing campaigns.

697J Special Topics: Collective Bargaining and Contract Administration
An overview of the theory and practice of collective bargaining. Includes analysis of different approaches to bargaining, the negotiations process, contract campaigns, and implementing a contract under the law.

697M Special Topics: Work Reorganization
Work reorganization under its many titles, including “lean production,” “partnership,” and “worker empowerment.” The theory and practice of work reorganization, focusing on developing union strategy to respond effectively.

697O Special Topics: Labor and Politics
Critical examination of labor’s legislative and political activities. Topics include theories of political power, the history of the labor-liberal alliance, labor’s relations with the Democratic Party, and third-party alternatives.

697P Special Topics: Labor in a Global Economy
Examines globalization from both a theoretical and strategic perspective. Focus on the core challenges that economic internationalization presents for labor, and the means by which the U.S. labor movement can rebuild itself into an effective international force.

697S Labor and Community: Coalition and Conflict
Analysis of different models of labor-community coalitions. Includes theories of labor as a social movement, issues of race and gender, coalition building with faith-based communities, student organizations, living wage movements, and other groups.

699 Master’s Thesis
Maximum credit, 6.

741 Introduction to Labor Studies
Examines contemporary issues confronting workers and their unions, in both theoretical and practical terms.

742 Labor Law
Introduction to federal law governing labor unions, the right to organize, and collective bargaining. Topics include historical examination of labor law in the nineteenth and early twentieth centuries, the operation of the National Labor Relations Board, and the National Labor Relations Act.

745 Labor Dispute Settlement
Principles and procedures for resolving labor disputes through negotiation, mediation and arbitration.

746 Comparative Labor Movements
Labor movements and systems in various countries. Combines individual country-studies with a cross-national topical approach.

773 Labor Arbitration
Theories, principles, and processes of resolving workplace conflict through private judicial systems.
Landscape Architecture and Regional Planning

Graduate Faculty

Elizabeth Brabec, Professor and Head of the Department of Landscape Architecture and Regional Planning, B.S., Guelph, 1981; M.L.A., 1984; J.D., Maryland, 1992.

Elisabeth Hamin, Associate Professor of Regional Planning and Director of the Ph.D. Program in Regional Planning, B.A., Cleveland State, 1984; M.B.A., Northwestern, 1986; Ph.D., Pennsylvania, 1997.

Mark Hamin, Lecturer in Regional Planning and Director of the Graduate Program in Regional Planning, B.A., Brown, 1984; Ph.D., Pennsylvania, 1999.


Ellen-J. Pader, Associate Professor of Regional Planning and Director of the Combined Degree Program in Regional Planning and Law (with Western New England College of Law), B.A., Kenyon College, 1972, Ph.D., University of Cambridge, 1981.

Robert L. Ryan, Associate Professor of Landscape Architecture and Regional Planning and Director of the Dual Degree Program in Landscape Architecture and Regional Planning, B.S.L.A., California Polytechnic State University at San Luis Obispo, 1985; M.L.A., M.U.P., Michigan, 1995; Ph.D., 1997.


Frank Sleegers, Assistant Professor of Landscape Architecture, M.L.A., Massachusetts at Amherst, 1995; Dipl.-Ing., Hannover, Germany, 1996.


Adjunct/Associate Faculty

David Bloniarz, Adjunct Lecturer of Landscape Architecture.

Timothy W. Brennan, Adjunct Lecturer of Regional Planning.

John Collura, Professor of Civil and Environmental Engineering.

Nancy Denig, Adjunct Lecturer of Landscape Architecture.

Harry L. Dodson, Adjunct Lecturer of Landscape Architecture.

Wayne Feiden, Adjunct Lecturer of Regional Planning.

John T. Finn, Professor of Systems Ecology.

Paul Fisette, Professor of Natural Resources Conservation.

Glenn Garber, Visiting Lecturer of Regional Planning.

Julie A. Graham, Professor of Geosciences.

Carol Heim, Professor of Economics.

Robin Karson, Adjunct Lecturer of Landscape Architecture.

David K. Loomis, Associate Professor of Forestry.

Martha Lyon, Visiting Lecturer of Landscape Architecture.

Maureen Moriarty-Lempke, Adjunct Lecturer of Regional Planning.

Rutherford H. Platt, Professor Emeritus of Geosciences.

Todd Richardson, Adjunct Lecturer of Landscape Architecture.

Stanley Rosenberg, Adjunct Lecturer of Regional Planning.

Charles Schweik, Professor of Natural Resources Conservation.

Alan Seewald, Adjunct Lecturer of Regional Planning.

Paul W. Shuldiner, Professor of Civil Engineering.

John Sinton, Adjunct Professor of Landscape Architecture.

Richard Taupier, Adjunct Lecturer of Regional Planning.

Rodney B. Warnick, Professor of Hospitality and Tourism Management.

Roger Washburn, Adjunct Lecturer of Landscape Architecture.

Degree Programs

At the graduate level, the department offers a Master of Landscape Architecture (M.L.A.) degree, a Master of Regional Planning (M.R.P.) degree, a dual M.L.A./M.R.P. degree option in Landscape Architecture and Regional Planning, a combined degree in Law and Regional Planning, and a Ph.D. in Regional Planning.

Financial Assistance

The Ph.D., M.L.A. and M.R.P. programs offer teaching and research assistantships to selected qualified students which carry a semester stipend and a waiver of tuition. The M.L.A. teaching assistantships require experience in at least one of the following: plant identification, design, graphics, natural processes, surveying, and theory.

Computer Requirement

All students are required to have a laptop computer, equal or greater to the specifications provided by the department. The department also provides a list of required software (including version).
Landscape Architecture Program (M.L.A. Degree)

The M.L.A. program is structured to educate students to plan and design sustainable places that embody beauty, protect the environment, and enhance people’s lives. Landscape architects work across environmental scales from the intimate garden to community and urban design to landscape and greenway planning and must be educated in the visual arts and the physical and natural sciences. The curriculum is designed to provide students with the essential knowledge and skills necessary to become leaders in the landscape architecture profession.

The program is centered on the design studio through which students are exposed to a wide range of scales and project types that integrate information from other classes and provide opportunities for interdisciplinary study. Many studio projects are community based, working with real clients in the private and public sectors.

Curriculum
The Master’s in Landscape Architecture is a three-year first professional degree program accredited by the Landscape Architecture Accreditation Board. Three groups of people are potential candidates.

1. No design background—For those who have discovered an interest in landscape architecture after earning a college degree in another field, the department offers a three-year program that includes a year of preparatory courses and then two years to earn the 48 graduate credits required for the degree.
2. Design background in related field—For those who have an architecture or related design degree, the department offers acceptance into the second year of the program although there may be a need to take a few of the first-year core requirements.
3. Bachelor’s in landscape architecture—These students enter the second year of the program and have the flexibility to expand their knowledge in a special area of individual concentration.

Core Requirements
The core requirements provide students with the knowledge they will apply in design studios and include:
1. landscape architectural history and theory
2. visual communication using both hand and digital techniques
3. plants
4. natural and cultural systems
5. site engineering (grading and stormwater management) and construction materials and methods
6. professional practice.

Design studios incorporate this knowledge into specific projects and introduce students to design theories, methodologies and processes, and landscape planning principles and approaches. The emphasis is on creative thinking and problem solving in the project’s physical and cultural context.

Concentrations
Students are encouraged to take several courses, within an area of concentration related to landscape architecture, both inside and outside the department. The following four areas of concentration are based on faculty research and professional expertise:
1. Ecological Landscape Planning and Design. This concentration engages ecological pattern and its associated processes across a range of spatial scales. It addresses current environmental and ecological issues such as green infrastructure, greenway planning, water resource planning, biodiversity, and brownfields.
2. Design and Management of Cultural Landscapes. This concentration engages the history and theory of the built environment and its role in contemporary design. It addresses current issues in landscape preservation and design such as varying treatments of cultural landscapes, and ecological and cultural revelatory design philosophies.
3. Urban Planning, Policy and Design. This concentration engages the economic, social, and cultural aspects of the urban experience. It addresses the roles of policy makers, planners, designers, and citizens in shaping the urban fabric in small to medium-sized cities.
4. Applications of Information Technology to Planning and Design. This concentration engages the ways in which the planning and design professions are being transformed by information technology. It addresses the integration of Geographic Information Systems (GIS), Computer Aided Design (CAD), and multimedia into the design process.

Regional Planning Program (M.R.P. Degree)

The M.R.P. degree program provides the theoretical and applied knowledge necessary to enter a career in urban and regional planning. A focus of the program is preparing professionals to recognize and promote sustainable development as the balance of ecology, economy, and equity achieved through a participatory planning process. The curriculum integrates studies of the physical, environmental, social, cultural, economic, and political facets of planning at all scales and densities: urban, suburban, and rural. A studio requirement in which students undertake projects for clients is a central part of the program. Assistantships represent another opportunity for professional development.

There are no prerequisites for the program. Students come from a wide variety of educational and professional backgrounds, including the arts, natural sciences, social sciences, design, and the humanities. The program is designed to balance core requirements and faculty research specialties with individual student interests.

The Curriculum
The M.R.P. is a two-year program. Students take a series of core courses, guided electives within their area of concentration, and additional electives of their choice. These are described below.

Core Requirements
Core requirements prepare students for more advanced planning classes. They provide basic knowledge in the following areas:
1. Planning concepts, theories, philosophies and histories.
2. Techniques associated with planning: quantitative, qualitative, GIS, CAD, and other visualization methods.
3. The built environment: recognition of opportunities and challenges, and understanding the environmental consequences of land and resource use activities.
4. The political, legal, institutional, and administrative setting of planning.
5. The economic and fiscal implications of planning.
6. The social, cultural, and psychological implications of planning.
7. “Plan-making” through studio reports, theses, and terminal projects.
8. Sustainable development and participatory planning.

Concentrations
In addition to the core courses, all students take three courses within an area of concentration. This enables each student to have one or more areas of specialization within the larger interdisciplinary planning program and ensures that everyone has sufficient background to undertake advanced research on a final project or thesis. In special cases, students may pursue an independently designed concentration of their own with the approval of the program director. The five areas of concentration are:
1. Urban and Regional Land Use Planning. The focus of this concentration is understanding the forces affecting the built environment, the interrelationships between land use and social conditions, and ways to support and regulate development to best achieve community goals. Important skills for this concentration include comprehensive planning, urban and regional
design, community participation methods, and applications of planning theory.

2. Housing, Social and Community Planning. This concentration, focusing on social, political, and cultural analyses of the built environment, explores different social and cultural responses to the built environment, analyzing policy, planning, and design criteria for building more responsible urban forms, and intervening in discriminatory practices. Topics of study include domestic and international analyses of housing policy, urban development, land use, urban form, urban design, spatial relations, and social change.

3. Landscape and Environmental Planning. This concentration focuses on environmental policy and planning as it relates to preserving and protecting environmental quality and habitat in the face of new development. Important skills for this concentration include landscape assessment, plan formulation, and evaluation of landscape units ranging from the local to watershed scale, using Geographic Information Systems as a planning tool.

4. Economic Development Planning. This concentration focuses on understanding the economic and social pressures facing communities, and strategies for building local and regional economies. It explores such issues as how towns, cities, and regions will survive in a globalizing economy, and how towns and cities build communities in periods of boom and decline. Topics of study include industrial planning, regional analysis, social planning and social impact assessment, public and private finance, land-use planning, and spatial analysis.

5. Environmental Management. This concentration is related to but distinct from the other concentrations described above, especially the Landscape and Environmental Planning concentration. It focuses on the environment as broadly conceived in terms of the relationships between land and resource use, ecological systems and services, and infrastructure and built form. This concentration also has a greater emphasis on comparative international development and sustainable management practices.

Regional Planning Program (Ph.D. Degree)

The Ph.D. degree program in Regional Planning is a research degree program for students interested in careers in the academic world or in research in public agencies or private corporations. It provides students with the advanced knowledge and skills required to understand and address issues of land use and population change, economic development, environmental protection, resource management, and the more elusive qualities of life" and trends in both urban and rural areas of this nation and the world.

Students admitted to this program normally have a Master’s degree in planning or a related field. Those with a Master’s degree in another field but with appropriate professional experience are given serious consideration. The typical student will require four to five years to complete the degree (the exact time generally depends on the dissertation topic). The Ph.D. requires a minimum of one year in full-time residence.

Degree Requirements

Master of Landscape Architecture
Master of Regional Planning

Both Master’s degree programs are so structured that persons with a variety of backgrounds can qualify for admission. The length of the program will vary with the student’s background. For instance, a person with no background in landscape architecture would spend a minimum of six semesters while a person who graduated from a five-year accredited B.L.A. program might spend as little as three semesters in the M.L.A. program. Most candidates for the M.R.P. degree can expect to complete the requirements in two years. Both programs have a required core, but all students must meet with their academic advisers prior to the start of classes to design a feasible and suitable program.

The degree is conferred upon those graduate students who have satisfactorily met the following basic requirements:

1. Work covering four semesters in residence, unless otherwise arranged.
2. The earning of not fewer than 48 credits, 30 of which must consist of graduate level courses given within the Department of Landscape Architecture and Regional Planning, unless otherwise approved.
3. The preparation of a satisfactory thesis or Master’s project and satisfactory completion of an oral examination on the same. (Basically, a Master’s project is comparable to a thesis in terms of scope of work required. However, the mode of presentation for the Master’s project is much more flexible; for example, large fold-out maps are not permitted in the presentation of a thesis but are permitted in a Master’s project.)
4. Fulfillment of the requirements indicated in the appropriate curriculum guidelines which were in effect at the time of the student’s first semester in the graduate program.
5. See additional requirements under the General Information Section of the Bulletin.

Ph.D. in Regional Planning

The degree requires satisfactory completion of 60 credits, including 15 dissertation credits (Regional Planning 899) and the required core courses. Students with a master’s degree from a Planning Accreditation Board-accredited planning program may petition to receive a maximum of 17 credits of advance standing, while students with other related degrees may receive a maximum of 12 credits of advance standing, as determined by the Program Director.

A Comprehensive Examination is required after completing most or all of the course requirements. It consists of written and oral examinations on planning history and theory, the student’s substantive area, and research methods. The oral examination may include a defense of the student’s dissertation proposal.

The dissertation must be a major contribution to new knowledge and relevant to the field of planning research.

Dual Degree Option in Landscape Architecture and Regional Planning

A growing number of students have recognized the overlap between policy and design and have seen the importance of a strong link between the process and product of land development. The dual degree option combines the design and analysis of urban and rural landscapes with a concern for the social, political, regulatory, and economic factors that shape those landscapes. This option, which usually requires one year less study than taking the degrees one after the other, confers two separate degrees upon completion. The versatility which results from the blending of these two related fields can be a valuable asset for the student. Many public agencies and private consulting firms have preferred employing those students who have the dual skills this option offers.

Students who choose the dual degree option are expected to complete 78 credit hours and must file for both degrees at the same time. The courses taken must include the required courses of both programs.

Combined Degree in Law (J.D.) and Planning (M.R.P.)

Students may simultaneously complete a Juris Doctor degree from Western New England College School of Law in Springfield and a Master
of Regional Planning degree from the University of Massachusetts Amherst in four academic years, rather than the five years it would take if the programs were pursued separately.

Students often spend their first year at the School of Law and the second year in the Regional Planning program. Thereafter, the student finishes degree requirements by spending entire semesters at either institution to complete remaining credits. Students are required to complete the core courses and mandatory academic requirements at each institution. In meeting these requirements, the combined program requires that each institution grant credit for one semester’s work (12 credits) at the other institution. For the Regional Planning 48-credit program, 36 credits will be taken in the planning program, with law courses constituting the remaining 12 cross-credits for the M.R.P. degree. At the School of Law, the student must earn 88 credits to obtain a J.D. degree, with 12 of those credits earned from the Regional Planning program.

Those interested in this program must apply and gain admission to each school separately, a process which is facilitated through cooperation in the admissions process by both the Regional Planning program and the School of Law.

All courses carry 3 credits unless otherwise specified.

Landscape Architecture

501 Studio I—Reading and Revealing the Site
Introduces students to reading and responding to the site. Goals include learning to experience and record the landscape, to design in response to the site, to think creatively, to generate design ideas and understand design as a process, to gain knowledge of design precedents and principles, and to learn tools and techniques of visual expression.

503 Studio II—Landscape Space, Design, and Meaning
An exploration of the modes of space: two-dimensional surfaces, three-dimensional objects, spatial enclosure, and the open continuous landscape. Emphasis on the media of landform, water, plants, and structures as the defining agents of human space in the garden and the landscape.

543 History and Theory I
A survey of the evolution of structures, settlements, and landscapes in the western world from the origins of human societies to the close of the Medieval period.

544 History and Theory II
Completes the survey begun in LandArch 543. Covers the Renaissance to the present.

547 Theory: Landscape Pattern and Process
Landscape patterns resulting from interactions of biotic, abiotic, and cultural resources and processes over time. Understanding these dynamics as a basis for planning and design interventions.

554 Studio III—Spaces and Places in Context
Application of spatial theory and design process to a specific site context. Develops map reading skills at various scales, strengthens drawing, lettering, and cross-section representation skills. Emphasis on landform design in a public park setting.

556 Studio IV—Landscape Planning
Introduction to landscape analysis, assessment, and planning with focus on ecological, cultural, and visual landscape issues. Landscape planning from regional to watershed to local levels. Emphasis on sustainability principles and inventory skills, map reading, data organization, interpretation, and assessment.

591F Green Urbanism
Interdisciplinary examination of current theories of urbanism focused on landscapes and sustainability. Includes review of international case studies at multiple scales.

596 Independent Study
Independent course or seminar work under direction of instructor.

597 Special Topics
Offered periodically as needs and conditions permit.

597A Computers in Landscape Architecture
Introduces students to digital tools and techniques being used in the profession: CAD, 3D modeling, image editing, animation, web design. Provides a clear framework for understanding digital data that is critical to future design practice.

597O Design Drawing
Introduces students to fundamental graphic communication skills used by landscape architects to conceive, develop, and present their design ideas.

601 Studio V—Site Planning
Introduces design process and understanding of a site’s context, the cultural and legal framework, and the natural site features in order to assess development potential and prepare appropriate design proposals for housed represented using digital technologies.

603 Studio VI—The Garden
The garden as the most personal, direct, and intimate expression of landscape architecture, as a contemporary art primarily through discussions of important works and design theory in the genre. Emphasis on developing an informed and creative personal approach which inspires while solving practical problems on real sites.

604 Studio VII—Urban Design
Application of urban design theories as they apply to various scales of urban design, with special attention focused on civic scale design elements and organization of spatial and functional requirements.

606 Studio VIII—Cultural Landscapes
Introduces students to the process of research, planning, design, and management of historically and culturally significant landscapes through selected real-world site projects.

607 Studio IX—Landscape Planning
Emphasis on advanced methods of preparing landscape suitability assessments, program development, and planning and design solutions with the aim of optimizing suitability and needs within open-space and greenway settings.

609 Studio X—Historic Preservation and Design
Landscape design proposals for sites within historically significant areas. Emphasis on methods of analysis and design development. Focus on architectural and garden design principles of specific periods. Graphic and photographic documentation of existing built forms serve as the basis for design proposals.

613 Construction I: Site Engineering
Site engineering problems related to general design including construction processes, alignment geometry, grading, drainage systems, earthwork, and detailing. Emphasis on construction document preparation.

614 Construction II: Site Structures
Design of site structures and required details focusing on stability, durability, and environmental compatibility. Emphasis on statics and strength of materials of site structures. Includes sizing of water retention and detention structures.
Regional Planning

651 Professional Practice
Models of professional office structure, including management, organization, and economics for private, public, and academic practice. Covers ethics, compensation, contracts, specifications, and business plan preparation.

691 Advanced Computer Applications in Landscape Architecture
Current developments in micro-computer hardware and software. Focus on future site design methods: the collection and analysis of site data, illustration of design alternatives, and calculation of engineering requirements.

691E People and the Environment
Interdisciplinary seminar on the applications of environmental psychology research to planning and design. Topics include landscape preference, territoriality and defensible space, way finding, and restorative settings/therapeutic gardens.

691F Research Issues in Landscape Architecture and Regional Planning
Survey of research issues and methods in landscape architecture and planning. Designed to assist students preparing their research for master’s thesis and projects.

696 Independent Study
698A-Z Master’s Project
Allows a student to work on an actual or demonstration project to explore aspects of landscape planning, design or processes related to landscape architecture. Credit, 6.

699 Thesis
Preparation of a research thesis in an emerging or state-of-the-art area of landscape architecture. Credit, 8.

Regional Planning

553 Resource Policy and Planning
Examination of natural resource policy formation and the planning process at the local, state, and regional levels; the role of Congress, the bureaucracy, and citizens’ interest in policy formation; the interplay among forces of economics, technology, ecology, and design in the determination of policy goals and planning horizons.

574 Introduction to City Planning
The contexts within which design, development, decision making, and deliberation of community plans take place. Topics include land-use regulation; environmental management; infrastructure, housing, and social services; current challenges; future trends and opportunities.

577 Urban Policies
Social, cultural, political, and economic analyses of urban policies and practices. Various disciplinary approaches used for critiquing and developing appropriate policies, including urban planning, anthropology, geography, political science, media studies, sociology, and economics. Includes service learning component.

591B Sustainable Communities
What a sustainable community, which achieves greater ecology, equity, and economy than typical current practices, could look like. The current best practices for the built environment, and the social structures and policies that interact with it, to achieve greater sustainability. Focus on the local community but with reference to national and global issues. Open to students from many disciplines who are interested in green urbanism and green ruralism.

591F Green Urbanism
Interdisciplinary examination of current theories of urbanism focused on landscapes and sustainability. Includes review of international case studies at multiple scales.

625 Quantitative Methods in Planning
Application of quantitative methods used by regional and urban planners. Problem definition and data sources, data collection and analysis using descriptive and inferential statistics, and spreadsheet and database planning software. Data presentation techniques. Prerequisite: STATISTIC 501 or equivalent.

643 Economic Development Issues in Planning
The contemporary theory and practice of economic development in the U.S. Provides the requisite background to undertake a critical evaluation of economic development strategies. The contemporary practice, history, and politics of economic development; prevailing theories of regional development; and specific state and local development strategies.

645 Growth Management
The role of policy in guiding land use. Examination of smart-growth principles and practices. Regional land use design and state-level policy as well as international comparisons included.

651 Planning History and Theory
Planning as a decision-making process, the attributes of the political and administrative environment within which planning takes place, and the implications of this environment for the planning process and the planner.

652 Tools and Techniques in Planning
Practical information, specific tools, regulatory processes, and analytic methods useful in the practice of public sector planning at the local level.

656 Judicial Planning Law
The law of land-use control as expressed in major judicial decisions in the U.S. Creation, expansion and powers of municipal corporations; use of legal planning tools such as zoning, abatement of nuisance, eminent domain, etc.

675 Regional Planning Studio I
The first in a sequence of workshop-type courses, to integrate skills and knowledge from conventional courses and apply them to representative planning problems. Admission for non-majors by consent of instructor.

691E Seminar in Geographic Information Systems for Planning and Design
The design and use of computerized geographic information systems for land planning and design decisions.

691F Research Issues in Landscape Architecture and Regional Planning
Survey of research issues and methods in landscape architecture and planning. Designed to assist students preparing their research for master’s theses and projects.

691M Seminar in Industrial Development Planning
The impact of industrial development upon communities. Topics range from brown-field revitalization to industrial park development, cluster development, workforce development, and the industrial land crisis.

693S Planning for Multiple Publics
Explores the social, cultural, and political underpinnings and implications of planning practice and theory. Focus on appropriate planning for different social groups and the relation of planning and policy to social change and research methodologies.

698A Practicum/Master’s Projects
Credit, 1-6.
Linguistics

Graduate Faculty

Elisabeth O. Selkirk, Professor and Head of the Department of Linguistics, B.A., California at Berkeley, 1967; Ph.D., Massachusetts Institute of Technology, 1972.

Joe Pater, Associate Professor and Graduate Program Director, B.A., Toronto, 1987; M.A., Concordia, 1992; Ph.D., McGill, 1997.

Rajesh Bhatt, Associate Professor, B.Tech., Indian Institute of Technology, Kanpur, 1993; Ph.D., Pennsylvania, 1999.

Seth Cable, Assistant Professor, B.A., Rutgers, 2001; M.S., Amsterdam, 2002; Ph.D., Massachusetts Institute of Technology, 2007.


Lisa J. Green, Associate Professor, B.S., Grambling State, 1985; M.A., Kentucky, 1987; Ph.D., Massachusetts at Amherst, 1993.

Kyle Johnson, Professor, B.A., California at Irvine, 1981; Ph.D., Massachusetts Institute of Technology, 1985.


John McCarthy, Distinguished University Professor, A.B., Harvard, 1975; Ph.D., Massachusetts Institute of Technology, 1979.

Christopher Potts, Associate Professor, B.A., New York, 1999; Ph.D., California at Santa Cruz, 2003.


The Department of Linguistics offers graduate work leading to the Ph.D. degree. Under exceptional circumstances, an M.A. degree may be granted, but no students are admitted specifically for an M.A. Students may concentrate their graduate work in any of the following areas: syntax, semantics, phonology, phonetics, diachronic linguistics, psycholinguistics, formal foundations of linguistic theory, and particular languages or language families. Graduate training in the department is strongly oriented toward preparing students to carry on individual creative research as early as possible in their graduate careers. The graduate program is set up so as to maximize close student-faculty contact.

Ordinarily, applications are accepted only for fall semester admission.

The requirements for the Ph.D. degrees listed below are subject to periodic review; students are therefore advised to check with the department for any changes in requirements.

The Doctor of Philosophy Degree Program

Prerequisites for Admission

A B.A., B.S., or M.A. degree.

Program of Study

Forty-eight credits of graduate work, at least half of which consist of 700- to 800-level linguistics courses.

Language Requirement

There is no formal language requirement in the Ph.D. program, although students are generally expected to be able to read relevant journal articles in a foreign language. Students are strongly encouraged to carry out linguistic research on a foreign language as part of their graduate work.

Examinations

Ph.D. candidates must satisfy the general examination requirement by submitting two papers embodying the student’s original research in two distinct areas of the discipline. A final oral examination is held after the doctoral dissertation is submitted.

Dissertation

A dissertation is required.

All courses carry 3 credits unless otherwise specified.

601 Intensive Introduction to Transformational Grammar

Intensive introduction to the concepts of transformational grammar. Survey in depth of problems and methods of research, with emphasis on different types of linguistic evidence and argument. Credit, 4.

603 Generative Phonology

Introduction to generative phonology primarily for graduate students in linguistics. Formalism developed and justified in response to increasingly complex sets of data. Credit, 4.
604 Syntactic Theory
Advanced survey of problems in syntax of natural language encountered in attempting to characterize formally the notion of "grammar of a natural language." Prerequisite: LINGUIST 601.

605 Language Change and Language Typology
An introduction to the study of language change and language variability and their relationships to general linguistic theory. Prerequisites: LINGUIST 601, 603.

606 Phonological Theory
Investigation of issues in current generative phonological theory. Construction of theoretical arguments using original evidence. Prerequisite: LINGUIST 603.

610 Semantics and Generative Grammar

611 Psychological Background to Linguistic Theory
Background psychological and biological assumptions made in linguistic theory and the abstract models they involve. Problems of learnability and parsability are primary topics. Structure and relevance of experimental approaches to these questions.

614 Introduction to Phonetic Theory
Introduction to the theory and practice of phonetics research, with emphasis on the relationships of phonetics to phonology. Extensive work in the phonetics laboratory. Prerequisites: LINGUIST 603 or consent of instructor.

620 Formal Semantics
An introduction to typed and intentional languages and their applications in linguistics. Topics include: the semantics of tense and modality, propositional attitudes, indexicality, quantification, recent developments in categorial grammar. Prerequisite: LINGUIST 610 (formerly 710).

702 Introduction to the Study of an Unfamiliar Language
Investigation, with the aid of an informant, of the structure of an unfamiliar language and of specific analytical problems it presents. Relevance of these in universal grammar. Prerequisite: LINGUIST 601.

705 Diachronic Linguistics
Topics from traditional historical linguistics from standpoint of transformational generative grammar: language change, relative chronology of sound changes, comparative method, internal reconstruction, and linguistic universals. Prerequisite: LINGUIST 601.

707 Universal Grammar
Universal principles of natural language. Universal hypotheses made to date in development of linguistic theory. Prerequisites: LINGUIST 601, 604.

708 Structure of English
Intermediate-level survey of problems in English syntax; follows directly from LINGUIST 601. Prerequisite: LINGUIST 601.

711 Psycholinguistics: Language Acquisition
Theoretical foundations and methodology of the study of child language. Relationship between language acquisition, study of universal grammar, and theoretical psychology. Experimental term project customary. Prerequisite: LINGUIST 601.

712 Psycholinguistics: The Perception of Linguistic Form
Introduction to psycholinguistics concentrating on the perception of linguistic form and the comprehension of discourse. Mental representation of grammar, psychological reality of linguistic models, empirically-motivated processing models. Prerequisite: LINGUIST 601.

713 Linguistics and Literature
Application of modern linguistics to literary analysis. Meter, style, and explication of text on the basis of linguistic criteria.

715 Theory of Grammar
Survey and comparison of language. Structural linguistics, stratificational grammar, scale-and-category grammar, transformational-generative grammar. The nature of linguistic evidence. Prerequisite: LINGUIST 601 or consent of instructor.

716 Topics in Phonetics
Geographical and cultural variations within a language; mapping of dialects. Analysis and interpretation of dialect materials.

720 Proseminar on Semantic Theory
A bridge between the introductory courses 610 and 620 and more advanced seminars. Content variable from year to year. Prerequisites: LINGUIST 610 and 620 or consent of instructor.

726 Mathematical Linguistics
Topics relating to mathematics, logic, computer science and linguistic theory. Typical topics: grammars and automata, formal models of transformational grammar, syntax-directed compilers. Prerequisites: LINGUIST 409, MATH 200, or CMPSCI 201.

730 Proseminar on Phonological Theory
A continuation of LINGUIST 606, with emphasis on developing the ability to conduct original research in phonology. Material complements that of the prerequisites. Typical areas include formal morphology (concatenative and non-concatenative), Lexical Phonology and lexical phonology, syntax-phonology interactions, and the connections between phonology and phonetic implementation. Prerequisites: LINGUIST 603, 606.

740-748 Structure of Language Courses
Phonology and syntax of a language other than English. Emphasis on the application of current linguistic theory to analytical problems presented by that language and the testing of current theoretical hypotheses by reference to those problems. An informant generally used. Within each of these courses, languages vary from year to year; any of them may be repeated for credit. Prerequisites: LINGUIST 601, 603.

740 Structure of an African Language
741 Structure of an American Indian Language
742 Structure of an Indo-European Language
743 Structure of a Malayo-Polynesian Language
744 Structure of a Finno-Ugric Language
745 Structure of a Near Eastern Language
746 Structure of an Oriental Language
747 Structure of a South East Asian Language
748 Structure of a Non-Indo-European Language

750 Proseminar in Syntax
Treatment in depth of a selected area of linguistic theory, with emphasis on developing students' ability to conduct research in syntactic theory. Prerequisite: LINGUIST 604.

751 Topics in Phonology
Advanced, intensive work on specific phonological problems, or on the phonology of a single language or small group of languages. Prerequisites: LINGUIST 603, 606.
Graduate Faculty

Mark A. Fuller, Professor of Management and Dean of the Isenberg School of Management, B.S., Arizona, 1985; M.S., 1987; Ph.D., 1993.

Carol Barr, Associate Professor of Sport Management and Associate Dean for Undergraduate Matters, B.S., Iowa, 1983; M.S., Massachusetts at Amherst, 1991; Ph.D., 1994.

Eric N. Berkowitz, Professor of Marketing and Associate Dean of Professional Programs, B.A., Massachusetts, 1971; M.B.A., 1973; Ph.D., Ohio State, 1976.


Christopher Agoglia, Associate Professor of Accounting, B.S., Florida Atlantic, 1989; Ph.D., Massachusetts at Amherst, 1999.

Richard J. Asebrook, Associate Professor of Accounting, B.S., Dayton, 1964; M.B.A., 1966; Ph.D., Wisconsin, 1974.

Soren Bisgaard, Isenberg Professor of Integrative Studies, B.S., Copenhagen, 1975; M.S., Technical University of Denmark, 1979; M.S., Wisconsin at Madison, 1982; Ph.D., 1985.


Kwong Chan, Assistant Professor of Marketing, B.Com., Tasmania, Australia, 1999; Ph.D. Michigan State, 2005.

Kathleen Debevec Witz, Associate Professor, B.S., Dayton, 1979; M.B.A., Cincinnati, 1980; Ph.D., 1982.


Graham Gal, Associate Professor of Accounting, B.A., Michigan, 1975; Ph.D., Michigan State, 1985.

Jane Giacobbe-Miller, Associate Professor of Management, B.A., Kansas State, 1974; M.A., 1982; Ph.D., Cornell, 1986.

Tiffany L. Green, Assistant Professor of Management, B.B.A., Michigan, 1992; M.S., Northwestern, 1995; Ph.D., 1998.


Nikunj Kapadia, Associate Professor of Finance, B.E., Maharaja Sayajirao University, India, 1984; M.B.A., Indian Institute of Management, 1986; M.Phil., Stern School of Business, 1993; Ph.D., 1995.


Thomas Kida, Professor of Accounting, B.S., Western New England, 1973; M.B.A., Massachusetts, 1974; Ph.D., 1978.


Bing Liang, Associate Professor of Finance, B.Sc., Ocean University of Qingdao, China, 1982; M.S., Chinese Academy of Science, 1988; M.S., Iowa, 1990; Ph.D., 1995.
Mzamo P. Mangalisо, Associate Professor of Management, B.Sc., University of Fort Hare, South Africa, 1974; U.E.D., 1975; M.B.A., Cornell, 1984; Ph.D., Massachusetts at Amherst, 1988.


George R. Milne, Associate Professor of Marketing, B.S., Utah, 1982; M.A., 1984; Ph.D., North Carolina at Chapel Hill, 1990.


Sanjay K. Nawalkha, Associate Professor of Finance and Operations Management, B.Sc., Bombay, India, 1984; M.B.A., Massachusetts, 1987; Ph.D., 1990.


Ray J. Pfeiffer, Jr., Associate Professor of Accounting, B.A., Moravian College, 1987; Ph.D., North Carolina at Chapel Hill, 1994.

M. David Piercy, Assistant Professor of Accounting, B.S., Brigham Young, 1999; M.Acc., 1999; Ph.D., Illinois, 2006.


Thomas Schneeweis, Michael and Cheryl Philipp Professor of Finance, B.A., St. John’s, 1969; M.S., Wisconsin, 1970; Ph.D., Iowa, 1977.


Mila Getmansky Sherman, Assistant Professor of Finance and Operations Management, B.S., Massachusetts Institute of Technology, 1998; Ph.D., 2004.


Bruce Skaggs, Associate Professor of Strategic Management, B.A., Virginia Polytechnic and State University, 1992; Ph.D., Pennsylvania State, 1999.


Melissa Woodard, Associate Professor of Management, B.S., St. Lawrence, 1972; M.S.W., Tennessee, 1976; Ph.D., Cornell, 1992.


Doctor of Philosophy Program

The goal of the Ph.D. Program in Management is to produce scholars capable of teaching and doing research related to the management of business organizations. To accomplish this goal, the program is designed to produce students who have demonstrated competence in:

a) the foundation areas of
   1) research methodology, (including statistics) and
   2) a student’s major concentration, plus
   3) a minor core foundation area of either economics or the behavioral sciences.

b) a major area of concentration within business administration and an allied area of minor concentration.

c) designing, executing and completing a significant research project.

d) teaching.

General Program of Study

The program of study normally consists of two to three years of coursework and one to two years of extensive research toward the completion of a dissertation. During the first year, students take foundation courses in research methodology, statistics, economics, and the student’s major field of concentration, which may require a written qualifying examination at the end of the first year. Over the next one to two years, students take advanced courses in research methods, then a major field and a minor field. The program of study is completed by taking the comprehensive examination, usually during the third year. Students must then complete a doctoral dissertation. In addition, all students must have one year of teaching experience prior to graduation.

A minimum program consists of 45 credit hours of course preparation plus a teaching preparation course, and 18 credit hours for the doctoral dissertation.

Prerequisites to the Program

All applicants are expected to be graduates of an accredited American college or university or a foreign institution determined to be equivalent, and to have achieved acceptable grade point averages in all prior undergraduate and graduate studies. Majors in Strategic Management must have an M.B.A. or its equivalent. Applicants are required to submit a Graduate Management Admission Test score.

Students not meeting the program’s entrance requirements generally must take more courses than students who have met the requirements. Applicants with a recent M.B.A. degree are usually considered to have met the entrance requirements.

Specific course requirements are kept to a minimum so that students, in cooperation with their advisers and the director of the Ph.D. Program, may choose a program which best meets their own needs. Introductory course requirements listed below, therefore, are prerequisites to ensure a minimal level of competence in doctoral-level courses.
The following prerequisites should be met upon application, or shortly after entry, to the Ph.D. Program:

a) Information Systems and Management Science
Working knowledge of computer programming, knowledge of management’s use of computers, and knowledge of basic management science applications and models.

b) Mathematics and Statistics
Working knowledge of differential and integral calculus, matrix algebra, probability, sampling, estimation, hypothesis testing, experimental design, and regression.

c) Economics
Intermediate level knowledge of microeconomics and macroeconomics.

d) Social and Behavioral Sciences
Demonstrated competence in the behavioral and social sciences.

e) Business Administration
Introductory level knowledge of the following areas: accounting, finance, marketing, business policy, operations, management, public policy toward business, and business law. Students with a prior business degree are assumed to have this knowledge. Those without prior business degrees are expected to demonstrate their competence in these areas.

Students entering the program may have acquired the knowledge by formal course work, self-study, or work experience.

Core Requirements
All students are expected to demonstrate competence in the foundation or core areas relevant to their major. Therefore, at the end of the first year (third semester for accounting), all students are evaluated by the faculty in their area. For some of the areas this means that students must pass a written or qualifying examination in their area of concentration. It is also expected that marketing and organization studies majors demonstrate satisfactory coursework in economics, and that finance, accounting, and management science majors demonstrate satisfactory course work in the behavioral sciences. This last requirement should be satisfied before students take their comprehensive examination.

Fields of Concentration
The fields of concentration normally consist of a minimum of 30 semester hours; 21 in a major field and 9 in a minor field. The minor concentration may be selected from graduate courses offered anywhere at the University. The major concentration must be selected from one of the following:

Accounting
Strategic Management
Finance
Organization Studies
Management Science
Marketing
Sport Management
Hospitality and Tourism Management

The major field of Strategic Management is intended to be broad in scope and does not require a specified minor field. The major field of Organization Studies may include aspects of Human Resource Management.

Upon arrival in the fall, a student is assigned an adviser from the major area selected. The student and adviser draft a tentative program of study, semester by semester. During the second semester a thesis or dissertation committee, including the adviser, formally approves the student’s plan of study, including the nature of the comprehensive exam. The plan of study is also approved by the doctoral program director. The nature and scope of the comprehensives must be approved at least one semester before the exam actually takes place. The comprehensive committee must include representation by the minor area; the exam must be written, and may include an oral portion.

Doctoral Dissertation
Upon completing the comprehensive examination, the student forms a dissertation committee in consultation with the projected chairperson and doctoral program director. The committee is composed of at least four members, including one person from outside the Isenberg School. Members on the committee are officially appointed by the Graduate School. A dissertation proposal is written and orally defended before the dissertation committee. After the committee accepts the proposal, the student completes the dissertation research to the satisfaction of the committee. The student must then successfully complete a final oral examination.

Teaching and Research Requirements
All doctoral students must have one year of teaching experience prior to graduation. This requirement is satisfied by serving as a teaching assistant in the Isenberg School of Management, for which enrollment in the school’s teaching preparation course is required. All doctoral students must also have one year of experience conducting research under the guidance of a faculty member.

Minimum Doctoral Program Schedule
Phase One (primarily first year)
Research Methodology Core 9 credits
Major Field Core 9 credits
Minor Field Core 3 credits

Phase Two (primarily second and third year)
Major and Minor Concentrations 18 credits
Advanced Methods 6 credits
Teaching Preparation 6 credits
Comprehensive Examination 3 credits

Phase Three (third and fourth year)
Dissertation Proposal Defense 9 credits
Dissertation Research 18 credits
Final Oral Examination 3 credits

Questions concerning the Ph.D. Program should be addressed to: Director of the Ph.D. Program, Isenberg School of Management, University of Massachusetts, Amherst, MA 01003.

Master’s Degree Programs
In accordance with the accreditation guidelines of the Association to Advance Collegiate Schools of Business (AACSB), the core knowledge for Master of Business Administration study within the Isenberg School of Management consists of basic coursework in economics, statistics, accounting, finance, marketing, information systems, organizational behavior, and the social and legal environment. Any baccalaureate degree holder is eligible to apply for the program.

Three Master’s degrees are offered within the Isenberg School: the full-time M.B.A. program (minimum of 37 credits), Part-time M.B.A. Program (37 credits), and the M.S. in Accounting.

Further information is also available online at www.isenberg.umass.edu.

The Master of Business Administration Degree (Full-time)

The Master’s degree requires a minimum of 37 credit hours, based on a student’s prior academic and professional experience. Accredited at the highest standard for business schools by the AACSB, the program is designed to provide candidates with a broad base of business knowledge and the opportunity to focus in a professional area of interest. Beyond the minimum core credit requirements, 13 credits of interest-area electives are required. Elective courses may also be taken outside the Isenberg School by those students interested in other nonbusiness areas in which a managerial component is desirable.

Elective offerings are taken in the second year along with the field practicum experience required of all students who are required to take more than the minimum 37-credit requirement. In addition, all first-year full-time M.B.A. students are required to enroll in a professional seminar each semester.
Core courses may be waived upon approval of the instructor and graduate program director but an elective must be taken to replace the waived course. Students may also transfer up to 6 credit hours of graduate courses obtained from accredited institutions within the past three years with a grade of B or better with approval of the graduate program director as long as those courses have not previously been used for another graduate degree.

Admission to the full-time Master’s program is for the fall semester only and all students take the common core courses. In the selection of candidates, no one academic background is favored and students with degrees in science, business, engineering, and liberal arts have joined the program. Academic history, GMAT performance, motivation, aptitude for graduate-level work, and managerial experience are all taken into consideration.

Further information is also available online at www.isenberg.umass.edu/mba.

Dual Degree Option in Management and Sport Management

For those students interested in an interdisciplinary education that will provide them with a strong foundation in business, a solid background in an area of engineering, and an in-depth research or project experience, the College of Engineering and the Isenberg School of Management offer four dual master’s degrees. Programs are available to complete the M.B.A. in conjunction with the M.S. in Civil Engineering (M.B.A./M.S.C.E.), the M.S. in Environmental Engineering (M.B.A./M.S.Envr.E.), the M.S. in Industrial Engineering and Operations Research (M.B.A./M.S.I.E.O.R.), or the M.S. in Mechanical Engineering (M.B.A./M.S.M.E.).

The programs typically total 72-73 credits and include a 42-credit M.B.A. core component, an engineering core, engineering electives, and discipline-focused project or thesis. Each program varies slightly; more information about the specific dual degrees is available in the respective engineering program section of this Bulletin.

Students applying to an M.B.A./engineering dual program submit one application and must meet the respective admission standards for each program. The GMAT is required for the M.B.A. and the GRE is required for the engineering degrees. The application is reviewed by both programs. Applicants must be accepted to both programs to enter the dual degree program.

Dual Degree Option in Management and Public Policy

The Center for Public Policy Administration and the Isenberg School of Management offer an M.P.P.A./M.B.A. dual degree program. This is a 72-credit program in which students complete the Master of Business Administration and the Master of Public Policy Administration degrees in two and an half years. The combined degree program allows students who are interested in both policy and public management issues and business administration to pursue an integrated and comprehensive course of study. Graduates would be prepared to move into careers in government and various areas of the private sector. It is recommended that students complete most of the required M.B.A. coursework in their first year. The second-year students enroll for a combination of M.B.A. and M.P.P.A. courses and complete an M.B.A. Practicum. During the summer of the second year, students complete an M.P.P.A. Internship. In the final semester, students complete two M.P.P.A. courses and two electives. Students applying to the M.P.P.A./M.B.A. dual degree program must meet the respective admission standards for each program. They submit one application and only the GMAT is required. However, that application is reviewed by both programs. Applicants must be accepted to both programs to enter the M.P.P.A./M.B.A. dual degree program.

The Master of Business Administration Degree (Part-time)

The Part-time M.B.A. is a 37-credit program offering one of the most efficient ways for individuals to advance their business knowledge and skills while balancing the demands of a full-time career. Classes are offered live at three sites within the state of Massachusetts (Holyoke, Shrewsbury, and Pittsfield) as well as online. The entire core curriculum is offered online every spring, summer, and fall semester. There is no campus residency requirement for the online courses so that the entire degree can be completed from anywhere in the world. A distinct advantage for students enrolled in this program is that they can choose live or online classes throughout their program, allowing for maximum flexibility.

The Part-time M.B.A. program is accredited at the highest standard for business schools by the Association to Advance Collegiate Schools of Business (AACSB) and taught by the same graduate faculty who teach the full-time program. The course curriculum emphasizes techniques of corporate management, including policy analysis, strategic planning, and organization design and control.

In the selection of candidates, no one academic background is favored and students with degrees
in science, business, engineering, and liberal arts have joined the program. Academic history, GMAT performance, motivation, aptitude for graduate-level work, and managerial experience are all taken into consideration. Admission to the Part-time M.B.A. program occurs throughout the year with semesters starting in spring, summer, and fall. For more details, visit www.isenberg.umass.edu/mba.

The Master of Science in Accounting Degree

The Master of Science in Accounting program, designed primarily for those intending to pursue a career in public accounting, enables students to meet the new 150-hour education requirement for Certified Public Accountant (C.P.A.) certification in Massachusetts.

The program prepares students to meet contemporary expectations of reliability and competence for C.P.A.s, and reflects changing demands for client service. It also expands the breadth and depth of students’ knowledge in substantive areas of practice, including taxation, financial reporting, information management, organizational dynamics, and investments, and enhances such skills and attributes as financial research and analysis, communications, ethical behavior, and interpersonal dynamics.

The four-semester sequence of study is taken over a 15-month period. Coursework for the 30-credit program is completed primarily during two consecutive summer terms, allowing students to be employed full-time during the intervening fall and spring semesters. The fall and spring semester courses are Web-based.

Planned sequence for credit hours earned is: Summer I—12 credit hours; Fall—3 credit hours; Spring—3 credit hours; Summer II—12 credit hours.

Application

Application for graduate study should be made directly through the Dean of the Graduate School, as described elsewhere in this Bulletin. A complete application consists of a) the application form (indicating the specific program to which application is being made), b) two letters of recommendation (professional preferred), c) two sets of official transcripts of all college-level work, and d) an official Graduate Management Admission Test (GMAT) score report. Applicants with a Ph.D., M.D. or J.D. from an accredited U.S. college or university do not need to submit a GMAT score. Information on the GMAT may be obtained online at www.mba.com. Application deadlines are found elsewhere in this Bulletin. Action is taken as soon as possible after receipt by the Graduate School of a complete application.

Standards for admission are consistent with those described earlier in this Bulletin.

Applicants with Test of English as a Foreign Language (TOEFL) scores of less than 260 are rarely admitted. This examination may be taken more than once.

All courses carry 3 credits unless otherwise specified.

514 Computer Auditing and Control

Those auditing techniques applicable to computer-based information systems. Techniques emphasized: integrated test facilities, snapshots, and generalized audit programs. Prerequisite: ACCOUNTG 311 or 312, or equivalent.

521 Financial Reporting I

A conceptual framework for accounting for a firm’s reported assets. Focus on the nature of assets and issues regarding their recognition, measurement, and disclosure. Assets covered are cash, receivables, inventory, plant and equipment, intangibles, and investments in equity securities. Motivations of management in choosing among acceptable accounting alternatives in each of these areas examined, along with the economic consequences of such choices.

522 Financial Reporting II

Continuation of ACCOUNTG 521. A conceptual framework for accounting for a firm’s reported liabilities. Focus on the nature of liabilities, and issues regarding their recognition, measurement, and disclosure. Liabilities covered include bonds, leases, pensions, other postretirement benefits, and current and deferred income taxes. Also, accounting for stockholders’ equity, earnings per share measures, and statement of cash flows. Motivations of management in choosing among acceptable accounting alternatives in each of these areas examined, along with the economic consequences of such choices. Prerequisite: SCH-MGMT 521 or equivalent.

523 Financial Reporting III

The third course in the financial accounting sequence, providing a conceptual framework for accounting for the combination of firms into a single economic entity. Topics include business combination consolidation problems, and accounting for international operations by examining translation of foreign currency financial statements and accounting for foreign currency transactions. Also examines fund and not-for-profit accounting. Prerequisite: SCH-MGMT 522 or equivalent.

541 Auditing

First part of course: conceptual in nature. Topics include nature of attest function, ethical and legal relationships of audits and types of audit reports. Second part: technical aspects of auditing including study and evaluation of internal control. Final part: statistical sampling and auditing in a computer environment. Prerequisite: SCH-MGMT 522 or equivalent.

572 Advanced Federal Tax Procedures

Concentration on the federal income taxation of corporations, partnerships, estates and trusts, gifts and estate taxes. Prerequisite: ACCOUNTG 371 or equivalent.

582 International Accounting

Examines issues associated with the globalization of business. Topics include international business and multinational strategy, major influences in developing accounting standards, comparative accounting practices, harmonization of international accounting standards, consolidated financial statements involving foreign subsidiaries, financial statement analysis involving foreign companies, and management, auditing, and tax issues in a global environment. Prerequisite: ACCOUNTG 322 or equivalent.

583 Law for Accountants

A broad survey of legal problems encountered in business transactions; emphasis on implications to accountants and auditors. Prerequisite: MANAGMNT 260 or consent of instructor.

591I Object Oriented Problem Solving for Business with Visual Basic

All standard features of Visual Basic as they relate to the business environment, including object oriented programming and database access.

597G Internet Business and Design

Hands-on design and development of Internet business, including work with area companies. Topics include Web site design, Internet strategies, process design, on-line customer services, Web marketing, payment, systems, securities, and related managerial and technical issues.
Legal Aspects of Commercial Transactions
Basic substantive law of commercial transactions. Legal topics include contract law, agency and corporate law, and government influence on business under the Uniform Commercial Code. Recent developments in law emphasized.

Accounting for Decision Making
A conceptual introduction to financial accounting, covering the complete accounting cycle and resulting financial statements. Topics include asset valuation and reporting, debt and evaluation financing, inter-corporate investments, and earnings management.

Managerial Accounting and Control
Accounting topics pertinent to managers in making internal decisions. Topics include cost behavior, cost-volume-profit analysis, profit planning, transfer pricing, evaluation of segment profitability, and activity-based costing.

Information Management
The management of information technology resources to successfully integrate into an organization electronic commerce, network computing, supply chain management, enterprise resource planning, transaction processing systems, customer relationship management, information security, and other relevant topics.

Financial Analysis and Decisions
Basic concepts, principles, and practices involved in financing businesses and in maintaining efficient operation of the firm. Framework for analyzing savings-investment and other financial decisions. Both theory and techniques applicable to financial problem solving.

Financial Management
Internal financial problems of firms: capital budgeting, cost of capital, dividend policy, rate of return, and financial aspects of growth. Readings and cases. Prerequisite: SCH-MGMT 640.

Managerial Economics
Microeconomic analysis and application to business decisions: cost and profit analysis; demand and pricing; investment analysis and capital budgeting; and economic forecasting.

Business Data Analysis
Statistical methods employed in collection, analysis, and interpretation of data. Business applications of sampling, analysis of variance, experimental design, regression analysis, and forecasting models.

Marketing Management
Marketing concepts of planning, organization, control, and decision making from viewpoint of the business executive. Stress on tools available for analysis and control of marketing activities.

Production Operations Management
Analysis of production problems and solution techniques. Work-flow processes, technology of materials and equipment, and control of availability, quality, cost, and price of products and resources.

Organizational Behavior and Theory
Addresses questions of organization design and human behavior. Presents perspectives for understanding and analyzing processes of managing complex organizations and the interpersonal dynamics within them. Credit, 4.

Organizational Planning and Strategy
Capstone course requiring application of knowledge, theories, and techniques derived from previous courses, using integrative cases and empirical observations to formulate improved policies and plans. Restricted to final semester or by consent of instructor. Prerequisites: SCH-MGMT 630, 640, 644, 650, 680.

Applied Mergers and Acquisitions
Evaluates strategic implications and tactical aspects of mergers, acquisitions, spin-offs, and alliances. Topics include valuation of M&A deals; deal structure; due diligence; corporate governance; legal, tax, regulatory, organizational, and environmental planning issues.

Services Marketing Management
The essentials of marketing management as applied to service industries such as health care, hospitality, financial, technology, and consulting. Topics include service quality, segmentation, positioning, consumer expectation, service recovery, internal marketing, and relationship marketing.

Sport Marketing
Application of traditional marketing strategies within the spectator sport industry. Issues such as fan identification, relationship marketing, and sponsorship explored, using weekly case studies.

A Coach Approach to Improving Leadership Effectiveness
Introduction to the field of organizational coaching, focusing on the utilization of coaching skills to improve leader effectiveness. Theoretical underpinnings of this emerging profession.

Advanced Managerial Accounting
A conceptual and analytical approach to the use of cost and revenue estimates in the planning and control of manufacturing and service firms; statistical estimation of cost and revenue behavior; transfer pricing and performance measurement in decentralized organizations. Prerequisite: introductory coursework in management accounting, management economics, and statistical analysis.

Accounting Information Systems
Accounting systems and their relationship to other business information systems. Graduate accounting status or consent of instructor required.

Accounting Theory
Constructing frameworks to understand the roles that financial reporting and accounting institutions play in a broad economic context. Prerequisite: graduate status or consent of instructor.

Taxes and Business Decisions
A conceptual overview of federal tax laws, focusing on the broad structure of the income tax law and how that law relates to many business investment and personal activities. Includes basic tax policy issues and the many social and political implications of our current tax system.

Federal Income Taxation of Corporations, Partnerships, Limited Liability Companies and Their Owners
Integrated examination of the three different tax regimes that apply to C Corporations, S Corporations and Partnerships and Limited Liability Companies. Comparison of the three regimes on an ongoing basis, with the aim of fostering the ability to compare the tax consequences of all three regimes and determine which is best under a particular set of facts and circumstances.

Money, Capital, Markets and Institutions

Investments
Development of general theory of investment management and its application to
individual and institutional investors; computer portfolio management. Prerequisite: SCH-MGMT 640.

742 Growth, Mergers, and Acquisitions
Analysis of financial problems and implications of corporate growth. Mergers and acquisitions as instruments for achieving growth. Text and cases. Prerequisite: SCH-MGMT 640.

743 International Finance
Introduction to foreign money and capital markets and international financial institutions: financial planning for corporations with overseas operations; analysis of sources and uses of corporate funds abroad; criteria for choice among alternative foreign investments. Text/case approach. Prerequisite: SCH-MGMT 640.

745 Financial Models
Analytical approach to financial management. Emphasis on theoretical topics of financial decision making. Through use of mathematical, statistical, and computer simulation methods, various financial decision making models are made. Prerequisites: SCH-MGMT 640.

746 Portfolio Theory
Factors affecting investment values of securities, and methods used in their analysis. Prerequisite: SCH-MGMT 741.

747 Theory of Financial Markets
In-depth study of portfolio analysis and stochastic processes in security markets. Emphasis on quantitative solution techniques and testing procedures. Prerequisite: SCH-MGMT 640.

749 Seminar in Finance
Seminar in current issues and developments in corporation finance, investments, and financial institutions and markets; emphasis on application of analytical techniques and decision models. Advanced graduate standing in finance or consent of instructor required.

751 Management Science Applications in Business
Application of probability theory (discrete and continuous), stochastic process, linear, quadratic and dynamic programming, waiting lines, sequencing, and computer simulation models to selected problems in management science. Prerequisite: SCH-MGMT 632.

752 Deterministic Models in Management Science
Introduction to deterministic models and techniques relevant to business problems. Topics include Kuhn-Tucker theory, mathematical programming, difference equations and discrete and continuous maximum principles. Consent of instructor required.

753 Probabilistic Models in Management Science
Introduction to probabilistic models and statistical techniques relevant to business problems. Consent of instructor required.

758 Supply Chain Management
Basic concepts of supply chain management such as synchronized information, product and financial flow, channel design and configuration, supplier relationships, internal and external logistics, and inventory deployment and replenishment. Supply chain modeling for the optimization and monitoring of a supply chain, or a segment thereof, using network (mathematical programming) models.

761 Consumer Behavior
Social, psychological, and economic roles of consumer in decision making and market behavior. External and internal determinants of buyer behavior.

762 Research Methods in Marketing
Applicability and utilization of quantitative research techniques to marketing problems and processes. Prerequisites: SCH-MGMT 650 and 660.

764 International Marketing Management
Impact of political, social, economic and cultural forces of divergent societies upon managerial decision-making process in international marketing operations. Problems associated with design of marketing strategy. Prerequisite: SCH-MGMT 660.

765 Product Management
Analytical, decision-making, and planning tasks of marketing and product management in competitive environments. Includes formulation of product-market strategies, new product development, product-line deletions, and formulation of marketing plans and budgets. Prerequisite: SCH-MGMT 660.

767 Management of Marketing Communications
Development of effective marketing communication strategies based on understanding of characteristics of audiences. Integration of conceptual material from communication theory as applied to advertising and other promotional problems. Prerequisite: SCH-MGMT 660.

769 Advanced Topics in Marketing
Seminar in current issues and developments in field of marketing, including trends in public policy, new research applications, and techniques for formulating marketing strategies. Advanced graduate standing in marketing or consent of instructor required.

770 Human Resource Management
Overview of personnel management theory and practice in organizations. Job definition; recruitment, selection, separation; training; health and safety; compensation; EEO issues.

772 Compensation Administration
Direct and indirect compensation; wage and salary criteria, policy, and methods; performance appraisal systems; incentive and nonincentive systems; payment methods for managers and professionals.

778 Advanced Topics in Personnel Management
Three-module seminar covering: A. Compensation and Benefits, 1st 3rd of semester; B. Performance Evaluation, 2nd 3rd; and C. Training and Development, final 3rd. Any or all modules may be taken.

782 Organization Development
Role of organization development consultant and cycle of events involved in assisting clients. Emphasizes development of skills in problem diagnosis, formulation of solutions, and managing organizational change. Prerequisite: SCH-MGMT 680.

783 Business and Its Environment
Relationship between business firms and various environments in which they operate; examines environmental impact of business decisions, issues related to social accountability of firms, and effects of governmental regulations. Advanced graduate standing or consent of instructor required.

791A Interpersonal Skills for Managers
Focuses on increasing awareness of and developing interpersonal skills. Emphasizes leadership, listening, assertiveness, negotiating, teamwork, and other skills. Prerequisite: SCH-MGMT 680.

795L Leadership and Beyond
An overview of different perspectives and approaches to leadership practice. Goes beyond traditional leadership practices to examine empowering leadership approaches.
and contemporary leadership challenges. Prerequisite: SCH-MGMT 680.

801 Philosophical Foundations in Business Administration
Conceptual foundations of business administration in context of social and economic philosophy. Corporate objectives and goal models, theories of organization, and social responsibilities of corporate management.

802 Foundations of Organization and Management Studies
Examines classic and contemporary texts in management commonly considered pioneering works. Participants read and critically evaluate the books to gain understanding of their importance in shaping the organization studies field. Prerequisite: consent of instructor.

803 Theory and Research in Organizational Behavior
Theories and empirical applications of organizational behavior in contemporary research. Topics include motivation, organizational justice, attitudes, leadership, and groups. Participants critically analyze research on current issues, Focus on building knowledge and research skills.

804 Research Methods I
Introduction to basic issues in research design; emphasis on methods allowing inference of cause-and-effect relationships.

805 Multivariate Methods for Business Research
Techniques of multivariate statistical analysis as applied to business research. Discriminant analysis, canonical correlation, multivariate analysis of variance and covariance, factor analysis, cluster analysis.

811 Business History
American business institutions as evolved through time. Impact of social and economic processes on their development and operations.

812 Jurisprudence and Business
Social-scientific and philosophical theories of law; systems, functions, processes and limits of law, applications to the business organization in its external and internal affairs.

815 International Aspects of Business Administration
Basis of international division of labor, history of international business policy, and cultural differences affecting management of international business enterprises.

821, 822 Management Science I, II
Selected topics of current significance in mathematical, statistical, computer, and behavioral approaches to management and administration. Either semester may be elected independently. Credit, 3-6.

823 Mathematical Programming
Application of linear, quadratic, integer, and dynamic programming models and algorithms in pricing and resource allocation by firms; sensitivity analysis and parametric programming.

824 Decision Models in Business Administration
Application of probability theory and selected topics in mathematics to stochastic and deterministic managerial decision models.

825 Seminar in Management Science
Presentation of journal reports on business topics utilizing a quantitative approach.

831 Long-Range Business Planning
Advanced and intensive study of long-range planning practices in business firms. Emphasis on planning process in relation to other managerial processes on most recent methods of reducing risk and uncertainty in long-term planning strategies.

832 Dynamics of Corporate Organization
Changes in corporate organization as adaptive responses to challenges and constraints imposed upon the corporation by variations in endogenous and exogenous factors.

833 Organization and Administrative Theory
Examines research and scholarly approaches to organization theory by investigating both the concept ‘organization’ and the concept ‘theory’. Presents such perspectives as decision theory, structural contingency theory, institutional theory, transaction cost economics, and network theory.

834 Management Systems: Theory, Analysis and Design
Review of systems with stress on normative behavioral systems. Designing, implementing, operating, maintaining, and controlling such systems. Organization viewed as a total system. Each student designs behavioral system as class project.

841 Management Information Theory
Theories and applications of management information system in context of total servomechanism system concept. Generation, organization, transformation, dissemination, codification, discrimination, and economics of information.

842 Management Control Systems
Function of total systems theory; provides direction in attaining planned objectives of the system. Various theories of control and measurement in relation to organization resources and information requirements.

845 Theory and Research in Sport Organizational Behavior and Sport Strategic Management
A critical examination of the literature pertaining to organizational behavior and strategic management within the sport context. Emphasis on theory development and empirical research approaches.

846 Theory and Research in Sport Marketing and Sport Consumer Behavior
An overview and analysis of current research issues within sport marketing and sport consumer behavior. Topics include socialization and motivation, social identity theory, viewership and attendance, brand management, loyalty, and sponsorship.

847 Theory and Research in Sport Law and Sports Economics
Examination of the key contributions to the sport law and sports economics literature. Taught as two separate modules, with each module emphasizing theory development and empirical research approaches within the respective fields.

851 Theory and Research in Sport Law and Sports Economics
An examination of the key contributions to the sport law and sports economics literature. Taught as two separate modules, with each module emphasizing theory development and empirical research approaches within the respective field.

851 Theory and Science in Marketing
The state of marketing knowledge; content and validity of marketing thought, theories, and other substantive and methodological contributions to development of marketing science.

852 Behavioral and Social Science Issues in Marketing
Materials from behavioral and social sciences used to expand understanding of marketing phenomena.
861 Advanced Accounting Theory I
Origin, development, and current status of financial accounting theory. Existing literature.

862 Advanced Accounting Theory II
Origin, development, and current status of managerial accounting theory. Existing literature.

871 Micro Theory of Finance
Optimum financial policies and decisions of nonfinancial firms. Theory of competition and optimum asset management of financial firms.

872 Financial Intermediaries and Markets
Financial intermediaries and financial markets and development of theory of financial intermediation as it relates to growth, employment, and price levels.

881 Production Management Analysis
Application of mathematical and statistical methods and models for production management decisions and problem analyses, and for managerial planning and control.

882 Production Management Policy
Formulation and administration and production and operations management policies with reference to developing an effective total business strategy.

883 Seminar in Tourism Theory and Research
Theory construction as it applies to the tourism phenomenon and its impacts. Students review published research and develop an understanding of classic theories to create a foundation framework for their dissertation research.

884 Decision Making for the Services Industry
For Ph.D. students in Hospitality and Tourism Management and related fields. Examines models used by service firms to make informed decisions.

885 Research in Services Marketing and Management
Surveys classic and current conceptual and empirical research in services marketing and management in the context of the hospitality and tourism industry and other sectors including health care, educational, and financial services.

888 Seminar in Hospitality Research
Selected topics of current significance to researchers and practitioners in the hospitality industry. Emphasis on identifying advancements in theories and their applications in hospitality cultures of inquiry.

891, 892, 893, 894, 895, 897 Seminar in Advanced Topics in Business Administration
Advanced topic section in each general or functional field of study. Investigation of current literature and research in these areas.

896 Independent Study in Business Administration
Individualized secondary or applied research in special areas of guided doctoral-level investigation. Consent of instructor required. Credit, 3-6.

899 Doctoral Dissertation
Credit, 18.

Mathematics and Statistics

Graduate Faculty

George S. Avrunin, Professor and Head of the Department of Mathematics and Statistics, B.S., Michigan, 1972; A.M., 1974; Ph.D., 1976.

Ivan Mirkovic, Professor and Graduate Program Director, B.S., University of Zagreb, 1977; M.S., 1981; Ph.D., Utah, 1986.

Tom Braden, Associate Professor, B.A., Chicago, 1990; Ph.D., Massachusetts Institute of Technology, 1995.


Qian-Yong Chen, Assistant Professor, B.S., University of Science and Technology of China, 1996; M.S., Institute of Computational Mathematics, China, 1999; M.S., Brown, 2004; Ph.D., 2004.

Weimin Chen, Associate Professor, Ph.D., Michigan State, 1998.

Erin Marie Conlon, Assistant Professor, B.S., Wisconsin, 1985; M.S., Minnesota, 1996; Ph.D., 1999.


Paul Gunnel, Associate Professor, B.S., Stanford, 1989; Ph.D., Massachusetts Institute of Technology, 1994.

Farshid Hajir, Associate Professor, B.A., Princeton, 1988; Ph.D., Massachusetts Institute of Technology, 1993.

Hui-Kuang Hsieh, Professor, B.S., Fu-Jen Catholic University, 1967; M.S., National Taiwan University, 1970; M.A., Columbia, 1972; Ph.D., Wisconsin, 1976.

Panayotis Kevrekidis, Associate Professor, Diploma in Physics, Athens, 1996; M.S., Rutgers, 1998; Ph.D., 2000.
Daeyeong Kim, Assistant Professor, B.S., Korea University, 2000; M.S., 2002; Ph.D., Pennsylvania State, 2008.
Anna Liu, Assistant Professor, B.S., Peking, China, 1997; M.S., Chinese Academy of Sciences, 2000; Ph.D., California at Santa Barbara, 2004.
Eyal Markman, Associate Professor, B.S., Bar Ilan University, 1987; Ph.D, Pennsylvania, 1992.
Franz Pedit, Professor, B.S., University of Innsbruck, 1980; M.S.C., 1983; Ph.D., 1985.
Arunas Rudvalis, Associate Professor, B.S., Harvey Mudd, 1965; M.A., Dartmouth, 1967; Ph.D., 1969.
Eric Sommers, Associate Professor, B.S., Brown, 1993; Ph.D., Massachusetts Institute of Technology, 1997.
John Staudenmayer, Associate Professor, B.A., Williams, 1992; M.S., Cornell, 1999; Ph.D., 2000.
Evgenii Tevelev, Assistant Professor, Honorary Diploma in Mathematics, Moscow State University, Russia, 1995; Ph.D., 1999.
Bruce Turkington, Professor, B.S., University of Victoria, 1974; M.S., Stanford, 1976; Ph.D., 1978.

Nathaniel Whitaker, Associate Professor, B.A., Hampton Institute, 1974; M.S., Cincinnati, 1981; Ph.D., California at Berkeley, 1987.
Siman Wong, Associate Professor, B.Sc., British Columbia, 1990; Ph.D., Massachusetts Institute of Technology, 1995.
Robin Young, Associate Professor, B.S., Witwatersrand, 1985; Ph.D., California at Davis, 1991.
Hong-Kun Zhang, Assistant Professor, B.S., Inner Mongolia, China, 1993; M.S., 1998; M.S., Alabama at Birmingham, 2001; Ph.D., 2005.

Adjunct/Associate Faculty
James J. Callahan, Professor of Mathematics, Smith College.
David A. Cox, Professor of Mathematics, Amherst College.
James Henle, Professor of Mathematics, Smith College.
Harriet S. Pollatsek, Professor of Mathematics, Mount Holyoke College.
Marjorie L. Senechal, Professor of Mathematics, Smith College.

General Information
The Department of Mathematics and Statistics offers programs leading to the Master of Science in Mathematics (with a separate Option in Statistics), the Master of Science in Applied Mathematics, and the Ph.D. in Mathematics (also with a separate Statistics option).

Admission and Financial Aid
Applications for admission are screened by a departmental committee, which bases its recommendations for admissions and financial aid on the applicant’s undergraduate record, letters of recommendation, and other data. Admission is very selective, and there is no minimal set of courses or grades that will guarantee admission. Applicants are encouraged to submit additional data on their mathematical training, such as texts used and topics covered in courses, details of any honors projects or individual reading, etc. GRE scores are required only for the M.S. program in Applied Mathematics, but should be submitted whenever possible.

Most Ph.D. students are supported by Teaching Assistantships providing a waiver of tuition and a stipend. The duties usually involve teaching one section of an elementary course each semester or equivalent work assisting the instructor of a large lecture course. A limited number of Research Assistantships are also available. Teaching Assistantships are also available for M.S. students, although usually with a smaller stipend.

Faculty Research Interests
The research interests of the faculty may be summarized briefly under a number of headings:
Algebra, Lie Theory, and Number Theory
Algebraic combinatorics, commutative algebra, algebraic groups, geometric Langlands program, analytic and algebraic number theory.
Geometry and Topology
Algebraic geometry, complex manifolds and Hodge theory, integrable systems, differential geometry, geometric analysis and variational problems, symplectic manifolds, geometric topology, applications to physics.
Analysis, Probability, Applied Mathematics, and Numerics
Non-linear PDEs, dynamical systems, harmonic analysis, large deviations, stochastic processes, mathematical physics, statistical mechanics and stochastic models, fluid dynamics, mathematical biology, symbolic computation.
Statistics
Bayesian statistics, bioinformatics and bio-statistics, linear models, measurement error models, mixed models, smoothing, reliability, and survival analysis.

Seminars and Colloquia
The department has an active colloquium, usually held on Thursdays at 4 p.m. The location makes it possible to invite a wide variety of well-known mathematicians and statisticians to visit and speak.

Each semester a number of seminars are organized by faculty or graduate students, meeting one or twice a week. The Graduate Student Seminar usually meets late Wednesday afternoon following a special departmental tea. Students often have an opportunity to talk in other seminars. Some of these (e.g., Applied Analysis and Computation, GANG, Probability and Statistics, Representation Theory) have developed a continuous existence, while others are organized around current research topics. The Valley Geometry Seminar and Five College Number Theory Seminar are ongoing Five College activities.

Centers and Special Facilities
Center for Applied Mathematics
The center involves faculty members and graduate students who are interested in research and instruction in applied mathematics and scientific
computation. The center organizes the research seminar on Applied Analysis and Computation, and manages the Master’s Degree Program in Applied Mathematics, a two-year professional degree intended for students who seek industrial employment.

Center for Geometry, Analysis, Numerics, and Graphics (GANG)
This center is a computational laboratory using interactive scientific graphics and numerical computation as tools in studying geometric interface problems and other nonlinear variational problems that arise in the physical sciences. The center organizes the weekly GANG seminar.

Research Computing Facility (RCF)
The RCF provides computing facilities for the department. These facilities may be used by faculty and students as a tool for research and academic purposes. The facility is mainly UNIX- and Linux-based. All of the systems are networked, and support connections to the campus network and the Internet. A full-time staff and several graduate students provide support and consulting services to the community.

Summary of Degree Requirements
A detailed description of all degree requirements may be obtained from the departmental Graduate Program Director or from the department’s Web site: http://www.math.umass.edu.

Ph.D. Coursework
A doctoral candidate must successfully complete 36 credits in graduate courses. There are distribution requirements which allow students to obtain a broad knowledge of mathematics and/or statistics and its applications. After completing the Qualifying Examinations (see below), students are expected to devote most of their time to their dissertation research (18 dissertation credits are required); during this period a student will normally take courses only in his or her specialty.

Qualifying Examinations
Twice each year written examinations are offered in the areas of advanced calculus/linear algebra, algebra, analysis, applied mathematics/numerics, complex analysis, probability/statistics and geometry/topology. Ph.D. candidates must pass a Basic Examination (in three areas, including advanced calculus/linear algebra) at the Ph.D. level and an Advanced Examination in two of these subjects. Roughly, the Basic Examinations are based on material from first- and second-year graduate courses.

Teaching Requirement
All students in the doctoral program are expected to gain experience communicating their subject by participating in the instruction of students. This requirement may be satisfied by performing the duties ordinarily assigned to a Teaching Assistant, but the precise kind and extent of activities necessary to satisfy it will be determined on an individual basis for each student.

M.S. Degrees
An entering Master’s candidate should normally have completed at least 18 semester credit hours in undergraduate mathematics and statistics beyond calculus. A one-year course in linear and (except for Statistics applicants) modern algebra and a one-year course in advanced calculus would be highly desirable.

Coursework
To earn a Master’s degree a student must complete 30 credit hours, at least 18 of which must be in courses in the department numbered 600 or above. There are distribution requirements which allow students to obtain a broad knowledge of mathematics and/or statistics and its applications. These requirements are different for each of the options—Mathematics, Applied Mathematics, and Statistics—and students should consult the Graduate Program Director for details. Students in Applied Mathematics and in Statistics are often encouraged to take appropriate courses from other departments.

Exams and Projects
To obtain an M.S. in Mathematics, students must pass a Master’s Exam; this is the same three-part Basic Exam given to Ph.D. students, although with a lower passing level. Students in the Statistics option, or in the M.S. program in Applied Mathematics must pass a two-part exam and must also complete a special project under the guidance of a faculty member.

There is neither a thesis requirement nor a foreign language requirement for a Master’s degree. A Master’s candidate who has not completed the degree requirements by the end of the second year will ordinarily not be permitted to reregister in the department.

Courses Offered
Listed below are frequently given graduate-level courses in Mathematics and Statistics. Not all of these courses are offered regularly and many topics courses are offered under a “generic” designation. Please consult the department’s website: http://www.math.umass.edu, which contains an updated list of regularly scheduled and topics courses.

Graduate students in other departments should consult the Undergraduate Catalog for mathematics courses which may carry graduate credit in their own departments or which in any event may be of interest, especially those in applied mathematics, probability, and statistics.

All courses carry 3 credits unless otherwise specified.

Mathematics

503 Topics in Computer-Connected Mathematics for Secondary Teachers
Computer-connected treatment of many topics appropriate for secondary school mathematics courses using computers, focusing on algorithms, round off error, and graphics. Topics chosen from number theory, linear algebra, geometry, analysis, probability, and statistics. Prerequisites: MATH 233 and 235 or equivalents; working knowledge of Basic, PASCAL, or Fortran.

511 Abstract Algebra I
Introduction to various topics in abstract algebra, such as groups, rings, and fields. A deeper and more advanced treatment than MATH 411. Prerequisites: MATH 235; MATH 300 or consent of instructor.

512 Abstract Algebra II
A continuation of MATH 511.

513 Combinatorics and Graph Theory
Cross-listed with CMPS CI 575. A basic introduction to combinatorics and graph theory for advanced students in computer science, mathematics, and related fields. Topics include elements of graph theory, Euler and Hamiltonian circuits, graph coloring, matching, basic counting methods, generating functions, recurrences, inclusion-exclusion, Polya’s theory of counting. Prerequisites: mathematical maturity, calculus, linear algebra, discrete mathematics course such as CMPS CI 250 or MATH 455. MATH 411 recommended but not required.

523 Introduction to Modern Analysis
Construction of the real number system; sequences, series, functions of one real
variable, limits, continuity, differentiability, Riemann integral; sequences and series of functions. Prerequisites: MATH 233, 235 and 300 or equivalent.

532 Topics in Ordinary Differential Equations
Topics chosen from: Sturm-Liouville theory, series solutions, stability theory and singular points, numerical methods, transform methods. Prerequisite: MATH 235 and 431.

534 Introduction to Partial Differential Equations
Classification of second-order partial differential equations, wave equation, Laplace’s equation, heat equation, separation of variables. Prerequisites: MATH 233, 235, and 431.

545 Linear Algebra for Applied Mathematics
Basic concepts (over real or complex numbers): vector spaces, basis, dimension, linear transformations and matrices, change of basis, similarity. Study of a single linear operator: minimal and characteristic polynomial, eigenvalues, invariant subspaces, triangular form, Cayley-Hamilton theorem. Inner product spaces and special types of linear operators (over real or complex fields): orthogonal, unitary, self-adjoint, hermitian. Diagonalization of symmetric matrices, applications. Prerequisite: MATH 235 or equivalent.

551 Numerical Analysis I
Introduction to computational techniques used in science and industry. Topics selected from root-finding, interpolation, data fitting, linear systems, numerical integration, numerical solution of differential equations, and error analysis. Prerequisites: MATH 233, and either MATH 235 or consent of instructor; knowledge of a high level programming language.

552 Numerical Analysis II
Introduction to the application of computational models to models arising in science and engineering, focusing mainly on the solution of partial differential equations. Topics include finite differences, finite elements, boundary value problems, fast Fourier transforms. Prerequisite: MATH 233 or consent of instructor.

563 Differential Geometry
Differential geometry of curves and surfaces in Euclidean 3-space using vector methods. Prerequisites: MATH 233 and 235.

611 Algebra I
Introduction to groups, rings, and fields. Direct sums and products of groups, cosets, Lagrange’s theorem, normal subgroups, quotient groups. Polynomial rings, UFDs and PIDs, division rings. Fields of fractions, GCD and LCM, irreducibility criteria for polynomials. Prime field, characteristic, field extension, finite fields. Some topics from MATH 612 included.

612 Algebra II
A continuation of MATH 611. Topics in group theory (e.g., Sylow theorems, solvable and simple groups, Jordan-Holder and Schreier theorems, finitely generated Abelian groups). Topics in ring theory (matrix rings, prime and maximal ideals, Noetherian rings, Hilbert basis theorems). Modules, including cyclic, torsion, and free modules, direct sums, tensor products. Algebraic closure of fields, normal, algebraic, and transcendental field extensions, basic Galois theory. Prerequisite: MATH 611 or equivalent.

621 Complex Analysis
Complex number field, elementary functions, holomorphic functions, integration, power and Laurent series, harmonic functions, conformal mappings, applications.

623 Real Analysis I
General theory of measure and integration and its specialization to Euclidean spaces and Lebesgue measure; modes of convergence, $L^p$ spaces, product spaces, differentiation of measures and functions, signed measures, Radon-Nikodym theorem.

624 Real Analysis II
Continuation of MATH 623. Introduction to functional analysis; elementary theory of Hilbert and Banach spaces; functional analytic properties of $L^p$-spaces, applications to Fourier series and integrals; interplay between topology, and measure, Stone-Weierstrass theorem, Riesz representation theorem. Further topics depending on instructor.

645 Differential Equations and Dynamical Systems I
Classical theory of ordinary differential equations and some of its modern developments in dynamical systems theory. Linear systems and exponential matrix solutions. Well-posedness for nonlinear systems. Qualitative theory: limit sets, invariant set and manifolds. Stability theory: linearization about an equilibrium, Lyapunov functions. Autonomous two-dimensional systems and other special systems. Prerequisites: advanced calculus, linear algebra and basic ODE.

646 Differential Equations and Dynamical Systems II
A continuation of MATH 645. Topics in the theory of dynamical systems, possibly including: Floquet theory of periodic solutions; bifurcation theory; complex behavior of higher dimensional systems, attractors and chaos. Applications from physical and biological sciences illustrate and motivate the theoretical material. Prerequisite: MATH 645.

651 Numerical Analysis I
The analysis and application of the fundamental numerical methods used to solve a common body of problems in science. Linear system solving; direct and iterative methods. Interpolation of data by function. Solution of nonlinear equations and systems of equations. Numerical integration techniques. Solution methods for ordinary differential equations. Emphasis on computer representation of numbers and its consequent effect on error propagation. Prerequisites: advanced calculus, knowledge of a scientific programming language.

652 Numerical Analysis II
Presentation of the classical finite difference methods for the solution of the prototype linear partial differential equations of elliptic, hyperbolic, and parabolic type in one and two dimensions. Finite element methods developed for two dimensional elliptic equations. Major topics include consistency, convergence and stability, error bounds, and efficiency of algorithm. Prerequisites: MATH 651, familiarity with partial differential equations.

671 Topology

696 Independent Study
Credit, 1-6.

699 Master’s Thesis
Consent of instructor required. Credit, 1-3 each semester.

701, 702 Topics in Algebra
Consent of instructor required. Credit, 1-3 each semester.

703 Theory of Manifolds I
Inverse and implicit functions theorems, rank of a map. Regular and critical values. Sard’s theorem. Differentiable manifolds,
submanifolds, embeddings, immersions and diffeomorphisms. Tangent space and bundle, differential of a map. Partitions of unity, orientation, transversality embeddings in $\mathbb{R}^n$. Vector fields, local flows. Lie bracket, Frobenius theorem. Lie groups, matrix Lie groups, left invariant vector fields. Prerequisite: MATH 671 or consent of instructor.

**704 Theory of Manifolds II**

**705, 706 Topics in Analysis**
Consent of instructor required. Credit, 1-3 each semester.

**711, 712 Advanced Algebra**
Consent of instructor required. Credit, 3 each semester.

**713 Introduction to Algebraic Number Theory**
Valuations, rings of integral elements, ideal theory in algebraic number fields of algebric functions of one variable, Dirichlet-Hasse unit theorem and Riemann-Roch theorem for curves. Prerequisites: MATH 611 and 612 or equivalent.

**731 Introduction to Partial Differential Equations I**

**732 Introduction to Partial Differential Equations II**
A continuation of MATH 731. General class of equations and systems, modeled on the prototypes studied in 731. Linear hyperbolic systems. Parabolic evolution equations, and semigroups of operators. Linear elliptic equations of second order. Topics in nonlinear equations. Possible topics include: hyperbolic conservation laws; nonlinear parabolic systems—reaction-diffusion equations, Navier-Stokes equations; mean curvature equations; free-boundary problems. Prerequisite: MATH 731.

**781 Algebraic Topology I**
Homotopy theory, simplicial and Cech homology theories. Prerequisites: MATH 611, 671.

**782 Algebraic Topology II**
General homology theory, universal coefficients theorems, singular homology theories, ring structure in cohomology theories, spectral sequences. Steenrod operations. Prerequisite: MATH 781.

**896 Independent Study**
Maximum credit, 6.

**861, 862 Advanced Geometry**
Credit, 3 each semester.

**892, 893, 894, 895 Research Seminar**
Presentation by advanced graduate students of research articles, perhaps own research. Credit, 1 each semester.

**899 Doctoral Dissertation**
Credit, 18.

**Statistics**

**501 Methods of Applied Statistics**
For graduate and upper-level undergraduate students, with focus on practical aspects of statistical methods. Topics include: data description and display, probability, random variables, random sampling, estimation and hypothesis testing, one and two sample problems, analysis of variance, simple and multiple linear regression, contingency tables. Includes data analysis using a computer package. Prerequisites: high school algebra; junior standing or higher.

**505 Regression Analysis**
Inferences in simple and multiple regression models, model fitting, checking and selection, diagnostics, presentation of the multiple linear regression model in matrix form. Has a strong applied component involving the use of a statistical package for data analysis. Prerequisite: previous coursework in statistics.

**506 Design of Experiments**
Planning, statistical analysis and interpretation of experiments. Designs considered include factorial designs, randomized blocks, latin squares, incomplete balanced blocks, nested and crossover designs, mixed models. Has a strong applied component involving the use of a statistical package for data analysis. Prerequisite: previous coursework in statistics.

**511 Multivariate Statistical Methods**
Introduction to the analysis of multivariate data. Topics include description of multivariate data; random vectors; multivariate analysis of variance, repeated measures/profile analysis; and topics from multivariate regression, discriminant analysis, clustering, (principal components, factor analysis, and canonical correlation). Has a strong applied component involving the use of a statistical package for data analysis. Prerequisite: previous background in statistics, or consent of instructor.

**515 Introduction to Statistics I**
First semester of a two-semester sequence. Emphasis on those parts of probability theory necessary for statistical inference. Probability models, sample spaces, conditional probability, independence, random variables, expectation, variance, discrete and continuous probability distributions, joint distributions, sampling distributions, the central limit theorem. Prerequisites: MATH 131, 132.

**516 Introduction to Statistics II**
Basic ideas of point and interval estimation and hypothesis testing; one and two sample problems, simple linear regression, topics from among one-way analysis of variance, discrete data analysis and nonparametric methods. Prerequisite: STATISTC 515 or equivalent.

**605 Probability Theory**

**607 Mathematical Statistics I**
Probability theory, including random variables, independence, laws of large numbers, central limit theorem; statistical models; introduction to point estimation, confidence intervals, and hypothesis testing. Prerequisite: advanced calculus and linear algebra, or consent of instructor.
608 Mathematical Statistics II
Point and interval estimation, hypothesis testing, large sample results in estimation and testing; decision theory; Bayesian methods; analysis of discrete data. Also, topics from nonparametric methods, sequential methods, regression, analysis of variance. Prerequisite: STATISTIC 607 or equivalent.

640 Sampling Theory
Introduction to the theory and practice of sampling from finite populations. Designs covered include simple random sampling, systematic sampling, cluster sampling, stratified sampling, sampling with unequal probabilities, multistage and double sampling. Also, ratio, regression and jackknife estimators and the determination of samples sizes. Prerequisite: calculus-based background in probability and statistics.

705 Linear Models I
First semester of two-semester sequence in the theory of linear models. Basic results on the multivariate normal distribution; linear and quadratic forms; noncentral Chi-square and F distributions; inference in linear models, including point and interval estimation, hypothesis testing, etc. Prerequisites: STATISTIC 607-608 or equivalent; linear algebra.

706 Linear Models II
Second semester of sequence in theory of linear models with focus on “analysis of variance/design of experiments” models. Includes factorial experiments (balanced and unbalanced designs, notions of interaction, etc.), randomized block designs, incomplete designs (incomplete block designs and Latin squares), random effects, nested models, and mixed models.

708 Applied Stochastic Models and Methods
Stochastic processes and their applications to engineering, the physical and social sciences, and finance. General topics: discrete-time processes (e.g., Markov chains, stationary sequences); continuous-time processes (e.g., Markov, Gaussian); spatial processes (e.g., Markov random fields). Specific applications, depending on the composition of the class may include: statistical physics, queuing theory, neural networks, time series prediction, stochastic algorithms in optimization, image processing, stochastic differential equations in finance, control theory. Prerequisites: STATISTIC 607-608.

712 Multivariate Analysis
The fundamentals of distribution theory, estimation and hypothesis testing in the multivariate framework. Includes multivariate regression, multivariate analysis of variance, principal components, factor analysis, cluster analysis and canonical correlation. Prerequisites: STATISTIC 607-608.

725-726 Estimation Theory and Hypothesis Testing
The advanced theory of statistics, including methods of estimation (unbiasedness, equivarience, maximum likelihood, Bayesian, minimax), optimality properties of estimators, hypothesis testing, uniformly most powerful tests, unbiased tests, invariant tests, relationship between confidence regions and tests, large sample properties of tests and estimators. Prerequisites: STATISTIC 605 and 608.

741, 742 Recent Developments in Statistics
Content varies with instructor. Possible topics include nonparametric statistics, reliability/survival analysis, time series, statistical physics, queuing theory, neural networks, time series prediction, stochastic algorithms in optimization, image processing, stochastic differential equations in finance, control theory. Prerequisites: STATISTIC 607-608.

Mechanical and Industrial Engineering

Graduate Faculty

Mario Rotea, Professor and Head of the Department of Mechanical and Industrial Engineering, E.E.D., Universidad Nacional de Rosario, Argentina, 1983; M.S.E.E., Minnesota, 1988; Ph.D., 1990.


Hari Balasubramanian, Assistant Professor, B.E., Regional Engineering College, Trichy, 2000; M.S., Arizona State, 2002; Ph.D., 2006.

Yossi Chait, Professor, B.S., Ohio State, 1982; M.S., Michigan State, 1984; Ph.D., 1988.

Kourosh Danai, Professor, B.S., Michigan, 1980; M.S., 1982; Ph.D., 1986.

Stephen de Bruyn Kops, Associate Professor, B.S., Swarthmore, 1986; M.S., University of Washington, 1995; Ph.D., 1999.


Ian Grosse, Associate Professor, B.S., Cornell, 1979; M.S., Virginia Polytechnic Institute, 1983; Ph.D., 1987.

Robert W. Hyers, Associate Professor, S.B., Massachusetts Institute of Technology, 1992; Ph.D., 1998.

Byung H. Kim, Professor, B.S., California at Berkeley, 1978; M.S., 1980; Ph.D., Massachusetts Institute of Technology, 1983.


Matthew A. Lackner, Assistant Professor, B.S.E.E., Princeton, 2002; M.S., Massachusetts Institute of Technology, 2004; Ph.D., Massachusetts at Amherst, 2007.

James Manwell, Professor, B.A., Amherst, 1970; M.S., Massachusetts, 1977; Ph.D., 1981.

Jenna Marquard, Assistant Professor, B.S., Iowa, 2003; M.S., Wisconsin at Madison, 2004; Ph.D., 2007.
The Master of Science program in Mechanical Engineering requires that a student complete a total of 30 credits, of which 12 credits are required in approved core courses. A 6- to 9-credit thesis or project is normally required. The remaining credits are electives to be taken from departmental research groupings.

Master of Science in Mechanical Engineering/ Master of Business Administration

For those students interested in an interdisciplinary education that will provide them with a strong foundation in business, a solid background in mechanical engineering, and an in-depth research or project experience, the College of Engineering and the Isenberg School of Management offer an M.S.I.E.O.R./M.B.A. dual master's degree. In this 72-credit program (42 in the Management and 30 in Engineering), students typically complete the two degrees in three years of study, and most of the required M.B.A. coursework (33 credits) in the first year. During the second and third years, students take a total of 30 credits in Engineering (21 core credits, 0-3 elective credits and a 6-9 credit thesis or project) as well as an M.B.A. practicum. Students applying to the M.S.I.E.O.R./M.B.A. dual degree program must meet the respective admission standards for each program. The GMAT is required for the M.B.A. and the GRE is required for the M.S.I.E.O.R. degree. Students submit only one application, which is reviewed by both programs. Applicants must be accepted to both programs to enter the M.S.I.E.O.R./M.B.A. dual degree program.

Master of Science in Mechanical Engineering

The Master of Science program in Mechanical Engineering and Operations Research requires that students complete a total of 30 credits. Candidates for the M.S. degree take a core curriculum consisting of M&I-ENG 620, 657, 684; at least one of 651 or 697Q; at least one of 686 or 754. They must take a total of at least six core courses as approved by their adviser. A master’s thesis or a special project must be completed. Students may select theoretical or applied research projects related to either the industrial, financial, or public sector; projects in the public sector have been concerned with health care delivery, the environment, energy, transportation, and community service. Additionally, all students must register for M&I-ENG 794 every semester.

Doctor of Philosophy Program

There are no formal course requirements for the Ph.D. degree in Mechanical Engineering. Typical programs include 9 credits of course work beyond the course requirements for the M.S. degree and consist of a major and minor within mechanical engineering and a minor in mathematics. The Doctor of Philosophy program in Industrial Engineering and Operations Research requires that a student complete a dissertation and a minimum of 9 course credits beyond those earned for a Master’s degree. Candidates entering without an M.S. degree will typically take the core courses described above. Additionally, all doctoral students must register for the
IEOR seminar (M&I-ENG 794) every semester. Students are not required to demonstrate competency in a foreign language. Other residency, dissertation, and examination requirements are described in the General Information section of this Bulletin. Brochures containing detailed information on requirements for the Master’s degree and Ph.D. degree in Mechanical Engineering and Industrial Engineering and Operations Research are available from the Mechanical and Industrial Engineering Department.

All courses carry 3 credits unless otherwise specified.

532 Network Optimization
Introduction to use of network optimization in IE/OR. Algorithm design and analysis, including: shortest path problems, minimum spanning trees, matching, optimal assignment, maximum flow, the traveling salesman problem, the Chinese postman problem, others. Numerous engineering applications stressed throughout. Prerequisite: M&I-ENG 379 or equivalent.

562 Power Systems Design
Energy sources and power systems used by industry and utilities to produce electricity, mechanical power, process heating and cooling examined for energy efficiency and economic feasibility. Analysis and design of thermal systems and specific components considered. Prerequisites: M&I-ENG 340 and 354.

570 Solar Energy Conversion
Review of engineering principles of solar energy conversion including collection techniques, thermal and direct conversion, system performance prediction, and selected topics. Prerequisite: M&I-ENG 354.

573 Engineering of Windpower Systems
Engineering aspects of windpower systems including aerodynamic analysis, mechanical design, support structure design, wind field analysis, system concepts and analysis, and economics. Prerequisites: M&I-ENG 340.

574 Advanced Energy Conservation
An advanced course in building thermal-fluid systems and industrial process energy analysis. Detailed analysis utilizing computer simulation, economic analysis, and energy conservation. Prerequisites: M&I-ENG 340 and 354.

586/SOM 752 Quantitative Decision Making
Survey in operations research. Introduction to models and procedures for quantitative analyses of decision problems. Topics include linear programming and extensions, integer programming, dynamic programming, Markov processes, and queuing models. Required for IE/OR graduate students who lack operations research exposure. Prerequisites: MATH 235 or equivalent and prior or concurrent course in probability and statistics.

587 Industrial Psychology
Lecture, case studies. Problems created by human aspects in the industrial environment from the workplace through management. Topics such as selection, training and evaluation of employees, organizational factors of motivation, job satisfaction, effective leadership, and the structure of the organization, and design of the work environments as it affects productivity, safety, and individual worker satisfaction. Prerequisites: at least one prior course in the behavioral sciences and/or more than a year of management experience.

597B Mechanical Behavior of Polymers
The relation between structure and the mechanical behavior of polymeric materials, including the application of fracture mechanics concepts to failure mechanisms such as wear, fatigue, and environmental degradation.

601 Advanced Thermodynamics I
Review of classical thermodynamics and conventional energy conversion systems. Introduction to kinetic theory of gases, and statistical thermodynamics. Selected topics in chemical thermodynamics.

603 Advanced Numerical Analysis
Numerical methods of solving problems in engineering analysis. Topics include interpolation polynomials, numerical integration and differential equations, multiple regression and correlation, roots of equations and solution of simultaneous equations and numerical solution of partial differential equations. Prerequisites: undergraduate calculus and differential equations.

604 Computational Fluid Dynamics
Topics in solving the Navier-Stokes equations using modern computational methods, such as Marker-in Cell, collocated meshes, boundary fitted meshes with transformation, finite volume methods, and special numerical methods for compressible flow. Numerical techniques of adding numerical viscosity, shock capturing, and adaptive mesh resolution. Prerequisites: M&I-ENG 603 and 607 or equivalent.

605 Finite Element Analysis
The underlying mathematical theory behind the finite element method and its application to the solution of problems from solid mechanics. Includes a term project involving the application of the finite element method to a realistic and sufficiently complex engineering problem selected by the student and approved by the instructor; requires the use of a commercial finite element code. Strong background in linear algebra and calculus recommended.

607 Advanced Fluid Dynamics I
Fundamentals of fluid mechanics including kinematics, the stress tensor, and basic equations. Inviscid flow and wave motion, advanced control volume analysis, including non-inertial reference frames. One-dimensional gas dynamics, shock waves, rarefaction and acoustic waves. Prerequisite: M&I-ENG 340 or equivalent.

609 Mechanical Properties of Materials
Principles of mechanical behavior and failure of metals, polymers, and ceramics. Analysis of problems in design of structural materials that must meet certain strength and performance criteria. Emphasis on the engineering significance and use of various experimentally measured properties such as fatigue life, critical stress intensity factor, relaxation modulus, creep rupture life, and crack growth rate.

616 Engineering Design Optimization
Optimization in design. Methods of optimization; numerical and variational, linear and nonlinear. Advantages, disadvantages, restrictions, and use of various methods.

620 Linear Programming
Theory and application of linear programming. Includes formulation of linear programming models, simplex, revised simplex and dual simplex algorithms, duality, parametric procedures, interpretation of results, and the decomposition principle. Prerequisite: consent of instructor.

642 Advanced Design of Feedback Systems
Advanced analysis and design of robust, linear, time-invariant feedback systems. Topics include frequency domain analysis, complex plane and Nichols charts, frequency domain stability criteria, design of classical lead/lag controllers, correlation between time response and frequency
response, uncertainty descriptions, single-loop linear continuous-time systems, cascaded-loop linear continuous-time systems, multi-loop linear continuous-time systems, and discrete-time systems. Prerequisites: undergraduate control course and consent of instructor.

643 Mechatronic Systems Design
Mechatronics as the synergistic integration of mechanical design, electronics design, controls, and embedded programming throughout the product and process design, with the aim to optimize the final design output. Mechatronic product design, with a focus on integrating the various engineering disciplines into electromechanical systems. Students work in teams on mechatronic design projects using a microcontroller development system.

644 Applied Data Analysis and Modeling
The basics of data acquisition and analysis, pattern classification, system identification, neural network modeling, and fuzzy systems. Essential to students whose thesis projects involve experimentation and data analysis.

651 Advanced Production Planning and Control
Quantitative approach to modeling and analysis in inventory systems, aggregate planning, flexible manufacturing and flexible assembly, scheduling, sequencing and forecasting. Emphasis on computer-aided production planning techniques. Prerequisites: M&I-ENG 379, 477, and 520.

657 Human Factors Design Engineering
Emphasis on topics from engineering psychology and research in human performance. Lectures and readings from the literature explore current theories and research relevant to human performance. Prerequisite: M&I-ENG 460 or consent of instructor.

684 Stochastic Processes in Industrial Engineering I
Introduction to the theory of stochastic processes with emphasis on Markov chains, Poisson processes, markovian queues and networks, and computational techniques in Jackson networks. Applications include stochastic models of production systems, reliability and maintenance, and inventory control. Prerequisites: M&I-ENG 271, 520, or equivalent.

686 Decision Analysis
Decision problems involving the choice between alternatives when uncertainty is present. Emphasis on practical applications of this method, rather than on the more abstract theory. Topics include the structure of a decision analysis problem, the assessment of the decision-maker's value structure.

688 Engineering Project
A research, design, or development project. Written preparation and oral defense of project proposal giving objectives, literature survey, and proposed plan. Written preparation and oral defense of final report giving results and conclusions. May be repeated for credit. Credit, 1-10.

697Q Logistics
A variety of issues that arise in the design and management of production/distribution systems, which typically consist of multiple plants, warehouses, and retailers or stores. Focus on the case of a sole owner with complete information whose objective is to minimize system-wide production, inventory, and transportation costs. Brief discussion of the case in which different firms own portions of the supply chain and the subsequent complications.

699 Master’s Thesis
Credit, 6-9.

701 Advanced Thermodynamics II
Theory of advanced, direct, and indirect energy conversion systems. Thermodynamic cycle optimization methods. Irreversible thermodynamics as applied to steady state energy conversion systems. Direct energy conversion systems include MHD, fuel cells, thermoelectric, thermionic, and other current systems. Prerequisite: M&I-ENG 601 or equivalent.

706 Advanced Heat Transfer II
Advanced topics in convective heat and mass transfer. Application to laminar and turbulent, internal and external convective heat and mass transfer problems such as evaporation, boiling, condensation, chemical reactions and radiation heat transfer effects. Prerequisites: M&I-ENG 606 and 607 or equivalent.

707 Advanced Fluid Dynamics II
Exact solutions to Navier-Stokes flow and laminar boundary layer flow. Introduction to transition and turbulent boundary layers, and turbulence modeling. Boundary layer stability analysis using perturbation methods. Prerequisite: M&I-ENG 607 or equivalent.

754 Engineering Economic Decision Making
Integrated treatment of elements of engineering economy, economics, accounting, and finance and operations research to provide a unified background for economic decision making. Prerequisite: background in economics, engineering, elementary probability theory, and undergraduate economics.

760 Advanced Mechanical Engineering System Design
The product realization process. Engineering design problem types. Critical review of the literature in engineering design theory and methodology. The guided iteration problem solving methodology—problem formulation, generation of alternatives, evaluation, and guided redesign—applied to conceptual, configuration, and parametric design problems. Term project to practice guided iteration methods and to introduce mechatronic systems.

794 Seminar
Presentation of current research activities and literature by faculty, graduate students, and outside visitors. Credit, 1 ea sem.

821 Turbulence
A unified development of the conservation laws governing turbulent flow, addressed to mechanical, aerospace, chemical, and civil engineers. Application to internal flows and atmospheric flows.

899 Doctoral Dissertation
Credit, 18.
Graduate Faculty

John M. Lopes, Professor and Head of the Department of Microbiology, B.A., Rhode Island, 1982; Ph.D., South Carolina, 1987.

Jeffrey Blanchard, Assistant Professor, B.S., Worcester Polytechnic Institute, 1987; Ph.D., Georgia, 1995.

Steven D. Goodwin, Professor and Dean of the College of Natural Sciences, B.A., Maine, 1976; M.S., Virginia, 1980; Ph.D., Wisconsin, 1986.

Kevin Griffith, Assistant Professor, B.S., Appalachian State, 1995; M.S., Maryland at Baltimore County, 1996; Ph.D., 2002.

James F. Holden, Assistant Professor, B.S., Washington, 1989; M.S., 1992; Ph.D., 1996.

Michele M. Klingbeil, Assistant Professor, B.S., Cleveland State, 1986; M.S., 1990; Ph.D., Toled, 1996.

Guy R. Lanza, Professor and Director of the Environmental Sciences Program, B.S., Fairleigh Dickinson, 1961; M.S., Kentucky, 1969; Ph.D., Virginia Polytechnic Institute, 1972.

Susan Leschne, Professor, B.S., Pittsburgh, 1968; Ph.D., 1975.


Leonard C. Norkin, Professor, B.S., Rensselaer Polytechnic Institute, 1964; Ph.D., Columbia, 1969.

Klaus R. Nüsslein, Associate Professor, B.S., Technical University, Munich, 1985; M.S., Freiburg, 1990; Ph.D., Michigan State, 1998.

Steven J. Sandler, Associate Professor, B.A., Pennsylvania, 1979; Ph.D., California at Berkeley, 1984.

Patrick D. Schloss, Assistant Professor, B.S., Cornell, 1997; Ph.D., 2002.

Elizabeth Stuart, Associate Professor, A.B., Wellesley College, 1962; Ph.D., Chicago, 1967.

Wilmore Webley, Assistant Professor, B.S., Northern Caribbean University, 1994; M.S., Massachusetts at Amherst, 2000; Ph.D., 2003.

Associate/Adjunct Faculty

Cynthia Baldwin, Professor, Department of Veterinary and Animal Sciences.

John Burand, Associate Professor, Department of Plant, Soil, and Insect Sciences.

Daniel Cooley, Associate Professor, Department of Plant, Soil, and Insect Sciences.

Ricardo Guerrero, Professor, University of Barcelona, Spain.

William Manning, Professor, Department of Plant, Soil, and Insect Sciences.

Lynn Margulis, Distinguished University Professor, Department of Geosciences.

Steven Petsch, Assistant Professor, Department of Geosciences.

Stephen Rich, Associate Professor, Department of Plant, Soil, and Insect Sciences.

Margaret Riley, Professor, Department of Biology.

Robert Weis, Associate Professor of Chemistry.

The Microbiology Department offers programs leading to the Master of Science and Doctor of Philosophy degrees, and also participates actively in the Five College Ph.D. Program. For graduate study in microbiology extensive undergraduate courses in microbiology are not as essential as a strong undergraduate background in chemistry, biological sciences, mathematics, and physics. Normally it is expected that entering graduate students will have completed two semesters each of organic chemistry, biochemistry, and physics, and mathematics through calculus. Students with deficiencies in these courses must compensate for them by taking appropriate courses as early as possible. Students may register for graduate courses while correcting deficiencies.

The general requirements for the M.S. and Ph.D. degrees in microbiology are those of the Graduate School. In addition, general GRE scores are required. The department requires no foreign language reading competency for the doctorate. Upon entrance a student meets with the Graduate Program Director and the Guidance Committee to plan the first-year course schedule. By the end of the second semester the student should select a research area. Subsequently, the research adviser helps plan the remainder of the course program.

A comprehensive examination is administered between the third and fourth semesters of graduate study. It consists of both written and oral parts and is designed to evaluate the extent to which students have acquired a working knowledge of the principles of microbiology.

By the end of their third year, students orally defend a proposal of the entire dissertation project in the dissertation prospectus in front of the chosen Dissertation Committee.

Ph.D. candidates in Microbiology must have at least one peer-reviewed manuscript accepted for publication before scheduling their dissertation defense. This requirement can only be waived if the dissertation committee can argue, in a written memorandum to the department head and graduate program director, that sufficiently extenuating circumstances exist. Approval of the waiver requires concurrence on the part of either the department head or graduate program director. Both must agree to a rejection of a request for a waiver.

All courses carry 3 credits unless otherwise specified.

542 Immunology Laboratory

Laboratory procedures in cellular immunology, immunochemistry exploring protein chemistry of antibodies, including antibody isolation using salt precipitation, ion exchange, and molecular sieving column chromatography, spectrophotometry, SDS polyacrylamide gel electrophoresis (PAGE), comparative proteomics, western blotting, immunoprecipitation, immunodiffusion (Ouchterlony technique), enzyme-linked immunoassay (ELISA), and immunofluorescence staining. Anatomy of the lymphatic system, mouse dissection and isolation of lymphocytes from spleen and thymus; cellular immunology, including histology of mouse and human leukocytes, principles of ABO blood grouping, normal and diseased lymphoid tissue, and two-color flow cytometric analysis of lymphocyte subpopulations. Prerequisite or corequisite: course in immunology, e.g., MICROBIO 320 or ANIMLSCI 472. Mr. Webley

550 Infection and Immunity

Principles of host-parasite interactions; examination of fundamental knowledge concerning: i) infections caused by pathogenic bacteria; ii) virulence factors, such as toxins and microbial structures; iii) pathogenesis and pathology of bacterial infections; iv) nonspecific factors in host resistance and susceptibility to infectious disease; and v) immunology of microbial infection. Prerequisite: MICROBIO 320 or ANIMLSCI 472 or consent of instructor. Ms. Stuart

552 Pathogenic Bacteriology

Laboratory procedures in clinical and diagnostic bacteriology including: i) culture and physiological characteristics of the pathogenic bacteria; ii) recommended procedures for the cultivation of both the common and rare pathogens isolated from clinical material; iii) conventional and rapid biochemical methods for detection.
and identification of medically important bacteria; iv) serological procedures on microorganisms of prime medical concern; and v) prescribed tests for the susceptibility of bacteria to antibiotics and antimetabolites. Prerequisite: MICROBIO 312; may be taken concurrently only by consent of instructor. Ms. Stuart

560 Microbial Diversity
Exploration and interpretation of the diversity of microbial life. The role in nature of various groups of microbes; their physiology and ecology. Metabolism and energy conservation in chemoheterotrophic and chemolithotrophic bacteria and archaea. Anoxic and oxygenic photosynthesis. Microbial behaviors, symbiotic associations, and communities. Emphasis on anaerobes. Prerequisite: MICROBIO 310 or consent of instructor; course in biochemistry desirable. Ms. Leschine

562 Environmental Biotechnology
Traditional and molecular methods strategically applied to problems related to microbial biotechnology and environmental microbiology. Ranges from the diversity of microbial life to biodegradation. Seven general areas emphasized: 1) Statistical sampling and site characterization, 2) biomass determination, 3) enrichment techniques, 4) microbial activity measurements, 5) single cell detection in situ, 6) sequence and phylogenetic analysis followed by probe design, and 7) other modern techniques of environmental microbiology. Each are accompanied by lectures and ongoing discussions led by the respective faculty member. Ms. Leschine, Mr. Nüsslein, Mr. Petsch.

565 Laboratory in Molecular Genetics
Methodology and principles of modern molecular genetics. Microbial genetics combining classical techniques with bacteriophages and bacteria with modern PCR and recombinant DNA experiments. Introduction to genomic and structural analysis using computer methods. Emphasis on experimental design and analysis. Prerequisite: MICROBIO 330 or equivalent or consent of instructor. Mr. Burand, Mr. Sandler

570 Virology
Molecular biology of viruses and viral genetic systems; viral disease processes. Emphasis on polio virus, influenza, herpes viruses, the DNA tumor viruses, retroviruses (including HIV), and hepatitis viruses. Prerequisite: background in cell biology, genetics, or biochemistry. Mr. Norkin

585 Concepts in Molecular Genetics
Fundamental and advanced concepts in bacterial gene regulation, with focus on bacterial responses to environmental stress. Emphasis on experimental design, and data interpretation and presentation. Prerequisites: basic coursework in biochemistry and genetics.

590B Bioinformatics Lab
An introduction to using bioinformatics to discover and test biological hypotheses. Students learn how to program in Perl, use the statistical language R, and become familiar with common algorithms and programs used in bioinformatics, particularly in the areas of genome sequence and expression analysis. Mr. Blanchard

590F Parasitology Lab
Hands-on experience in parasitological studies. Students analyze live and prepared samples of selected parasites, and the insect vectors that transmit disease. Experimental sessions involve completing parasite life cycles, inhibiting parasite growth using various drugs, and the genetic technique called RNA interference. Corequisite: MICROBIO 590S or consent of instructor. Ms. Klingbeil

590S Parasitology
Classical and modern parasitology concentrating on protozoan and worm parasites of major medical/veterinary importance. Topics include basic principles of parasitology, life cycles, epidemiology, host-parasite interactions, drug treatments and vector control programs, along with information on the basic biology, biochemistry, and genetics of selected parasites. Prerequisites: introductory course in biology; BIOCHEM 285, MICROBIO 310. Ms. Klingbeil

590W Science Writing and Reviewing
Focus on writing and reviewing scientific manuscripts and grant proposals. Students write a short research paper based on sample data and formatted for a specific journal, review a paper prepared by a faculty member, and review a grant proposal prepared by a faculty member and discuss the review in a mock study section. Students work in small groups to stimulate collaborative thinking. Credit, 2. Mr. Lopes

597B Microbial Biotechnology
Examines agricultural and industrial uses of microorganisms and genetic modification of microbes for specific purposes. Topics include history, microbial processes and products, biofuels production, single cell protein production, bioremediation, N₂ fixation, Agrobacterium and plant genetics, genetically modified organisms; government regulation and social implications. Prerequisite: MICROBIO 310 or consent of instructor. Credit, 1-3. Ms. Leschine

597E Environmental Microbiology
How microorganisms interact with each other and with their environment. Microbial distribution and activities in natural systems, and their importance to ecosystem function and environmental quality. Extreme habitats; habitat-specific forces; microbial activity; microbial transformations and their impact on different environments; species diversity, detection, and control of microorganisms; and associations with higher organisms. Each basic principle followed by applied and environmental case studies. Modern techniques of environmental microbiology. Graduate students write an independent research proposal. Prerequisite: MICROBIO 310. Mr. Nüsslein.

680 Microbial Physiology
Main aspects of microbial growth, energy and biosynthesis pathways, metabolic regulation and integration of pathways into a coherent system. Emphasis on physiological diversity, global control systems governing the adaptation of microorganisms to different environmental conditions, and emerging methodologies. Prerequisite: general background in microbiology and biochemistry. Mr. Holden

690E Microbial Evolution and Ecology
Theoretical and experimental issues confronting the application of evolutionary and ecological principles to microbial populations and communities. What is currently known about microbial ecology from the level of individuals to ecosystems as well as issues still unresolved. Mr. Schloss

696 Independent Study
Research under direction of a faculty member. Credit, 1-8.

697D Special Topics: Acid Mine Drainage
Critical reviews and discussions of the current literature dealing with biogeochemistry of acid mine drainage (AMD). Establishes a broad understanding of the current literature and the basics of the biogeochemistry of AMD, and the biogeochemical processes related to AMD production and attenuation. AMD studied as a model for the interaction of microbial, geological, and hydrochemical systems. Credit, 1. Mr. Nüsslein
Molecular and Cellular Biology

Graduate Faculty

(See individual departments for degrees, institutions, and years)

David J. Gross, Interim Director, Molecular and Cellular Biology Program and Associate Professor of Biochemistry and Molecular Biology.

Dominique R. Alfandari, Assistant Professor of Veterinary and Animal Sciences.

Juan Anguita, Assistant Professor of Veterinary and Animal Sciences.

Kathleen F. Arcaro, Associate Professor of Veterinary and Animal Sciences.

Richard B. Arenas, Adjunct Professor of Biology.

Sarah J. Bacon, Associate Professor of Biological Sciences, Mount Holyoke College.

Cynthia L. Baldwin, Professor of Veterinary and Animal Sciences.

Michael J. Barresi, Assistant Professor of Biology, Smith College.

Tobias I. Baskin, Associate Professor of Biology.

Magdalena Bezanilla, Assistant Professor of Biology.

Daniel L. Chase, Assistant Professor of Biochemistry and Molecular Biology.
Alice Y. Cheung, Professor of Biochemistry and Molecular Biology.

J. Marshall Clark, Professor of Veterinary and Animal Sciences.

Elizabeth A. Connor, Associate Professor of Biology.

Edward P. Debold, Assistant Professor of Kinesiology.

Geert J. De Vries, Professor of Psychology.

Sean M. Decatur, Assistant Professor of Chemistry, Mount Holyoke College.

Gerald B. Downes, Assistant Professor of Biology.

Rachel D. Fink, Associate Professor of Biological Sciences, Mount Holyoke College.

Rafael A. Fissore, Professor of Veterinary and Animal Sciences.

Molly Fitzgerald-Hayes, Professor of Biochemistry and Molecular Biology.

Neil S. Forbes, Assistant Professor of Chemical Engineering.

Nancy G. Forger, Professor of Psychology.

Scott C. Garman, Assistant Professor of Biochemistry and Molecular Biology.

Lila M. Gierasch, Distinguished Professor of Biochemistry and Chemistry.

Richard A. Goldsby, Professor of Biology, Amherst College; Adjunct Professor of Veterinary and Animal Sciences.

Adam C. Hall, Assistant Professor of Biological Sciences, Smith College.

Jeanne A. Hardy, Assistant Professor of Chemistry.

Samuel P. Hazen, Assistant Professor of Biology.

Daniel N. Hebert, Associate Professor of Biochemistry and Molecular Biology.

Alejandro P. Heuck, Assistant Professor of Biochemistry and Molecular Biology.

James F. Holden, Assistant Professor of Microbiology.

Abbie M. Jensen, Assistant Professor of Biology.

D. Joseph Jerry, Professor of Veterinary and Animal Sciences.

Igor A. Kaltashov, Associate Professor of Chemistry.

Rolf O. Karlstrom, Associate Professor of Biology.

Young-Cheul Kim, Assistant Professor of Nutrition.

Michele M. Klingbeil, Assistant Professor of Microbiology.

Michael J. Knapp, Assistant Professor of Chemistry.

Joseph G. Kunkel, Professor of Biology.

Wei-Lih Lee, Assistant Professor of Biology.

Susan B. Leschne, Professor of Microbiology.

John M. Lopes, Professor and Chair of Microbiology.

Jesse Mager, Assistant Professor of Veterinary and Animal Sciences.

Michael J. Maroney, Professor of Chemistry.

Craig T. Martin, Professor of Chemistry.

Lynne McLandsborough, Associate Professor of Food Science.

Jerrold S. Meyer, Professor of Psychology.

Murgiappan Muthukumar, Professor of Polymer Science and Engineering.

John R. Nambu, Associate Professor of Biology.

Leonard C. Norkin, Professor of Microbiology.

Jennifer Normanly, Associate Professor of Biochemistry and Molecular Biology.

Barbara A. Osborne, Professor of Veterinary and Animal Sciences.

Yeonhwa Park, Assistant Professor of Food Science.

Om Parkash, Assistant Professor of Plant, Soil, and Insect Sciences.

Sandra L. Petersen, Professor of Biology.

Randall W. Phillips, Associate Professor of Biology.

Dominic L. Pecora, Professor of Biological Sciences, Amherst College.

Pablo J. Pomposiello, Lecturer of Microbiology.

Omar A. Quintero, Assistant Professor of Biological Sciences, Mount Holyoke College.

David L. Ratner, Professor of Biological Sciences, Amherst College.

Stephan M. Rich, Associate Professor of Plant, Soil, and Insect Sciences.

Margaret A. Riley, Professor of Biology.

Jennifer L. Ross, Assistant Professor of Physics.

Vincent M. Rotello, Professor of Chemistry.

Steven J. Sandler, Associate Professor of Microbiology.

Danny J. Schnell, Professor and Chair of Biochemistry and Molecular Biology.

Lawrence M. Schwartz, Professor of Biology.

Stylianos P. Scordilis, Professor of Biological Sciences, Smith College.

Dennis G. Searcy, Professor of Biology.

Rong Shao, Adjunct Research Assistant Professor of Veterinary and Animal Sciences.

Kalidas Shetty, Professor of Food Science.

J. Enrique Silva, Adjunct Professor of Biology.

Sallie W. Smith Schneider, Adjunct Research Assistant Professor of Veterinary and Animal Sciences.

Elizabeth S. Stuart, Associate Professor of Microbiology.

Janice C. Telfer, Assistant Professor of Veterinary and Animal Sciences.

Karsten W. Theis, Assistant Professor of Biochemistry and Molecular Biology.

Lynnmarie K. Thompson, Associate Professor of Chemistry.

Kimberly D. Tremblay, Assistant Professor of Veterinary and Animal Sciences.

Pablo E. Visconti, Associate Professor of Veterinary and Animal Sciences.

Patricia Wadsworth, Professor of Biology.

Elsbeth L. Walker, Associate Professor of Biology.

Robert M. Weis, Associate Professor of Chemistry.

Christine A. White-Ziegler, Associate Professor of Biological Sciences, Amherst College.

Steven A. Williams, Gates Professor of Biological Sciences, Smith College.

Patrick L. Williamson, Professor of Biological Sciences, Amherst College.
The Program in Molecular and Cellular Biology meets the needs of those students who prefer advanced interdisciplinary training that is generally more flexible than the programs offered by the participating Departments of Biochemistry and Molecular Biology, Biology, Chemistry, Microbiology and others.

Prerequisites of the Program
Admission to the program is dependent upon a strong background in the biological sciences, chemistry, mathematics, and physics. This includes minimally two semesters each of organic chemistry and physics, at least one semester of physical chemistry, and mathematics through calculus. Students with deficiencies in these courses must remove them by taking appropriate courses at the earliest possible time. Only recent graduates of the life sciences departments at the University of Massachusetts Amherst are accepted into the Master’s program.

General Requirements
The general requirements for the M.S. and Ph.D. degrees in Molecular and Cellular Biology are those of the Graduate School. The program requires no foreign language competency for the doctorate. A detailed description of degree requirements may be obtained from the Program Director.

Doctor of Philosophy Degree Program
All students take Molecular and Cellular Biology 641 and 642, and Biochemistry 623 during the first year. Students select at least three other courses including one from each of two lists of offerings in the areas of molecular and cell biology (see below). Formal course requirements should be completed by the end of the fourth semester.

Each first-year student selects two laboratory rotations (one per semester) to gain research experience in different areas of contemporary molecular and cell biology. These are chosen to reflect students’ research interests.

A written comprehensive examination is given at the end of the first year of study. This exam covers topics presented in the core courses and in program seminars. It tests the ability to use this knowledge to solve problems, to develop appropriate experimental approaches, and to interpret and critically evaluate data from the scientific literature.

An oral defense of an original research presentation constitutes the second part of the comprehensive examination and is usually completed before the end of the second academic year. There is also a final oral defense of the written dissertation. The Program typically requires four to five years to complete, with three or more years devoted to full-time research.

The Master’s Degree Program
The requirements for the Master’s degree consist of 30 graduate credits, 21 of which must be in program-related courses. During the first year students take Molecular and Cellular Biology 642, and either Biochemistry 623 or Molecular and Cellular Biology 641. At least 6 credits of advanced course work is required as well. Up to 10 credits may be earned for the Master’s thesis, which is defended orally before a faculty committee.

All courses carry 3 credits unless otherwise specified.

641 Advanced Cellular Biology

642 Advanced Molecular Biology

696 Independent Study
Laboratory research under direction of faculty member. Credit, 1-6.

698 Master’s Project
Credit, 6.

699 Master’s Thesis
Credit, 1-10.

899 Doctoral Dissertation
Credit, 18.

Program-related Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>ANIMLSCI 521</td>
<td>Physiology of Reproduction</td>
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<tr>
<td>ANIMLSCI 597A</td>
<td>Immunology</td>
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<tr>
<td>ANIMLSCI 642</td>
<td>Molecular Medicine</td>
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<tr>
<td>BIOCHEM 657</td>
<td>Drug Design</td>
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<tr>
<td>BIOLOGY 510</td>
<td>Plant Physiology</td>
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<tr>
<td>BIOLOGY 511</td>
<td>Experimental Plant Physiology</td>
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<tr>
<td>BIOLOGY 523</td>
<td>Histology</td>
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<tr>
<td>BIOLOGY 565</td>
<td>Human Physiology</td>
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<tr>
<td>BIOLOGY 568</td>
<td>Experimental Endocrinology</td>
</tr>
<tr>
<td>BIOLOGY 571</td>
<td>Biological Rhythms</td>
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<tr>
<td>BIOLOGY 572</td>
<td>Neurobiology</td>
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<tr>
<td>BIOLOGY 574</td>
<td>Cell Motility and the Cytoskeleton</td>
</tr>
<tr>
<td>BIOLOGY 597E</td>
<td>Advanced Physiology</td>
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<tr>
<td>CHEM 650</td>
<td>Metals in Biology</td>
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<tr>
<td>CHEM 657</td>
<td>Drug Design</td>
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<td>CHEM 728</td>
<td>Biophysical Chemistry</td>
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<tr>
<td>CHEM 791A</td>
<td>Bioanalytical Chemistry</td>
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<td>MICROBIO 540</td>
<td>Immunology</td>
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<td>MICROBIO 542</td>
<td>Immunology Laboratory</td>
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<td>MICROBIO 560</td>
<td>Microbial Diversity</td>
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<td>MICROBIO 570</td>
<td>Virology</td>
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<td>MICROBIO 590S</td>
<td>Parasitology</td>
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<td>MICROBIO 680</td>
<td>Microbial Physiology</td>
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<tr>
<td>MICROBIO 690K</td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>PSYCH 572</td>
<td>Neurobiology</td>
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</tbody>
</table>

Special topics courses and graduate-level courses in various departments are taught by Molecular and Cellular Biology faculty and are accepted for credit. Graduate-level courses are accepted for credit if approved by the student’s dissertation adviser.
Music

Graduate Faculty

Jeffrey Cox, Professor and Chair of the Department of Music and Dance, B.M., Eastman School of Music, 1975; M.M., 1976; M.M.A., Yale School of Music, 1978; D.M.A., 1983.

T. Dennis Brown, Associate Professor and Graduate Program Director, B.M., Boston, 1966; M.M., Michigan, 1967; Ph.D., 1976.

Brent Auerbach, Assistant Professor, B.A., Harvard, 1997; M.M., Eastman School of Music, 2000; Ph.D., 2005.


William Hite, Lecturer (Voice), M.M., Boston Conservatory, 1984.


Laura Klock, Professor, B.M., Michigan, 1973; M.M., 1974.

Lynn Klock, Professor, B.M., Michigan, 1974; M.M., 1975.

Christopher Krueger, Visiting Assistant Professor, B.M., New England Conservatory, 1972.


Bruce MacCombie, Professor, B.A., Massachusetts at Amherst, 1967; M.M., 1968; Ph.D., Iowa, 1971; Post-doctoral studies, Freiburg Conservatory.

Lanfranco Marcelletti, Director of Orchestral Activities, B.M., Pernambuco State Music Conservatory, Recife, Brazil, 1983; M.M., Yale School of Music, 1996.


Benedict Smar, Lecturer, B.M., Susquehanna University, 1974; M.M., Michigan, 1975; Ph.D., Toledo, 2000.


Doctor of Philosophy Degree Program

The Department of Music and Dance offers a Master of Music degree with concentrations in the following areas: Accompanying; Conducting (Choral, Wind, and Orchestral); Composition; Jazz Composition/Arranging; Music Education (Applied, Conducting, and Research); Music History/Musicology; Music Theory; and Performance.

Each degree candidate must complete a minimum of 33 credit hours. Each concentration comprises a basic core of courses in music history, theory, participation in ensembles, and electives. Other required courses depend on the concentration. All students must take a comprehensive oral examination.

Admission requirements vary according to the area of concentration. For more information, contact: Graduate Program Director, Department of Music and Dance, 273 Fine Arts Center, University of Massachusetts, Amherst, MA 01003, tel. (413) 545-6135, email: tdbrown@music.umass.edu.

Master of Music Degree Program

The Department of Music and Dance offers a Master of Music degree with concentrations in the following areas: Accompanying; Conducting (Choral, Wind, and Orchestral); Composition; Jazz Composition/Arranging; Music Education (Applied, Conducting, and Research); Music History/Musicology; Music Theory; and Performance.

Each degree candidate must complete a minimum of 33 credit hours. Each concentration comprises a basic core of courses in music history, theory, participation in ensembles, and electives. Other required courses depend on the concentration. All students must take a comprehensive oral examination.

Admission requirements vary according to the area of concentration. For more information, contact: Graduate Program Director, Department of Music and Dance, 273 Fine Arts Center, University of Massachusetts, Amherst, MA 01003, tel. (413) 545-6135, email: tdbrown@music.umass.edu.

Four-Summers Master’s Program

The Four-Summers Master of Music program is designed to serve the needs of K-12 teachers. Candidates complete a total of 33 credits toward the master’s degree over four summers. For more information, contact: Graduate Program Director, Department of Music and Dance, 273 Fine Arts Center, University of Massachusetts, Amherst, MA 01003, tel. (413) 545-6135, email: tdbrown@music.umass.edu.

All courses carry 3 credits unless otherwise specified.

500 The Middle Ages

501 The 17th Century

502 Haydn, Mozart, Beethoven

503 The 19th Century

504 Music of the 20th Century

505 History of Opera

506 Music of the Renaissance

507 The Age of Bach and Handel

510 Counterpoint

Writing and analysis of invertible counterpoint, various canonic devices, and fugue.
511 Orchestration
Problems in scoring for various ensembles including full orchestra.

516, 517, 519 and 618A-V Performance:
Individual Instruction
Literature and instrumental technique or voice production. Audition required. Credit, 1-4.

A
Applied Piano

B
Applied Organ

C
Applied Voice

D
Applied Violin

E
Applied Viola

F
Applied Cello

G
Applied String Bass

J
Applied Oboe

K
Applied Clarinet

L
Applied Bassoon

M
Applied Saxophone

N
Applied Trumpet

O
Applied French Horn

P
Applied Trombone

R
Applied Baritone Horn

S
Applied Tuba

T
Applied Percussion

U
Applied Flute

V
Applied Piano Accompaniment

525 Music in Education — Philosophical Foundations
Basis for development of a personal philosophy of music education through extensive reading and discussion. Analysis of philosophical considerations of music education.

585 Fundamentals of Electronic Music

586 Introduction to Digital Music Synthesis

600 Musicology Seminar I
Bibliography, materials, and research methods in historical and systematic musicology.

601 Musicology Seminar II
Specialized topics in historical and systematic musicology. May be repeated for credit with varying content as advised.

610-613 Analysis of Music
Representative compositions from each period. Analysis by score and sound of the various musical forms and media.

610 Analysis of Music 1600-1750

611 Analysis of Music 1750-1825

612 Analysis of Music 1825-1890

613 Analysis of Music 1890-Present

615 History and Pedagogy of Theory
Principal authors of treatises dealing with composition, counterpoint, and harmony. Emphasis on relationship between works discussed and contemporary pedagogical techniques of presenting theory and allied subjects.

620 Supervision and Administration of Music
Function of the music supervisor, and administrative problems in public school.

621 Research in Music Education
Individual research projects in selected areas of music education.

630 Graduate Recital
Credit, 2.

631 Graduate Composition Project
Credit, 2.

659 Composition
Free composition in various forms and media. Credit, 1-4.

696 Independent Study
Credit, 1-6.

697 Special Topics
Credit, 1-6.

699 Master’s Thesis
Credit, 3-10.

899 Doctoral Dissertation
Credit, 18.

Performing Organizations
(Each ensemble receives 1 credit.)

(Audition Required)

551-553 Small Ensemble

560 University Chorale

561 University Chorale Chamber Singers

562 Women’s Choir

563 Chamber Choir

564 Madrigal Singers

565 University Orchestra

566 Marching Band
Fall semester only. Credit, 2.

567 Symphony Band

568 Wind Ensemble

569 Concert Band

570 Jazz Workshop

572 Trombone Choir

574 String Bass Ensemble

575 Chamber Jazz Ensemble

576 Percussion Ensemble

577 UMass Marimbas

578 Collegium Musicum

579 Vocal Jazz Ensemble

580 Performance Workshop for Singers
Credit, 2.

582 Chamber Orchestra—Opus 1
Neuroscience and Behavior

Graduate Faculty

Errolde S. Meyer, Director of the Neuroscience and Behavior Program and Professor of Psychology.

Elizabeth A. Connor, Graduate Program Director and Associate Professor of Psychology.

Lisa D. Sanders, Co-Graduate Program Director and Assistant Professor of Psychology.

John-Paul Baird, Assistant Professor of Psychology and Neuroscience, Amherst College.

Michael J. F. Barresi, Assistant Professor of Biological Sciences, Smith College.

Andrew G. Barto, Professor of Computer Science.

Neil E. Berthier, Professor of Psychology.

Eric L. Bittman, Professor of Biology.

Elliott M. Blass, Professor of Psychology.

Jeffrey D. Blaustein, Professor of Psychology.

Barry Braun, Associate Professor of Kinesiology.

Kyle R. Cave, Professor of Psychology.

James J. Chambers, Assistant Professor of Chemistry.

Daniel L. Chase, Assistant Professor of Biochemistry and Molecular Biology.

Jane W. Couperus, Assistant Professor of Developmental Cognitive Neuroscience, Hampshire College.

Matthew C. Davidson, Assistant Professor of Psychology.

Geert J. De Vries, Professor of Psychology.

Gerald B. Downes, Assistant Professor of Biology.

Nancy G. Forger, Professor of Psychology.

Adam C. Hall, Associate Professor of Biological Sciences, Smith College.

Joseph Hamill, Professor of Kinesiology.

Mary E. Harrington, Professor of Psychology, Smith College.

UnJa L. Hayes, Assistant Professor of Psychology.

Duncan J. Irschick, Associate Professor of Biology.

Elizabeth M. Jakob, Professor of Psychology.

Abigail M. Jensen, Associate Professor of Biology.

Gary P. Kamen, Professor of Kinesiology.

Rolf Karlstrom, Associate Professor of Biology.

Jane A. Kent-Braun, Professor of Kinesiology.

Jacquie Kurland, Assistant Professor of Communication Disorders.

Agnes Lacourse, Assistant Professor of Psychology.

John R. Nambu, Associate Professor of Biology.

Leonard C. Norkin, Professor of Microbiology.

Melinda A. Novak, Professor of Psychology.

Sarah R. Partan, Assistant Professor of Cognitive Science, Hampshire College.

Sandra L. Petersen, Professor of Biology.

Jeffery Podos, Associate Professor of Biology.

Sally I. Powers, Professor of Psychology.

Rebecca E. Ready, Assistant Professor of Psychology.

Heather N. Richardson, Assistant Professor of Psychology.

Lawrence M. Schwartz, Professor of Biology.

Lisa S. Scott, Assistant Professor of Psychology.

Hava Siegelmann, Associate Professor of Computer Science.

Rebecca M.C. Spencer, Assistant Professor of Psychology.

John G. Stoffolano, Professor of Entomology.

Richard E.A. van Emmerik, Associate Professor of Kinesiology.

R. Thomas Zoeller, Professor of Biology.

Adjunct/Associate Faculty

Margaret Anderson, Professor of Biological Sciences, Smith College.

Stephen A. George, Professor of Biology and Neuroscience, Amherst College.

Will J. Millard, Associate Professor of Psychology and Education, Mount Holyoke College.

Richard F. Olivo, Professor of Biological Sciences, Smith College.

James K. Rowlett, Assistant Professor of Psychobiology, Department of Psychiatry, Harvard Medical School, New England Primate Research Center.

Marc J. Tetel, Assistant Professor of Biological Sciences, Wellesley College.

Christine K. Wagner, Associate Professor of Psychology, New York at Albany.

Wei-Dong Yao, Assistant Professor of Psychiatry, New England Primate Research Center, Harvard Medical School.

The primary goal of this program is to offer coordinated and comprehensive training and research in Neuroscience and Behavior leading to the degree of Doctor of Philosophy. Participating faculty are members of the Departments of Psychology (Division of Behavioral Neuroscience), Biology, Computer Science, Kinesiology, Microbiology, Veterinary and Animal Sciences, and Plant, Soil, and Insect Sciences.

Prerequisites of the Program

To be considered for admission to the Neuroscience and Behavior (NSB) program, applicants should demonstrate substantial undergraduate training in the biological and physical sciences. Successful applicants usually have their undergraduate degree in a biological/life-science discipline or in physiological psychology. Students with degrees in other fields (computer science, physical sciences, mathematics, engineering) are also considered for admission. Undergraduate coursework of applicants should normally include several semesters of biological science, organic chemistry and/or biochemistry, two semesters of advanced mathematics (through calculus), one semester of statistics and at least two courses in neurobiology or physiological psychology. Individuals with a Master’s degree in a life-science discipline from another institution, as well as University of Massachusetts graduate students currently enrolled in NSB-participating departments, are also eligible for admission to the program.
General Requirements

The general requirements for the Ph.D. degree in Neuroscience and Behavior are those of the Graduate School. An up-to-date detailed description of degree requirements may be obtained from the Neuroscience and Behavior website: www.umass.edu/neuro.

Doctor of Philosophy Degree Program

Because of diversity in students' backgrounds, interests, and career goals, it is the intent of the program to provide a maximum of flexibility in individual training programs. NSB students are expected to fulfill the following requirements for the Ph.D.

1. Completion with a grade of B or better in at least the following courses within the first two years of graduate study: the NSB proseminar, two core courses, three electives, and at least one quantitative course. Eighteen credits of Ph.D. dissertation are also required.

2. Satisfactory completion and oral presentation of a major empirical research project within the first two years of graduate study.

3. Passing the preliminary doctoral comprehensive examination no later than the end of the third year of graduate study.

4. Completion and oral defense of an original dissertation, normally within five years of entering the program (three or four years for students entering with a master's degree in a related field).

Students are urged to seek advice from their guidance committees concerning curricula, career plans, and especially research at the earliest opportunity. They should be aware that faculty members outside their specific research area may also be able to provide the kinds of valuable insights that will help them complete their requirements in a timely and beneficial manner.

Proseminar and Research Ethics courses: All first-year NSB students are required to take, during the fall semester, the NEUROS&B 792A Proseminar introducing the program and its faculty and covering topics such as grant writing and the art of oral presentations. BIOLOGY 791B Responsible Conduct of Research in the Life Sciences is offered during the spring semester and covers major topics in the scientific ethics of life science research. Both are 1-credit, pass-fail courses.

Core courses: All students entering the program are required to take the two core NSB courses, NEUROS&B 692C Molecular, Cellular and Developmental Neurobiology and NEUROS&B 692D Neuroanatomy, Physiology, and Behavior. One is not a prerequisite of the other but both must be completed, with a grade of B or better, by the end of the second year. Their purpose is to provide a common base of knowledge for students from diverse undergraduate backgrounds.

Electives: Given the need for students to orient their studies toward their proposed research areas early in their graduate program, a number of existing courses are designated as NSB electives. Students must satisfactorily complete three of these courses (with at least two being at the 600 level or above) within the first two years of study, choosing from the following list.

- BIOCHEM 720 Biochemistry of Cellular Membranes
- BIOLOGY 521 Comparative Vertebrate Anatomy
- BIOLOGY 523 Histology
- BIOLOGY 544 Ornithology
- BIOLOGY 548 Mammalogy
- BIOLOGY 550 Animal Behavior
- BIOLOGY 564/565 Vertebrate Physiology
- BIOLOGY 566/567 Comparative Physiology
- BIOLOGY 568/569 Endocrinology
- BIOLOGY 571 Biological Rhythms
- BIOLOGY 580 Developmental Biology
- BIOLOGY 597M Environmental Endocrine Disrupters
- BIOLOGY 750 Advanced Animal Behavior
- CMPSCI 683 Artificial Intelligence
- CMPSCI 691C Seminar: Computational Neuroscience
- CMPSCI 691I Computational Modeling of Emotions and Regions in the Brain
- MICROBIO 721 Neurovirology
- NEUROS&B 891A Seminar: Cell Death and Differentiation in Neurons
- NEUROS&B 891B Biological Rhythms
- PSYCH 530 Human Neuropsychology
- PSYCH/BIOLOGY 591 Primate Behavior
- PSYCH 591 Advanced Topics in Behavioral Neuroendocrinology
- PSYCH 591H Social Attachment: Neurobiology of Interpersonal Stress
- PSYCH 591O Aging and Cognition
- PSYCH 617 Applied and Basic Cognitive Development
- PSYCH 630 Research Topics in Behavioral Neuroscience: The Neurobiology of Mental Disorders
- PSYCH 650 Brain Development and Behavior
- PSYCH 731 Neuroanatomical Bases of Behavior
- PSYCH 732 Neurochemistry
- PSYCH 733 Psychopharmacology
- PSYCH 750 Learning and Memory Processes in Children
- PSYCH 791B S-Methods in Cognitive Neuroscience
- PSYCH 891 Social Attachment: Neurobiology to Interpersonal Stress
- PSYCH 891F S-Environmental Influences on Reproduction and Reproductive Behavior
- PSYCH 891N Brain Plasticity
- PSYCH 891UU Seminar: Visual Cognition and Attention

In addition, any course (or three-credit special topics seminar) at the 600 level or above taught by a member of the NSB core faculty may be used to satisfy the elective requirement. Students may substitute three journal clubs for one 500-level NSB elective. All three journal clubs must be led and graded by a faculty member. Students wishing to substitute journal clubs for an elective should submit to the graduate operations committee a memorandum requesting the substitution and including the reading lists or syllabi of the journal clubs.

Quantitative requirement: Every student must take at least one course to satisfy this requirement, which is determined by his or her guidance committee. In most cases, this involves successfully completing one or more statistics courses, such as: PSYCH 640 and 641 Statistical Inference in Psychology I, II; PUBHLTH 640 Intermediate Biostatistics; STATISTIC 501 Methods of Applied Statistics; or STATISTIC 506 Design of Experiments. However, the guidance committee may deem it necessary for the student to meet the quantitative requirement by taking other appropriate quantitative courses in areas such as bioinformatics or modeling.

Additional coursework: With strong recommendations from the guidance committee, students select courses in other areas, including genetics, embryology, cybernetics, histology, cell biology, and cell regulation, according to their chosen field of research, interest, and specialization. Students are also expected to take several advanced seminars and to regularly attend colloquia sponsored by the NSB program.

Major research project: Early in their careers, all NSB students are expected to gain experience in the design, conduct, and reporting of empirical research. Therefore, with the exception of individuals entering the program with a Master's degree in neuroscience or a related field, all students will be required to complete a major research project within the first two years of study. The format of the report must be agreed upon in advance by students and their guidance committees and should be presented in typical journal style with abstract, introduction, methods, results, discussions, and references. Following approval of the submitted report by
the guidance committee, each student gives an oral presentation of findings to the entire NSB program. This process must be completed no later than November 1 of the third year in the NSB Program.

Comprehensive exam: Before the start of the third year in the program, all students must pass a preliminary doctoral comprehensive examination. This examination serves both an educational and evaluative role: to enable students to develop and demonstrate a level of scholarship and knowledge in their chosen area of study that is appropriate for the doctoral-level neuroscientist, and to demonstrate students’ critical, integrative, and theoretical abilities within the broader scope of Neuroscience and Behavior. The final requirement of the Ph.D. program in Neuroscience and Behavior is the completion and defense of a doctoral dissertation.

Master of Science Program

The program is available only to graduates of the University of Massachusetts Amherst who have worked as undergraduates in the lab of an NSB faculty member. Participating students normally identify a faculty adviser in their junior year and become actively engaged in research throughout their senior year. The research should lead to a well-defined project suitable for graduate-level major research in the Neuroscience and Behavior Program.

Students may apply for graduate admission to the NSB Master’s Program in their senior year and must be in compliance with Graduate School regulations and requirements. At the beginning of graduate study the student selects a thesis committee consisting of an adviser and two NSB faculty members. Each M.S. graduate student must attend the NSB Proseminar during the fall semester. Required courses include two core courses (one in Cellular, Molecular and Developmental Neuroscience, the other in Neuroanatomy, Physiology, and Behavior), and two electives (at least one must be at the 600 level or above). In addition, the student must obtain three credit hours in research methodology, (a variety of options are available including statistics courses, methods courses, and research practica). Thirty credit hours are required for the NSB Master’s degree. It is anticipated that qualified students should be able to complete the entire B.S./M.S. degree track within five years, including two summers. Career opportunities include biotechnology/pharmaceutical companies, medical school, veterinary school, science journalism, law school (intellectual-property and corporate law), government agencies, and academic research laboratories.

All courses carry three credits unless otherwise specified.

699 Master’s Thesis
Credit, 1-10.

899 Doctoral Dissertation
Credit, 18.

Graduate Faculty

Jean Elizabeth Swinney, Associate Professor and Dean of the School of Nursing, B.S.N., New York University, 1964; M.A., 1980; Ph.D., Texas at Austin, 1992.

M. Christine King, Associate Professor and Graduate Program Director, B.S., Maryland, 1974; M.S., Boston University, 1976; Ed.D., Massachusetts at Amherst, 1988.

Genevieve Chandler, Associate Professor, B.S.N., D’Youville College, 1971; M.S.N., Boston University, 1975; Ph.D., Utah, 1986.

Jeungok Choi, Assistant Professor, B.S.N., Seoul National University, 1983; M.S.N., 1987; M.P.H., Tufts, 1999; Ph.D., Boston College, 2001.

Jean DeMartinis, Associate Professor, B.S., Ball State, 1977; M.A., 1979; Ph.D., Texas at Austin, 1991.

Eileen Hayes, Associate Professor, B.S.N., Worcester State, 1980; M.S., Massachusetts at Amherst, 1988; Ph.D., 1997.

Elizabeth Henneman, Associate Professor, B.S.N., Boston College, 1979; M.S., Colorado at Denver, 1986; Ph.D., California at Los Angeles, 1998.

Cynthia Jacelon, Associate Professor, B.S., Trenton State College, 1980; M.S.N., Boston University, 1986; Ph.D., New York University School of Education, 2000.

Karen Kalmakis, Assistant Professor, B.S.N., Elms College, 1986; M.S.N., Massachusetts at Amherst, 1993; M.P.H., 2005; Ph.D., 2008.

Karen Plotkin, Clinical Assistant Professor, B.S.N., Fitchburg State, 1980; M.S., Massachusetts at Amherst, 1994; Ph.D., 2004.

Joan Roche, Clinical Assistant Professor, B.A., Dayton, 1968; M.S., Massachusetts at Amherst, 1993; Ph.D., 2004.

Donna Zucker, Associate Professor, B.S., Loyola, 1980; M.S., Massachusetts at Amherst, 1990; Ph.D., Rhode Island, 1999.

Master of Science Program—Clinical Nurse Leader (CNL) Program—Online

The Master of Science Program in Nursing builds on previous nursing education and clinical experience to prepare students for an advanced-education nurse generalist role in a variety of
healthcare settings and to lay a foundation for doctoral education.

The Clinical Nurse Leader (CNL) master’s concentration prepares nurse leaders who design, provide, manage, and coordinate health promotion, risk reduction, disease prevention, and illness management services to individuals and clinical populations.

The CNL is accountable for the application of research-based information and the efficient and cost-effective use of resources to improve clinical and environmental care outcomes and effect change in health care organizations.

The graduate is prepared to lead both interdisciplinary and interdisciplin ary health care teams, and to function across all clinical settings in order to meet the demands of a complex care delivery system.

This program addresses the competencies and knowledge specified by the American Association of Colleges of Nursing for Master’s Education and for the specific Clinical Nurse Leader focus. The School of Nursing program is accredited by the Commission on Collegiate Nursing Education. The graduate is prepared to take the CNL certification examination prepared by The American Nurse Credentialing Center (ANCC).

The CNL program is a distance-accessible program offered through a mixed-delivery method, with coursework predominantly online and some campus visits required. All coursework is offered through Continuing and Professional Education (CPE): www.umassulearn.net.

Program Objectives
At the completion of the program the graduate will be prepared to:
1. Implement the CNL role in a variety of clinical settings.
2. Apply advanced knowledge (pharmacology, patho-physiology, health assessment) and core competencies (critical thinking, communication, nursing technology/resources) to the development and evaluation of a plan of care for individuals or populations at the point of care.
3. Assume accountability for the efficient and cost effective use of human, environmental, and national resources by applying principles of healthcare policy, finance, economics, and ethics to care delivery.
4. Integrate knowledge of informatics, human diversity, and ethics to address and manage variation in population outcomes and ensure culturally relevant care.
5. Implement evidence-based practices and professional standards of care to effect change in healthcare organizations and improve outcomes of care.
6. Apply principles of leadership and collaboration to improve the health outcomes of individuals and clinical populations.
7. Improve clinical practice and optimize health-care outcomes through use of information systems and other technologies.
8. Advocate for the client, interdisciplinary care team, and profession in legislative and regulatory arenas.

Admission Criteria
Students must meet the general requirements of both the University of Massachusetts Amherst Graduate School and the School of Nursing, and must have a baccalaureate degree from a nationally accredited school of nursing or be a registered nurse with a non-nursing baccalaureate degree.

The School of Nursing uses the degree-granting institution grade point average (GPA) as one measure of an applicant’s academic potential. Successful applicants typically have GPAs of 3.0 or above. If the GPA is less than 3.0, applicants may still apply and be considered for admission, but might wish to submit a Graduate Record Exam (GRE) score if they believe that their GPA does not accurately reflect their abilities.

Applicants must also provide official transcripts from all undergraduate and graduate programs attended, documentation of RN licensure, TOEFL scores (if needed), and evidence of courses in undergraduate-level Health Assessment (or equivalent) and Elementary Statistics. Applicants should provide a sample of their own scholarly writing, a written statement of professional goals, and two letters of recommendation.

Application Deadline is February 1 each year.

Course Requirements
The M.S./C.N.L. concentration requires completion of 37 credit hours of coursework. Selected courses include practicum/project hours. The curriculum consists of 27 didactic credit hours, 10 practicum credit hours (4:1 ratio; 56 contact hours per one credit hour totals 566 contact hours), and a 60-hour fieldwork experience in NURSING 690L Leadership in Public Health Systems. NURSING 690C Advanced Health Assessment and Clinical Reasoning has a mandatory workshop, a “Competency Leveling Workshop” that is a three-day experience using 24 contact hours of laboratory time for the course.

Credit Transfer
Students who have taken non-degree courses at the University of Massachusetts Amherst may transfer a maximum of six credits hours from these courses. Up to six additional credits may be transferred from institutions other than the University of Massachusetts Amherst. These courses must have been taken within the last three years and a grade of B or better achieved.

The completion of graduate courses taken as a non-degree student does not guarantee admission into the program. Students admitted and matriculated into the program may enroll in all courses; non-degree students may enroll on a space-available basis and by consent of the instructor. Only matriculated students may enroll in the clinical practicum.

Master of Science (in Nursing)/Master of Public Health Dual Degree Program—Online

The M.S./M.P.H. program is now closed to all but currently admitted and matriculated students. Those interested in an advanced degree in public health and nursing should consult the Doctor of Nursing Practice (D.N.P.) in Public Health Nursing Leadership Degree program elsewhere in the Nursing section of this Bulletin.

Faculty
M.S./M.P.H. program faculty are the graduate faculty in the School of Nursing with expertise in public health nursing; and, from the five core domains of public health at the School of Public Health and Health Sciences (SPHHS) as well as expert faculty nationally who have received appointments. The most current faculty listings are posted on the School of Nursing and the SPHHS websites.

All courses are offered online. Students are able to access the course materials 24 hours a day, seven days a week. Clinical practicums involve diverse clinical activities tailored to meet individual learning needs and are completed in settings identified by the student.

Ph.D. in Nursing

Program Objectives and Course of Study
The purpose of the Ph.D. in Nursing Program is to develop doctorally prepared nurse researchers, scholars, and educators who will be able to advance nursing knowledge and improve nursing practice; synthesize knowledge from nursing and other disciplines to address complex health problems; and be leaders in nursing research and nursing education.

Graduates will be beginning-level researchers with a strong foundation in inquiry in the areas of clinical nursing research or health services research who can assume research and faculty roles in schools of nursing or centers of nursing research. Upon successful completion of the program, students are awarded the Doctor of
Philosophy in Nursing from the University of Massachusetts Amherst.

Description of the Program
The Ph.D. Program graduates will have three major areas of expertise: knowledge of the discipline of nursing; knowledge of a clinical or practice population; and strategies of research and scholarship, such as grant writing and publication. They will think critically and lead the profession and public to policies which promote health. To achieve this expertise, students will be educated didactically, through course work, seminars, and tutorials, and experientially, through grant writing, and independent research. The program consists of a minimum of 57 credit hours including 12 credits in nursing knowledge and theory development, 15 credits in research and statistics, 12 credits in electives, and 18 credits for the dissertation. Elective credits are distributed in nursing and cognates (non-nursing courses). Post-baccalaureate students must take an additional 24 credits distributed across nursing, cognates, and statistics. Students are required to successfully complete a comprehensive examination, dissertation proposal defense, and defense of the completed dissertation. The program is designed for both post-baccalaureate and post-master’s students. A full-time course of study includes two to three years of coursework and one year for the dissertation. A part-time plan of study may be designed in consultation with a faculty adviser. There is a one-year residency requirement as defined by the Graduate School, and an on-campus orientation.

Admission Policies
Admission priority is given to applications completed and postmarked by February 1. Decisions regarding admission to the doctoral program are based on an overall appraisal of applicants’ abilities to undertake doctoral study and of their potential contribution to nursing science as evidenced in the following:

1. Official transcripts from colleges or universities attended.
2. A master’s degree in nursing from a nationally accredited School of Nursing and a grade point average of 3.0 or better; or a baccalaureate degree in nursing from a nationally accredited university and a grade point average of 3.2 or better.
3. Official transcripts from all undergraduate and graduate programs attended.
4. Two letters of recommendation.
5. Two examples of scholarly writing (e.g., publications, scholarly papers).
6. A clinical research focus congruent with that of a faculty sponsor.
7. Completed application forms with fee.
8. Participation in an admission interview.

Additional criteria for international applicants:
1. Completion of International Student Application, available online from the University of Massachusetts Amherst Graduate School.
2. GPA of 3.0 or equivalent.
3. Use of translation service for transcript as necessary.
4. TOEFL scores where applicable.

Further information may be obtained from: Cynthia Goss, Ph.D. Program Office, School of Nursing, 123 Skinner Hall, University of Massachusetts, Amherst, MA 01003-0420, tel. (413) 577-2322 or cgoss@nursing.umass.edu.

Doctor of Nursing Practice—Online

An on-campus orientation is required for this online program. The Doctor of Nursing Practice (D.N.P.) is a post-baccalaureate or post-master’s program designed to provide an exemplary accredited academic and clinical education for nurses who will practice at the highest level. It offers the following concentrations: Primary Care Family Nurse Practitioner and Public Health Nurse Leader. Specific goals for the program are to graduate nurses who will: 1) engage in nursing practice using the advanced knowledge from nursing and related disciplines to improve health outcomes, 2) provide leadership and collaborate with leaders in other professions for change in systems of care, 3) synthesize and translate evidence from nursing and other disciplines to manage complex health problems, and 4) provide culturally proficient care to respond to health disparities and societal needs.

Core competencies essential for those preparing for direct care roles and for population-based roles build on eight essential content areas: 1) scientific underpinnings for practice, 2) organizational and systems leadership for quality improvement, and systems thinking, 3) clinical scholarship and analytic methods for evidence-based practice, 4) technology and information for the improvement and transformation of health care, 5) health-care policy for advocacy in health care, 6) interprofessional collaboration for improving patient and population healthcare outcomes, 7) clinical prevention and population health for improving the nation’s health, and 8) advanced nursing practice for improving the delivery of patient care.

All students are required to attend an on-campus orientation in early summer. Post Master’s (PM) students can plan for a less than one-week orientation. Post baccalaureate (PB) students should plan for an additional Advanced Health Assessment leveling workshop. PB students make two further campus visits corresponding to specialty course requirements. All students visit campus to present their capstone presentation orally. It may also be recommended that students take PUBH 540 Introductory Biostatistics before NURSING 797D Intermediate Biostatistics based on results of an assignment to determine statistics background given during orientation.

Admission Criteria
Admission priority is given to applications completed and postmarked by February 1.

Post-Baccalaureate
Students must meet the general requirements of both the University of Massachusetts Amherst Graduate School and the School of Nursing and have a baccalaureate degree from a nationally accredited school of nursing or be an RN with a non-nursing baccalaureate degree. The School of Nursing uses the degree-granting institution Grade Point Average (GPA) as one measure of an applicant’s academic potential. A successful applicant will typically have a GPA of 3.0 or above (on a 4.0 scale). If the GPA is lower than 3.0, applicants may still apply and be considered for admission, but may wish to submit a Graduate Record Exam (GRE) score if they believe that the GPA does not accurately reflect their abilities.

Other requirements include official transcripts from all graduate and undergraduate programs attended, documentation of RN licensure, sample of scholarly writing, a written statement of professional goals, two letters of recommendation, TOEFL scores if needed, a course in elementary statistics and a course in health assessment if the graduate plan of study includes advanced health assessment.

Post-Master’s
The School of Nursing offers a post-master’s entry to the Doctor of Nursing Practice. Admissions criteria are the same as for the post-baccalaureate applicant plus transcripts from all graduate programs attended. For all post-master’s entry applicants, an application review will determine D.N.P. degree requirements. A minimum of 36 credits post-master’s is required.

Course Requirements
The post-baccalaureate program of study is 79-81 credits, depending on the specialty selected. The program must be completed in five years and includes theory, research, core courses, and clinical practica. Core courses for all specialty tracks required include NURSING 603, 630,
690L, 690S, 704, 797D; PUBHLTH 524, 630; SCH-MGMT 680, Capstone, and Residency is also required. Additional Public Health courses required by specialty can be viewed at www.umass.edu/nursing. All non-nursing course descriptions can be viewed in this course catalog under their respective departments. A residency and capstone project are also required. The course requirements for post-master’s students will vary, depending on their prior coursework and selected specialty area. Requirements are determined by a portfolio review process.

All courses carry 3 credits unless otherwise specified.

603 Theoretical Components of Nursing Science
Major approaches to theory development in the profession. Analysis of nursing theory and theories from related disciplines, to develop conceptual models for clinical practice. Limited to Nursing majors.

610 Primary Care of Children, Adolescents and Young Adults
Evaluation of theory and research in the practice of primary care nursing with culturally diverse populations of children, adolescents, and young adults. Common health problems affecting this population presented with a focus on the health promotion and management of health disruptions. Social problems, health care policies, and practices which affect the delivery of primary health care emphasized.

615 Advanced Pathophysiology
Concepts and theories related to disorders of physiological processes which result in health alterations in the child and the adult. Alterations in normal body functions leading to disease and discomfort of the individual presented within an organizing framework. Clinical inferences from concepts and theories of pathophysiology and pharmacology presented in relation to clinical nursing practice in primary care.

620 Primary Care of Middle Aged and Older Adults
Evaluation of theory and research in the practice of primary care nursing with culturally diverse populations of middle aged and older adults. Common health problems affecting this population presented with a focus on the health promotion and management of health disruptions. Social problems, health care policies, and practices which affect the delivery of primary health care emphasized.

630 Research Methodology in Nursing
Examines the relationship among research, theories, and advanced nursing practice. Emphasizes research participation and advanced research utilization, including research evaluation, practice outcomes, clinical application of research, and problem identification.

640 Advanced Public Health Nursing I
Focus on analyzing health problems and solutions as they occur in the local, national, and global community. Use of community assessment techniques, and environmental and population characteristics to systematically examine geographical, sociocultural, political and economic perspectives in order to increase the effectiveness of the delivery of health services.

642 Teaching in Nursing
The dynamic and creative processes involved in the preparation of students for competent, reflective nursing practice. Philosophies, theories, methodologies, and trends in nursing education.

660 Psychiatric-Mental Health Nursing with Individuals
Selected concepts, theories, and research related to advanced practice nursing with individuals with mental health care needs.

665 Psychiatric-Mental Health Nursing with Groups
Selected concepts, theories, and research related to group dynamics and advanced practice nursing with groups with mental health care needs.

670 Family Systems and Interventions in Nursing
Selected concepts, theories, and research related to family dynamics and advanced practice nursing with families with mental health care needs.

680 Consultation for Advanced Practice Nurses
Selected concepts, theories, and research related to advanced practice nursing consultation.

690A Living with Chronic Health Problems Across the LifeSpan
Critical analysis of the literature from arts and sciences on self-management, symptom management, and other theoretical models for living with chronic health problems.

690C Advanced Health Assessment and Clinical Reasoning
Classroom and laboratory practice and case-based approaches to health assessment and differential diagnosis of common health problems for diverse groups. Must be taken concurrently with NURSING 698A.

690D Advanced Pharmacology
Principles of pharmacology for classes of drugs commonly used in various healthcare practices.

690L Healthcare Quality
Contemporary quality-of-care issues in health care policy, research, and delivery systems and national initiatives to improve outcomes of care for individuals and populations.

690L Leadership in Public Health Systems
Course and field work focus on leadership theory, development, and competencies of contemporary public health leaders. The application of health policy as integral to the leadership role.

690T Curriculum Development, Evaluation and Processes in Nursing
Focuses on developing knowledge and skills of nurse educators in applying principles of curriculum development, evaluation, and related processes in nursing education.

691 Special Topics Master’s Research Seminar or Project
Students participate with expert faculty in research on a variety of topics selected by the faculty.

696 Independent Study

698 Seminar and Practica
Supervised practica provide clinical experience in the student’s area of specialization.

698A Practicum for Advanced Health Assessment and Clinical Reasoning
This first supervised clinical practicum affords graduate students, in collaboration with an interdisciplinary team, the opportunity to practice health assessment at the highest level for diverse clients with varied needs.

698T Practicum: Teaching
A precepted experience focusing on processes involved in preparing students for competent, reflective nursing practice. Philosophies, theories, methodologies, and trends in nursing education as applied to clinical teaching.

699 Master’s Thesis (or 697)
Prerequisite: NURSING 630. Credit, 6.
704 Health Disparities and Social Justice
Using group discussion, research, and community-based assignments, students explore the historical dimensions leading to health disparities, social injustice, and concepts of marginalization, poverty, race, class, and gender.

790D Pharmacotherapy Management
A case-based course integrating principles of pharmacology to construct, implement, and evaluate optimal pharmacotherapeutic regimens commonly observed in various healthcare settings to prepare the practitioner for prescriptive authority.

790G Research Translation in Nursing
Models and methods of research translation in nursing including research dissemination and implementation, program planning and evaluation, cost-effectiveness analysis, and preparation of research translation grant proposal.

790I Psychiatric Mental Health Nursing with Individuals II
Evaluation of theory and research as it applies to the practice of psychiatric-mental health nursing of individuals with selected serious and persistent psychiatric disorders.

790J Informatics for Nursing Practice
Provides students with essential knowledge and skills to utilize information systems/technology to improve and transform healthcare systems and provide leadership within healthcare systems and/or academic settings.

790P Advanced Public Health Nursing II
Incorporates the scope of advanced practice public health nursing (APPHN) and requisite competencies to analyze public health nursing interventions within the context of community preventive services for public health problems.

797D Intermediate Biostatistics
Statistical techniques frequently used in health sciences research and the use of analytic software to create, manage, and analyze data on personal computers.

798 Advanced Seminar and Practicum
Supervised advanced practica provide intensive clinical experience in the student’s area of specialization. Credit, 6.

890C DNP Capstone Course
The implementation, monitoring, evaluation, and dissemination of a theoretically based research translation project designed as a programmatic intervention to address a clinical practice problem.

898 DNP Practicum: Immersion Experience
An intensive immersion opportunity for students to further enhance and integrate their prior learning and to gain experience with designated DNP essential and specialty competencies.

Courses Required of All Students in the Ph.D. Program
Prerequisites to all courses are a baccalaureate or a master’s degree in nursing and admission to the program. Doctoral nursing students must complete a minimum of 57 credit hours including coursework in nursing knowledge and theory development, research and statistics, cognates and electives, and credits for the dissertation. Post-baccalaureate students must take an additional 24 credits distributed across nursing, cognates, and statistics. Students are required to successfully complete a comprehensive examination, dissertation proposal defense, and defense of the completed dissertation.

700 Philosophy of Science: Philosophical Foundations of Nursing Science
Prepares doctoral students to systematically analyze epistemological, ontological, and metatheoretical perspectives in the philosophy of science, while also considering the implications for scientific inquiry, theory development, and knowledge development in nursing.

710 Quantitative Methods in Nursing Research
Advanced study of designs, methods, instrumentation, and measurement for quantitative nursing research. Students develop a research prospectus.

720 State of the Discipline of Nursing
A critical examination of the current state of knowledge in the discipline. Students analyze, evaluate, and synthesize selected aspects of this knowledge.

730 Qualitative Methods in Nursing Research
Advanced study of major qualitative research designs and methods used to build substantive knowledge in nursing. Emphasis placed upon experiential learning of methods and techniques to design studies and generate, analyze, and interpret data.

810 Advanced Nursing Research
Seminar designed to assist students in the preparation of a research proposal for the federal sector.
Graduate Faculty

Nancy L. Cohen, Professor and Head of the Department of Nutrition, B.S., Cornell, 1980; Ph.D., California at Davis, 1984.

Elena T. Carbone, Associate Professor and Graduate Program Director, B.S., New Hampshire, 1984; M.S., Boston University, 1988; Dr.P.H., North Carolina at Chapel Hill, 1999.

Jean A. Anliker, Associate Professor and Extension Nutrition Education Program Director, B.S., Iowa State, 1970; M.S., Iowa, 1973; Ph.D., Massachusetts at Amherst, 1985.

Patricia Beffa-Negrini, Lecturer, B.S., Connecticut, 1979; M.S., Purdue, 1981; Ph.D., Massachusetts at Amherst, 1990.

John J. Cunningham, Professor, B.S., Purdue, 1970; M.S., 1972; Ph.D., Maryland, 1978.

Srimathi Kannan, Assistant Professor, B.S., Bharatidasan University, 1986; M.S., 1988; Ph.D., Tennessee, 1995.

Young-Cheul Kim, Assistant Professor, B.S., Keimyung University, Korea, 1986; M.S., Korea University, 1988; Ph.D., Tennessee, 1995.


Richard J. Wood, Associate Professor, B.S., Boston University, 1973; M.S., Connecticut, 1977; Ph.D., 1981.

Adjunct/Associate Faculty

Robert J. Niclosi, Professor of Health and Clinical Sciences, University of Massachusetts Lowell.

Ira S. Ockene, Professor of Medicine, Associate Director, Division of Cardiovascular Medicine and Director, Preventive Cardiology Program, University of Massachusetts Medical School, Worcester.

Yeonhwa Park, Assistant Professor, F.J. Francis endowed Chair, Department of Food Science.

General Information

Degrees offered are the Master of Science and the Master of Public Health (M.P.H.) in Nutrition and the Doctor of Philosophy in Public Health. Studies in the Nutrition program emphasize nutritional interventions, including nutritional metabolism, nutrition education, nutrition and exercise, and community nutrition. The Master of Science program prepares graduates for doctoral studies in nutrition and for careers in research, clinical nutrition, community nutrition, or nutrition education. The Master of Public Health is a professional degree program that prepares those with advanced degrees and experience for practice and career advancement in a public-health nutrition setting. The doctoral program prepares individuals for teaching and research in academic institutions and for positions of professional leadership in health and health-related agencies in which research is an important function.

Master of Science Degree Program

For the Master of Science program, a bachelor’s degree in nutrition or a related field such as biochemistry, biology, exercise science, food science, physiology or public health is appropriate. Students with other bachelor’s degree emphases may also apply if prerequisite coursework is completed. At least five out of seven of the following core preparation courses must be taken before admission: Introductory Biology or Zoology, Human Physiology, General Chemistry (2 semesters), Organic Chemistry, Biochemistry, Microbiology, Basic Human Nutrition. The remainder must be taken while enrolled in the Master’s program, but not for graduate credit. The focus of the M.S. degree program can be on either Nutrition Sciences or on Community Nutrition. The M.S. student can select either the thesis or the non-thesis route to complete the degree requirements.

Degree Requirements

The thesis option requires a minimum of 32 graduate credits and the non-thesis option a minimum of 36 graduate credits according to the following:

1. **Nutrition Core**

   These courses must be taken by those who do not have a B.S. degree in nutrition. Graduate credits are given for courses numbered above 500.

   - NUTRITN 352 Life Cycle Nutrition
   - NUTRITN 572 Community Nutrition
   - NUTRITN 577 Nutritional Problems in the U.S.
   - NUTRITN 585 Practical Nutrition Counseling
   - NUTRITN 586 Assessment
   - NUTRITN 630 Nutrition and Chronic Diseases
   - NUTRITN 696 Research Problems
   - NUTRITN 793/4 Seminar

2. **Advanced Nutrition Core**—11 credits

   These courses must be taken by all enrolled in the M.S. program.

   - NUTRITN 352 Life Cycle Nutrition
   - NUTRITN 572 Community Nutrition
   - NUTRITN 577 Nutritional Problems in the U.S.
   - NUTRITN 585 Practical Nutrition Counseling
   - NUTRITN 630 Nutrition and Chronic Diseases
   - NUTRITN 696 Research Problems
   - NUTRITN 793/4 Seminar

3. **Nutrition Concentration**—6 credits

   Choose either the Nutrition Sciences or the Community Nutrition concentration:

   a. **Nutrition Sciences**

      - NUTRITN 714 Advanced Nutrition—Vitamins
      - NUTRITN 715 Advanced Nutrition—Minerals

   b. **Community Nutrition**

      - NUTRITN 585 Practical Skills in Nutrition Counseling
      - NUTRITN 640 Public Health Nutrition

4. **Electives**—6 credits

   a. **Nutrition Sciences**

      - Two courses, with at least one from outside the Department.

   b. **Community Nutrition**

      - BIOST&EP 630 Principles of Biostatistics
      - NUTRITN 699 M.S. Thesis

5. **Culminating Experience**

   Choose from **Thesis or Non-thesis Option**:

   a. **Thesis Option** (9-13 credits):

      - BIOST&EP 640 Intermediate Biostatistics
      - NUTRITN 699 M.S. Thesis

   b. **Non-thesis Option** (13 credits):

      - 6 credits of coursework at the 500 level or above, within or outside the Department, plus:

   1. **Nutrition Sciences**

      - NUTRITN 696 Research Problems

   2. **Community Nutrition**

      - NUTRITN 696 Research Problems

   All students are encouraged to gain practical experience and to complete the requirements of the American Dietetic Association for eligibility to become a Registered Dietitian (R.D.).

Master of Public Health Degree (M.P.H.) in Nutrition

Also available online, this degree program prepares those with an advanced degree and three to five years of relevant, post-B.S. experience for practice and career advancement in a public-health nutrition setting. Two courses in nutrition are also required.
Degree Requirements
All candidates must complete 44 graduate credits as follows:
1. Public Health coursework—15 credits. One course from each of the following categories:
   - BIOST&EP 540 Introductory Biostatistics
   - BIOST&EP 630 Principles of Epidemiology
   - COM- HLTH 601 Application of Social and Behavior Theories in Public Health Interventions
   - COM- HLTH 620 Principles of Public Health Practice
   - ENV- HLTH 565 Environmental Health Practices
2. Nutrition coursework—17 credits
   - BIOST&EP 634 Nutritional Epidemiology
   - NUTRITN 572 Community Nutrition
   - NUTRITN 577 Nutritional Problems in the U.S.
   - NUTRITN 640 Public Health Nutrition
   - NUTRITN 731 Nutritional Assessments
   - NUTRITN 793/4 Graduate seminars (2 credits)
   - NUTRITN Elective graduate course (3 credits)
3. Elective coursework—a graduate course in Nutrition (3 credits).
4. Practicum—3 credits. 120-200 hours of field training in Public Health Nutrition. All M.P.H. students are required to complete a practicum experience as part of their degree requirement, and may receive credit for the practicum experience depending on their major department’s policy. Practice experiences may be paid or unpaid. Placements are arranged in consultation with the student’s faculty adviser or the Office of Public Health Practice and Outreach in the School of Public Health and Health Sciences. The adviser reviews the student’s interests, preferences, financial standing, experience, and skills, and is usually able to arrange for interviews with a suitable organization either directly or through another faculty member.
5. Project or additional courses—6 credits as:
   a. Project and oral project-presentation, or
   b. additional 6 credits of coursework (2 courses, 3 cr. each), and a final oral exit examination.

Doctor of Philosophy (Ph.D.) in Public Health—Nutrition Option
Doctoral applicants should have earned a bachelor’s degree and have demonstrated basic research competency through a required thesis (M.S. thesis, honors thesis or equivalent research experience). An applicant is expected to have completed the equivalent of the Nutrition Core courses required for the M.S. degree. Otherwise, any deficiency must be completed before a student is allowed to take the comprehensive examination for the Ph.D. degree.

Degree Requirements
Candidates select a minor in addition to the major in nutrition. A total of 57 credits including the following:
1. Ph.D. Dissertation, NUTRITN 899 (18 credits)
2. Graduate Seminar (3 credits)
   The student presents three seminars, one in Nutrition, one in the Minor, and the third in either.
3. Nutrition (major concentration) (24 credits)
   from:
   - NUTRITN 630 Nutrition and Chronic Diseases
   - NUTRITN 640 Public Health Nutrition
   - NUTRITN 714 Advanced Nutrition—Vitamins
   - NUTRITN 715 Advanced Nutrition—Minerals
   - NUTRITN 731 Nutritional Assessment
   - NUTRITN 741 Methods in Nutrition Research
   - BIOST&EP 630 Principles of Epidemiology
   - BIOST&EP 634 Nutritional Epidemiology
   - BIOST&EP 640 Intermediate Biostatistics
4. Minor concentration (12 credits)
   To be selected from within the School of Public Health and Health Sciences or another appropriate Ph.D. -granting program.
5. Comprehensive Examination:
   Upon completion of the 39 credits of course work, the student must pass a comprehensive examination. The comprehensive examination consists of two parts:
   - Written examination: Each Ph.D. student is required to write the examinations in two areas, Nutrition (major area) and the minor area declared by the student.
   - Oral examination: A continuation of the written examination with added emphasis on the student’s area of research interests.
6. Dissertation defense
   Upon successful completion of the comprehensive examination, the student prepares a dissertation proposal that must be approved by the dissertation committee before being submitted to the Graduate School.

Note: The Ph.D. degree in Public Health does not require competency in a foreign language.

All courses carry 3 credits unless otherwise specified.

572 Community Nutrition
Skills and techniques needed to effectively carry out community nutrition programs and nutrition education, including knowledge of agencies and programs, community assessment, legislation, nutrition education, and working with people. Prerequisite: NUTRITN 352 or consent of instructor.

573 Community Nutrition Fieldwork
Supervised fieldwork experience in community nutrition programs. Prerequisites: NUTRITN 572 and consent of instructor. Credit, 3-6.

577 Nutritional Problems in the U.S.
Food-related problems and policies. Availability and safety of U.S. food supply. Evaluation of nutritional status of the general population and vulnerable groups. Social, psychological, and economic influences on food intake. Alternative food patterns. Prerequisite: NUTRITN 352.

578 Nutritional Problems of Developing Nations
Malnutrition as it exists in developing countries and its socioeconomic background. Protein-energy malnutrition, famine, vitamin and mineral deficiency diseases, synergism between nutrition and infection, and the role of international agencies in fighting malnutrition. Prerequisite: NUTRITN 352 or consent of instructor.

580 Medical Nutrition Therapy
Physiological and metabolic bases for nutritional care and the application of this knowledge to the treatment of specific diseases. Topics include surgery, burns, infections, cancer, liver diseases, renal failure, diabetes, cardiovascular diseases, and alternative modes of feeding. Credit, 5.

585 Practical Skills in Nutrition Counseling
Introduction to and practice of nutrition counseling skills including counseling theories and health behavior theories; effective counseling skills; information giving, education, and counseling; and counseling relationships. Prerequisites: NUTRITN 580; may be taken concurrently.

630 Nutrition and Chronic Diseases
Metabolic roles of dietary components in the etiology and pathophysiology of cardiovascular diseases, diabetes, obesity, osteoporosis, protein-energy malnutrition, anemia, and cancer. Metabolism of nutri-
ents associated with each disease and the influence of overall dietary composition. Prerequisites: general biochemistry and/or nutritional biochemistry.

640 Public Health Nutrition
A practice-based approach to public health nutrition processes through readings, lectures, and active participation. Assessing community needs; priorities, goals and objectives; implementing an intervention; designing a nutrition plan; building coalitions; and preparing grant applications. Prerequisites: NUTRITN 572 and 577 or consent of instructor.

678 Topics in International Nutrition
Causes and consequences of malnutrition in developing countries from an interdisciplinary viewpoint. Some knowledge of agriculture nutrition and/or health sciences required. Student presentations and discussion of current issues pertaining to nutrition and development. Prerequisite: NUTRITN 572 or consent of instructor.

696 Research Problem
Mainly for candidates for the Master of Science degree who do not write a thesis. Original research expected. Two bound copies of a written report of the study required by the department. Credit, 3-6.

698 Nutrition Practicum
Practical field experience in human nutrition. Prerequisite: NUTRITN 352 or consent of instructor.

699 Master’s Thesis
Individual research. Credit, 1-6.

713 Advanced Nutrition — Carbohydrates, Lipids and Energy
Metabolic role of carbohydrates and lipids as sources of energy. Energy production at cellular level and consideration of whole body energy balance. Prerequisite: BIOCHEM 523 or consent of instructor.

714 Advanced Nutrition — Vitamins
Metabolic role of vitamins, specific functions, requirements, sources, assay methods, effects of deficiencies and excesses. Prerequisite: NUTRITN 713 or consent of instructor.

715 Advanced Nutrition — Minerals
Metabolic role of minerals, specific functions, requirements, sources, assay methods, effects of deficiencies and excesses. Prerequisite: NUTRITN 713 or consent of instructor.

716 Proteins in Human Nutrition
Digestion, absorption, and metabolism of proteins and amino acids. Evaluation of protein value of foods and dietary protein requirements and malnutrition. Prerequisite: BIOCHEM 523 or consent of instructor.

731 Nutritional Assessment
Procedures used in assessing human nutrition, including demographic, clinical, anthropometric, biochemical, and dietary intake methodologies. Standards of evaluation and validity of procedures used in national surveys and other pertinent studies.

741 Methods in Nutrition Research
Introduction to the design and implementation of longitudinal and cross-sectional nutrition research projects and writing grant proposals.

793 Seminar
Readings, reports and discussions on current literature in area of food or nutrition. Credit, 1.

794 Seminar

796 Research Project

896 Research Project
Consent of graduate instructor required. Not a thesis; for Ph.D. candidates only. Credit, 1-4.

899 Doctoral Dissertation
Credit, 18.

Organismic and Evolutionary Biology

Graduate Faculty

(See individual departments for degrees, institutions, and years)

Joseph S. Elkinton, Director, Organismic and Evolutionary Biology Program and Professor of Plant, Soil, and Insect Sciences.

Elizabeth Dumont, Associate Director and Chair of Admissions, Organismic and Evolutionary Biology Program, and Associate Professor of Biology.

Elizabeth M. Jakob, Associate Director and Graduate Program Director, Organismic and Evolutionary Biology Program and Professor of Psychology.

Lynn Adler, Assistant Professor of Plant, Soil, and Insect Sciences.

Peter Alpert, Associate Professor of Biology.

Anne L. Averill, Associate Professor of Plant, Soil, and Insect Sciences.

Tobias Baskin, Professor of Biology.

Robert Bernatzky, Associate Professor of Plant, Soil, and Insect Sciences.

Eric L. Bittman, Professor of Biology.

Jeffrey Blanchard, Assistant Professor of Microbiology.

Jeffrey D. Blaustein, Professor of Psychology.

Barry Braun, Associate Professor of Kinesiology.

John Buonaccorsi, Professor of Mathematics and Statistics.

Bruce Byers, Associate Professor of Biology.

Ana Caicedo, Assistant Professor of Biology.

Graham Caldwell, Associate Professor of Kinesiology.

Daniel Cooley, Associate Professor of Plant, Soil, and Insect Sciences.

Margery C. Coombs, Professor of Biology.

Gerald Downes, Assistant Professor of Biology.

Geert De Vries, Professor of Psychology.

John Finn, Professor of Natural Resources Conservation.
Organismic & Evolutionary Biology

Todd K. Fuller, Professor of Natural Resources Conservation.
Laurie Godfrey, Professor of Anthropology.
Steven D. Goodwin, Professor of Microbiology and Dean of the College of Natural Sciences.
Curtice R. Griffin, Professor of Natural Resources Conservation.
Duncan Irschick, Associate Professor of Biology.
Abigail Jensen, Associate Professor of Biology.
Francis Juanes, Professor of Natural Resources Conservation.
Rolf Karlstrom, Associate Professor of Biology.
Matthew Kelty, Professor of Natural Resources Conservation.
Jane Kent-Braun, Professor of Kinesiology.
Joseph G. Kunkel, Professor of Biology.
R. Mark Leckie, Professor of Geosciences.
Lynn Margulis, Distinguished University Professor of Geosciences.
Kevin McGarigal, Associate Professor of Natural Resources Conservation.
Benjamin B. Normark, Associate Professor of Plant, Soil, and Insect Sciences.
Melinda B. Novak, Professor and Chair of Psychology.
Klaus Nüsslein, Associate Professor of Microbiology.
Sheila Patek, Assistant Professor of Biology.
Jeffrey Podos, Associate Professor of Biology.
Adam H. Porter, Associate Professor of Plant, Soil, and Insect Sciences.
Stephan Rich, Associate Professor of Plant, Soil, and Insect Sciences.
Alan Richmond, Senior Lecturer of Biology.
Margaret A. Riley, Professor of Biology.
Dennis G. Searcy, Professor of Biology.
Karen Searcy, Senior Lecturer of Biology.
John G. Stoffolano, Professor of Plant, Soil, and Insect Sciences.
Roy Van Driesche, Research Associate Professor of Plant, Soil, and Insect Sciences.
George N. Wade, Professor of Psychology.
Elsbeth Walker, Associate Professor of Biology.
James W. Walker, Professor of Biology.
Paige Warren, Assistant Professor of Natural Resources Conservation.
R. Thomas Zoeller, Professor of Biology.
Adjunct/Associate Faculty
Jill Bubier, Associate Professor of Environmental Science, Mount Holyoke College.
Ethan Clofelter, Associate Professor of Biology, Amherst College.
Stephen DeStefano, Adjunct Assistant Professor of Natural Resources Conservation.
Robert L. Dorit, Associate Professor of Biological Sciences, Smith College.
Aaron Ellison, Senior Research Fellow, Harvard Forest.
Cristina Cox Fernandes, Adjunct Research Assistant Professor of Biology.
Cynthia Gill, Assistant Professor of Natural Sciences, Hampshire College.
Gary Gillis, Associate Professor of Biological Sciences, Mount Holyoke College
Alan Goodman, Dean, School of Natural Science, Hampshire College.
J. Whitey Hagadorn, Assistant Professor of Geology, Amherst College.
Alex J. Haro, Adjunct Assistant Professor of Natural Resources Conservation, and U.S.G.S. Conte Anadromous Fish Research Center.
Michael Hood, Assistant Professor of Biology, Amherst College.
Norman Johnson, Adjunct Research Assistant Professor of Plant, Soil, and Insect Sciences.
Laura Katz, Professor of Biological Sciences, Smith College.
Diane Kelly, Research Assistant Professor of Biology.
David King, Adjunct Research Assistant Professor of Natural Resources Conservation.
Benjamin H. Letcher, Adjunct Assistant Professor of Natural Resources Conservation, and U.S.G.S. Conte Anadromous Fish Research Center.
Stephen D. McCormick, Adjunct Associate Professor of Biology and U.S.G.S. Conte Anadromous Fish Research Center.
Martha E. Mather, Adjunct Assistant Professor of Natural Resources Conservation.
Scott M. Melvin, Adjunct Assistant Professor of Natural Resources Conservation.
Robert B. Merritt, Professor of Biological Sciences and Dean of Faculty, Smith College.
Jill S. Miller, Assistant Professor of Biology, Amherst College.
Keith Nislow, Adjunct Assistant Professor of Natural Resources Conservation.
Sarah Partan, Assistant Professor of Cognitive Sciences, Hampshire College.
Stan Rachootin, Professor of Biological Sciences, Mount Holyoke College.
Paul Sievert, Research Associate Professor of Natural Resources Conservation.
L. David Smith, Associate Professor of Biological Sciences, Smith College.
Ethan Temeles, Professor of Biology, Amherst College.
Stephen G. Tilley, Professor of Biological Sciences, Smith College.

The Graduate Program in Organismic and Evolutionary Biology (OEB) is an interdepartmental program that trains master’s and doctoral students in ecology, evolutionary biology, animal behavior, and organismal biology. OEB is structured to offer broad, flexible training. Participating faculty are members of the Departments of Anthropology; Biology; Geosciences; Kinesiology; Microbiology; Natural Resources Conservation; Plant, Soil, and Insect Sciences; and Psychology as well as members of the other Five Colleges (Amherst, Hampshire, Mount Holyoke, and Smith).

Prerequisites of the Program
Applicants must have substantial undergraduate training in the life sciences, with an undergraduate cumulative grade point average of at least 3.0. Applicants must submit Graduate Record Examination scores for the general test to the Graduate School. Applicants must contact potential advisers early in the application process because acceptance is contingent upon securing a prospective major adviser prior to admission. Three letters of recommendation are required. Contact the OEB Office, tel. (413) 545-0928, or

Contact the OEB Office, tel. (413) 545-0928, or
Three letters of recommendation are required. Because acceptance is contingent upon securing a prospective major adviser early in the application process, applicants must submit Graduate Record Examination scores for the general test to the Graduate School. Applicants must contact potential advisers early in the application process because acceptance is contingent upon securing a prospective major adviser prior to admission. Three letters of recommendation are required. Contact the OEB Office, tel. (413) 545-0928, or
email: oeb@bio.umass.edu or view the program’s website, www.bio.umass.edu/oeb, for further information about the program.

General Requirements

General requirements for the M.S. and Ph.D. degrees in Organismic and Evolutionary Biology follow those of the Graduate School. Formal course requirements include graduate level courses in both ecology and evolution. OEB is currently developing core courses in Ecology and Evolution to fulfill these two requirements. The Ecology course will be offered in fall 2009; the Evolution course in fall 2010. In addition to these two core courses, a broad range of more specialized ecology and evolution electives are offered. Students are also required to take OEB 697B Ecology and Evolutionary Biology (proseminar for new OEB students), OEB 697Y Graduate Student Seminar Series (OEB student seminars) as well as two semesters of OEB 891C (OEB seminars). Statistical coursework through multivariate analysis is required. The program requires no foreign language competency.

The student’s Guidance Committee determines additional coursework. Ph.D. students are required to teach for a minimum of one semester. Both the M.S. and the Ph.D. require acceptance of a thesis with original research. The Ph.D. also requires that students pass an oral preliminary examination by the end of the second year in residence and defend a doctoral dissertation. Contact the OEB Office for a detailed description of degree requirements.

Program-related Courses

ORG&EVBI 696 Master’s Independent Study
Laboratory research under direction of an OEB faculty member. Credit, 1-6.

ORG&EVBI 697B Ecology and Evolutionary Biology Discussion
Proseminar required for all new OEB students during first semester of residence Credit, 1.

ORG&EVBI 697Y Graduate Student Seminar Series
Student-presented seminars. Required of all OEB students. Typically taken during second or third year of residency. Credit, 1.

ORG&EVBI 699 Master’s Thesis
Credit, 1-10.

ORG&EVBI 796 Ph.D. Independent Study
Laboratory research under direction of an OEB faculty member. Credit, 1-6.

ORG&EVBI 797C OEB Ecology Core Course
Foundation in Ecology required of all OEB students, taken first or second year. Credit, 4.

ORG&EVBI 797D OEB Evolution Core Course
Foundation in Evolution required of all OEB students, taken first or second year. Credit, 4.

ORG&EVBI 891C OEB Seminar
Weekly seminars held during both semesters. Notable speakers invited by OEB faculty. Students present their research. Credit, 1.

ORG&EVBI 899 Doctoral Dissertation
Credit, 18.

Ecology Requirement
For current students, the courses listed below meet the Ecology course requirement. Incoming students must take ORG&EVBI 797C OEB Ecology Core Course.

BIOLOGY 550 Animal Behavior
BIOLOGY 750 Advanced Animal Behavior
ENTOMOL 511 Insect Behavior
ENTOMOL 683 Insect Ecology
FOREST 577 Ecosystem Modeling and Simulation
FOREST 703 Advanced Forest Ecology
GEO-SCI 541 Paleocoeology
GEO-SCI 658 Paleoclimatology
PSYCH 620 Learning and Animal Behavior
PSYCH 891 Behavioral Ecology
W&FCONSV 564 Wildlife Habitat Management
W&FCONSV 565 Wildlife Population Dynamics and Management
W&FCONSV 571 Fisheries Science and Management
W&FCONSV 697 Carnivore Ecology, Biology and Behavior
W&FCONSV 697A Conservation Biology
W&FCONSV 697L Landscape Ecology
W&FCONSV 720 Ecological Interactions of Fishes
W&FCONSV 768 Advanced Wetland Ecology

Evolution Requirement
For current students, the courses listed below meet the Evolution course requirement. Incoming students must take ORG&EVBI 797D OEB Evolution Core Course.

BIOLOGY 521 Comparative Vertebrate Anatomy
BIOLOGY 522 Vertebrate Fossils and Evolution
BIOLOGY 528 Principles of Evolution
BIOLOGY 597L Principles of Molecular Evolution
BIOLOGY 722 Vertebrate Paleontology
ENTSOMOL 697Q Evolutionary Genetics
ORG&EVBI 797E Environmental Evolution

Additional Evolution Courses
For current students, these courses fulfill the Evolution requirement with approval of the Graduate Program Director.

BIOLOGY 540 Herpetology
BIOLOGY 542 Ichthyology
BIOLOGY 544 Ornithology
BIOLOGY 548 Mammalogy
ENTOMOL 655 Systematic Entomology
GEO-SCI 697A Symbiosis
GEO-SCI 697B Protists
MICROBIO 560 Microbial Diversity

Statistics Requirement

BIOST&EP 540 Introductory Biostatistics
BIOST&EP 640 Intermediate Biostatistics
NRC 697M Multivariate Statistics for Natural Resources
Philosophy

Course of Study
The course requirement for the M.A. in Philosophy is satisfactory completion of 10 graduate-level (500 or above) courses. Of these, four must be university philosophy courses at the 700-level, exclusive of 796. The remaining six may include: up to six hours of Phil 699; university philosophy courses at the graduate level; or, with the approval of the department’s Graduate Program Director, graduate-level courses in other fields or at other institutions.

Summary of Degree Requirements
In addition to the course requirement, a candidate for the M.A. in Philosophy must also satisfy a course distribution requirement, and either (a) earn two passing grades in any combination of preliminary exams or “starred papers,” or (b) write, defend, and properly submit a satisfactory Master’s thesis. A complete account of the requirements for the M.A. in Philosophy is contained in “The M.A. Program in Philosophy,” available from the department.

Ph.D. Program
Course of Study
The course requirement for the Ph.D. in Philosophy is satisfactory completion of 15 graduate-level courses, exclusive of 699 and 899. Of these, seven must be university philosophy courses at the 700-level, exclusive of 796. The remaining eight may include: up to six hours of Independent Study or university philosophy courses at the 500, 600, or 700 level.

Summary of Degree Requirements
In addition to the course requirement, a candidate for the Ph.D. in Philosophy must also satisfy a course distribution requirement, and a “starred paper”/preliminary exam requirement. When these requirements have been satisfied, the student may begin work on the Ph.D. dissertation. To satisfy the dissertation requirement, a candidate for the Ph.D. must write an acceptable Ph.D. dissertation, defend it at the final oral exam, and submit it in proper form to the Graduate School and the department. A complete account of the requirements for the Ph.D. in philosophy is contained in “The Ph.D. Program in Philosophy,” revised June 2007, available from the department.

All courses carry 3 credits unless otherwise specified.

500 Contemporary Problems
Intensive study of recent work in anglo-American analytic philosophy. Topics may include problems in metaphysics,
epistemology, philosophy of language, and other areas.

511 Modal Logic
Propositional modal logic: T, S4, S5, subjunctive conditionals, truth value gaps, supervaluations. Quantified modal logic: Barcan formula, contingent identity systems, tense logic, and other topics.

512 Philosophy and Logic
Naive set theory and mathematical induction. Axiomatic presentations of propositional and predicate logic. Interpretations and validity. Completeness theorems for both systems. The Lowenheim-Skolem theorem.

513 Math Logic I

514 Math Logic II
Further topics in mathematical logic (e.g., set theory, recursion theory, type theory).

550 Epistemology
Topics may include knowledge, epistemic justification, belief, truth, perception, skepticism.

551 Metaphysics
Topics may include necessity and possibility, universals and particulars, causality, the mental and the physical.

560 Political Philosophy
Topics may include nature and proper role of the state, nature and justification of legal obligation and rights.

561 Aesthetics
Theories on the nature of art and aesthetic evaluation; their epistemological and metaphysical implications.

562 History of Ethics
Intensive study of classic texts in the history of ethics. May include works of such figures as Aristotle, Plato, Aquinas, Hobbes, Hume, Kant, Mill, Moore, and others.

563 Ethical Theory
Critical study of recent work in moral philosophy. May include utilitarian, Kantian, or other normative theories, as well as naturalistic, nonnaturalistic, or emotivist theories in metaethics.

582 Philosophy of Science
Critical analysis of structure of scientific method and language of science, respective roles of induction and deduction in science, and the status of theoretical terms.

583 Philosophy of Religion
Topics may include arguments for the existence of God, problem of evil, faith and reason, meaning of religious language, the divine attributes, and religious foundations of morality.

584 Philosophy of Language
Topics may include Frege’s theory of sense and reference, Russell’s theory of denoting phrases, elocutionary aspects of speech acts, modal and epistemic contexts, theories of tense.

585 Philosophical Theology
Historical and systematic study of the methods and validity of theological thought, through selected problems.

586 Philosophy of Mathematics

591-595 Seminars

596 Independent Study

597 Special Topics

691-695 Seminars

696 Independent Study

697 Special Topics

698 Practicum

699 Master’s Thesis

701 Selected Philosopher I
Intensive critical study of work of a major figure in history of philosophy.

702 Selected Philosopher II
Intensive critical study of work of a major philosopher.

703 Problems in History of Philosophy
Intensive critical study of selected topics in history of philosophy.

710 Formal Logic
Selected advanced topics in logic. Consent of instructor required.

750 Metaphysics
Selected topics in analytic metaphysics, such as properties, identity, time, modality, minds, free will.

751 Theory of Knowledge
Selected topics in epistemology.

760 Ethics
Selected topics in ethical theory. May focus on issues in normative ethics, axiology, metaethics, virtue theory, or the epistemology of ethics. Readings may include works of any period from the ancients to the present.

782 Philosophy of Religion
Selected topics in philosophical theology, such as freedom and foreknowledge, the problem of evil, the divine attributes, classical theistic arguments (e.g., the ontological argument, the cosmological argument), and reformed epistemology.

783 Philosophy of Language
Selected topics in philosophy of language, such as truth, meaning, reference, names, descriptions, demonstratives.

784 Philosophy of Science
Selected topics in the philosophy of science, such as confirmation, laws, causation, explanation, and scientific realism.

785 Philosophy of Mind
Selected topics in the philosophy of mind, such as intentionality of the mental, relation between the mental and the physical, connection between thought and action, and ways of verifying the existence of various mental states.

791-795 Seminars

796 Independent Study

797 Special Topics

891-895 Seminars

896 Independent Study

897 Special Topics

899 Ph.D. Dissertation
Credit, 18.
Physics

Graduate Faculty

Donald Candela, Professor and Head of the Department of Physics, B.A., Harvard, 1978; Ph.D., 1983.

Krishna S. Kumar, Professor and Graduate Program Director, M.S., Indian Institute of Technology, 1984; Ph.D., Syracuse, 1990.

Marc Achermann, Assistant Professor, M.S., ETH Zurich, 1998; Ph.D., 2001.

Egor Babaev, Assistant Professor, B.S., A.F. Ioffe Physical and Technical Institute, Russia, 1997; Ph.D., Upsala, Sweden, 2001.

Guy Blaylock, Associate Professor, B.S., Grinnell, 1978; M.S., Illinois, 1980; Ph.D., 1986.

Benjamin P. Brau, Assistant Professor, B.A., Reed, 1994; Ph.D., Massachusetts Institute of Technology, 2002.

Laura Cadonati, Assistant Professor, Laurea in Physics, Milan, Italy, 1995; M.A., Princeton, 1998; Ph.D., 2001.

Stuart Cameron, Assistant Professor, B.S., Pennsylvania College of Technology, 1997; Ph.D., University of Rochester, 2002.

Benjamin Davidovitch, Assistant Professor, B.S., Hebrew University, Jerusalem, 1993; M.S., 1996; Ph.D., The Weizmann Institute of Science, Rehovot, 2001.

Anthony D. Dinsmore, Associate Professor, B.S., Yale, 1992; Ph.D., Pennsylvania, 1997.

John F. Donoghue, Professor, B.S., Notre Dame, 1972; Ph.D., Massachusetts, 1976.

John F. Dubach, Professor, Chief Information Officer and Special Assistant to the Chancellor, B.S., Santa Clara, 1971; M.S., Stanford, 1973; Ph.D., 1975.

Lori S. Goldner, Professor, A.B., Cornell, 1984; Ph.D., California at Santa Barbara, 1991.

Eugene Golowich, Professor, B.S., Rensselaer Polytechnic Institute, 1961; Ph.D., Cornell, 1965.

Robert B. Hallock, Distinguished Professor, B.S., Massachusetts, 1965; M.S., Stanford, 1967; Ph.D., 1969.

Stanley S. Hertzbach, Professor and Associate Dean of Arts and Sciences, B.S.E., Johns Hopkins, 1959; Ph.D., 1965.


David Kawall, Assistant Professor, B.S., Toronto, 1989; Ph.D., Stanford, 1996.

William J. Leonard, Research Associate Professor, B.S., Massachusetts at Amherst, 1982; Ph.D., 1988.

Jonathan L. Machta, Professor, B.S., Michigan, 1975; M.S., Illinois, 1976; Ph.D., Massachusetts Institute of Technology, 1980.

Narayanan Menon, Professor, M.Sc., Indian Institute of Technology, Kanpur, India, 1988; Ph.D., Chicago, 1995.

Rory A. Miskimen, Professor, B.A., California at Berkeley, 1978; Ph.D., Massachusetts Institute of Technology, 1983.

Andrea P. Pocar, Assistant Professor, B.S., Universita Statale di Milano, Italy, 1996; Ph.D., Princeton, 2003.

Nikolay Prokofiev, Professor, M.S., Moscow Engineering Physics Institute, 1982; Ph.D., Kurchatov Institute, Russia, 1987.


Jennifer L. Ross, Assistant Professor, B.A., Wellesley, 2000; Ph.D., California at Santa Barbara, 2004.

Christian Santangelo, Assistant Professor, B.A., Cornell, 1997; Ph.D., California at Santa Barbara, 2004.

Lorenzo Sorbo, Assistant Professor, B.S., Bologna, Italy, 1997; Ph.D., International School of Advanced Studies, Trieste, Italy, 2001.

Boris V. Svestunov, Professor, M.S., Moscow Engineering Physics Institute, 1983; Ph.D., Kurchatov Institute, Moscow, 1990.


Mark T. Tuominen, Professor, B.S., Minnesota, 1986; Ph.D., 1990.

Stephane Willocq, Associate Professor, B.S., Université Lebre de Bruxelles, 1985; Ph.D., Tüfis, 1992.

Adjunct Faculty

David Lawrence, Adjunct Assistant Professor.

Murugappan Muthukumar, Adjunct Professor.

General Degree Information

The Department of Physics offers graduate work leading to the degree of Doctor of Philosophy. Note: a Master of Science degree is offered only to current University of Massachusetts Amherst students.

Candidates planning to major in physics should have completed at least (preferably, more than) 15 semester credit hours in undergraduate physics beyond an introductory calculus-based sequence and also 6 credits of mathematics beyond college-level calculus.

All degree candidates are required to perform teaching in the department. A waiver of this requirement must be requested from the graduate studies committee.

Summary of Requirements for the Ph.D. Degree

The general requirements for the Ph.D. in Physics are those of the Graduate School. These are implemented along the following lines. During the first two years, a student typically carries a course load of nine or ten credits. The first year is taken up with core courses that cover basic physics at the advanced level: 601, 602, 605, 606, 614, and 615. In the second year the student selects research courses at the 700 and 800 level. Students are required to take at least three of these courses, one of which may be in the student’s area of research, a second may be in a related field, and the third must be in a totally distinct field. Students making normal progress are expected to pass the qualifying examination during the second year, and then devote their major efforts to research, taking the occasional course either of interest to them or of direct relevance to the research program. The department requires no foreign-language reading competency for the doctorate. A student must register for 18 credits in physics under 899 Doctoral Dissertation.

Summary of Requirements for the M.S. Degree

The requirements for the Master’s degree consist of 30 graduate credits, at least 15 of which shall be in the 600-900 courses, (3.000 average), and at least 21 of which shall be in physics. The 15 credits of 600-900 courses may include 6 credits of Master’s thesis, PHYSICS 699. The M.S. candidate must take at least one course in the Quantum Mechanics sequence which starts with
PHYSICS 564. At least five courses in physics must be passed with a grade of A or B, and a general examination must be passed or a Master’s thesis written and successfully defended before the degree is awarded.

All courses carry 3 credits unless otherwise specified.

530 Radiation Physics
For science majors specializing in nuclear medicine, radiology, environmental sciences, radiation protection, and applied areas using ionizing radiations. Principles of atoms and nuclei, radioactivity, interaction of radiation with matter, radiation detectors and methods, applications of radioactive and stable nuclei as tracers. Special topics. Consent of instructor required. Credit, 4.

531 Electronics for Scientists I
Operation and use of the basic elements of modern electronics, both analog and digital. Analog circuit analysis, filters, diodes, transistors, operational amplifiers, oscillators, power supplies, integrated circuits. Gate construction and families, flip-flops and flip-flop circuits, the 68000 microprocessor, machine language, and the building of a computer based on the 68000. A “hands-on” experience for those using electronic equipment in research, testing, and analysis. Prerequisites: a freshman course in electricity and magnetism; knowledge of basic dc and ac circuit concepts. Credit, 4.

553 Optics

556 Nuclei and Elementary Particles
Nuclear properties and models, nuclear decays and reactions. Interactions of hadrons and leptons, internal symmetries and quantum numbers, quarks, unified interactions and gauge symmetry. Prerequisite: PHYSICS 424.

558 Solid State Physics
Introduction to the properties of solids. Emphasis on the key role played by quantum mechanics in determining the electrical and thermal properties of metals, insulators, semiconductors, and magnets. For senior and graduate students in physics and astronomy, the physical sciences, and engineering. Prerequisites: PHYSICS 423 and 424.

562 Advanced Electricity and Magnetism
Description of electric and magnetic fields in a dynamical context-electromagnetic radiation theory, optics, plasma physics, relativistic electrodynamics, cavity resonators, waveguides. Prerequisite: PHYSICS 422.

564 Introductory Advanced Quantum Mechanics
Breakdown of classical physics, wave mechanics including the Schrödinger equation and its interpretation, one-dimensional problems, uncertainty principle, harmonic oscillator, hydrogen atom. Prerequisites: PHYSICS 422, 424.

568 Cosmology and General Relativity
Mathematical and conceptual aspects of the special and general theories of relativity. Lorentz transformations, covariant formulation of the laws of nature. The equivalence principle, curved spaces, solutions of the equations of relativity. Prerequisite: PHYSICS 422.

601 Classical Mechanics
Lagrange’s and Hamilton’s equations, central force problem, rigid bodies, small oscillations, continuum mechanics, fluid dynamics.

602 Statistical Physics
Survey of thermodynamics. Boltzmann distribution, statistical interpretation of thermodynamics, Gibbsian ensembles and the method of Darwin, Fowler; quantum distributions and their applications, transport phenomena. Prerequisites: PHYSICS 601, 606 (the latter may be taken concurrently).

605 Methods of Mathematical Physics
Selected topics with application to physics in linear algebra and Hilbert space theory, complex variables, Green’s functions, partial differential equations, integral transforms, integral equations. Credit, 4.

606 Classical Electrodynamics I
Electrostatic and magnetostatic fields in vacuum and material medium. Maxwell’s equations, radiation, and special relativity. Covariant formulation of the field equations. Fields of a moving charge, motion of particles, radiation reaction, applications to physical phenomena as time permits. Prerequisite: PHYSICS 601. Credit, 4.

614 Intermediate Quantum Mechanics I
Abstract quantum mechanics, Hilbert space, representation theory, three-dimensional problems, angular momentum, spin, vector coupling, bound state perturbation theory, variational method. Prerequisite: PHYSICS 605.

615 Intermediate Quantum Mechanics II
Angular momentum, time dependent and time independent perturbation theory, semi-classical and quantum treatment of radiation, scattering theory, Klein-Gordon equation, Dirac equation. Prerequisite: PHYSICS 614.

696 Independent Study
Special study in some branch of physics, either theoretical or experimental, under direction of a faculty member.

699 Master’s Thesis
Credit. 6.

714 Introductory High Energy Physics
Introduction to physics of elementary particles; treating the development of the field, the particle spectrum, symmetries, quarks, experimental methods, an introduction to theories of the strong, electromagnetic and weak interaction, and recent developments. Prerequisites: PHYSICS 614, 606.

715 Introductory Solid State Physics

716 Introduction to Superfluidity and Superconductivity
Description of fundamental experiments and properties of superfluid 4He, 3He and superconductors. The two fluid model, elementary excitations, fluid structure, vortices, superfluid films and macroscopic quantum effects in superfluidity. Type I and II superconductors, the mixed state, the Meisner effect, superconducting junctions and an introduction to devices. Prerequisite: PHYSICS 614.

719 Nuclear Physics
Basic concepts of nuclear physics, instruments and methods. Natural radioactivity, nuclear radiations—their properties and interaction with matter, nuclear-radiation detectors, electrostatic and magnetic analyzers, mass spectrometry, charged particle accelerators, elementary discussion of alpha and beta decay, nuclear isomerism, internal conversion, nuclear reactions, neutron physics, fissions, nuclear spin and magnetic moments, cosmic rays and elementary particles. Prerequisite: PHYSICS 614.
723 Topics in Mathematical Physics
Subjects vary depending on instructor. Most recently has included topics in nonlinear dynamics. Prerequisite: consent of instructor.

724 Group Theory in Quantum Mechanics
Finite dimensional groups and their representations; representations of the permutation group; representations of SU(n), tensor representations, decomposition of direct product representations; three-dimensional rotation group. Clebsch-Gordon and Racah co-efficients; the Lorentz group and its representations; applications to atomic, solid state, nuclear and high energy physics. Prerequisite: PHYSICS 615.

811 Field Theory
Klein-Gordon and Dirac equations, field quantization, interacting fields, S-matrix, perturbation theory and Feynman diagrams, renormalization, path integrals, and recent developments.

813 High Energy Physics
Advanced study of particle physics. Topics vary with instructor; may include the theory of the weak interactions, deep inelastic scattering, phenomenology of the strong and weak interactions, quantum chromodynamics, gauge theory, attempts at unification, and recent developments. Prerequisite: PHYSICS 714.

816 Solid State Physics
Transport phenomena in solids including semiconductors, optical properties of solids, superconductivity, superfluidity, magnetism. Topics vary with instructor. Prerequisite: PHYSICS 715.

817 Advanced Statistical Physics

821 General Relativity
Mathematical and conceptual aspects of the special and general theories of relativity. Lorentz transformations, covariant formulation of the laws of nature. The equivalence principle, curved spaces, solutions of the equations of relativity. Prerequisite: PHYSICS 606.

850 Advanced Topics in Physics
One or more subjects of special interest covered in lectures. Consent of instructor required.

851 Special Topics in Nuclear Physics
Advanced and current topics in nuclear physics.

852 Special Topics in High Energy Physics
Advanced and current topics in high energy physics. Prerequisite: PHYSICS 813.

853 Special Topics in Solid State Physics
Advanced and current topics in solid state physics. Prerequisite: PHYSICS 816.

860 Seminar on Research Topics
Instruction via reading assignments and seminars on research topics not currently covered in regular courses. Consent of instructor required. Credit, 1-3.

899 Doctoral Dissertation
Credit, 18.

Graduate Faculty
(See individual departments for degrees, institutions, and years.)

Elsbeth L. Walker, Associate Professor of Biology and Director, Plant Biology Program.

Lynn Adler, Assistant Professor of Plant, Soil, and Insect Sciences.

Peter Alpert, Associate Professor of Biology.

Tobias Baskin, Associate Professor of Biology.

Magdalena Bezanilla, Assistant Professor of Biology.

Ana Caicedo, Assistant Professor of Biology.

Maura C. Cannon, Research Associate Professor of Biochemistry and Molecular Biology.

Alice Cheung, Professor of Biochemistry and Molecular Biology.

Daniel R. Cooley, Associate Professor of Plant, Soil, and Insect Sciences.

Michelle DaCosta, Assistant Professor of Plant, Soil, and Insect Sciences.

Susan Han, Associate Professor of Plant, Soil, and Insect Sciences.

Samuel Hazen, Assistant Professor of Biology.

Geunhwa Jung, Assistant Professor of Plant, Soil, and Insect Sciences.

Francis X. Mangan, Associate Professor of Plant, Soil, and Insect Sciences.

William J. Manning, Professor of Plant, Soil, and Insect Sciences.

Jennifer Normanly, Associate Professor of Biochemistry and Molecular Biology.

Om Parkash, Assistant Professor of Plant, Soil, and Insect Sciences.

Susan C. Roberts, Associate Professor of Chemical Engineering.

Danny J. Schnell, Professor of Biochemistry and Molecular Biology.

Karen Searcy, Senior Lecturer in Biology and Curator of Herbarium.

Kalidas Shetty, Professor of Food Science.

Robert L. Wick, Professor of Plant, Soil, and Insect Sciences.
Adjunct Faculty

Aaron Ellison, Associate Professor of Biology, Harvard Forest, Harvard University.

Martha Hoopes, Clare Boothe Luce Assistant Professor of Biological Sciences, Mount Holyoke College.

Jill Miller, Assistant Professor of Biology, Amherst College.

Carolyn Wetzel, Assistant Professor of Biological Sciences, Smith College.

Lawrence J. Winship, Professor of Botany, Hampshire College.

The Program in Plant Biology trains master’s and doctoral students whose research interests are focused on the study of plants. Reflecting its interdisciplinary nature and the diverse interests and expertise of the faculty, the program offers areas of concentration in research in cell biology and physiology; biochemistry and metabolism; genetics and evolution; and environmental, ecological, and integrative biology. Within these topic areas the research goals can be either theoretically or practically oriented. Participating faculty are members of the departments of Biochemistry and Molecular Biology, Biology, Chemical Engineering, Food Science, and Plant, Soil, and Insect Sciences, as well as Smith, Mount Holyoke and Amherst colleges.

Prerequisites of the Program

Applicants should have a bachelor’s degree in botany, biology, biochemistry, or a related field, with an overall cumulative average of 3.0. Minimal undergraduate course requirements include the following: one year of general biology or plant science or biochemistry; one year of general chemistry with laboratory; one year of organic chemistry with laboratory; mathematics through calculus; and one semester of physics. Students lacking these introductory courses should include a statement with their admissions application explaining how they will obtain such knowledge before their preliminary examinations or M.S. defense. Finally, evidence of laboratory training and research experience is highly desirable.

Applicants must submit the standard University of Massachusetts application form for Graduate School admission. Official Graduate Record Examination scores, official transcripts, and letters of reference must be included. The subject test in biology, chemistry, or biochemistry is optional. For more information, prospective applicants should contact the Plant Biology office by email: pb@bio.umass.edu, or through its website: www.bio.umass.edu/plantbio.

General Requirements

The general requirements for the M.S. and Ph.D. degrees in Plant Biology follow those of the Graduate School. Plant Biology requires no foreign language competency. A detailed description of degree requirements may be obtained from the program office.

Ph.D. Degree Program

Ph.D. candidates are required to complete 15 credits in formal coursework, including the one-year Plant Biology core curriculum courses in their first year. A minimum of two elective courses are required, to be selected from the list of program-related offerings. Formal course requirements should be completed by the end of the fourth semester. However, for each semester throughout the entire training period, the student will be required to participate in a journal club.

Ph.D. students who have not been targeted by a faculty member prior to admission participate in one laboratory rotation during each of the first two semesters of study. Laboratory rotations, based on students’ research interests, permit them to become acquainted with members of specific laboratories, the subjects of study in those laboratories, and possible projects for doctoral research. At the conclusion of the second rotation, students select a laboratory in which to complete their dissertation research and obtain approval from the faculty member to work in their laboratory.

The Ph.D. comprehensive exam consists of two parts: 1) passing the first year Plant Biology core curriculum courses with a grade of B- or better and 2) defending an original research proposal relating to the student’s planned dissertation project. The proposal must be completed by the end of the fifth semester. There is also a final oral defense of the written dissertation. It is expected that students will complete the Ph.D. degree in four to five years. Funding, consisting of a teaching assistantship or a research assistantship, is guaranteed for up to five years, contingent upon satisfactory progress toward the Ph.D. degree.

M.S. Degree Program

The M.S. degree program in Plant Biology is designed to accommodate students of diverse academic backgrounds and with varied career plans. All students in the M.S. program are required to perform independent research and prepare a thesis. A minimum of 30 graduate credits are required of which nine must be in 600-level Plant Biology core courses, six to ten in M.S. thesis research, and four or more from journal clubs. The remaining graduate credits are elective. The candidate should select a faculty adviser by the end of the first semester, and thereafter prepare a thesis proposal. It is expected that the thesis will be of sufficient quality, originality, and substance as to warrant its publication in a peer-reviewed scientific journal. A final oral exam is based on the thesis research. It is expected that the student will finish the M.S. degree program in two years; funding is guaranteed for this period of time.

Fifth-Year Master’s Program

The Plant Biology Graduate Program offers the Fifth-Year Master’s Program exclusively for B.S. graduates of the university or any other of the Five Colleges. This accelerated program is open to students who have already begun undergraduate research in the lab of a Plant Biology Graduate Program faculty member before their senior year and intend to develop that project into a master’s degree. Both a thesis and non-thesis option are offered. Students who are interested in this program should meet with their academic and research advisers to discuss this option before the end of their junior year. Students are expected to complete the master’s degree approximately 15 months (including two summers and an academic year) after receipt of their bachelor’s degree.

Program-related Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>BIOCHEM 623</td>
<td>Advanced General Biochemistry</td>
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<tr>
<td>BIOLOGY 510</td>
<td>Plant Physiology</td>
</tr>
<tr>
<td>BIOLOGY 514</td>
<td>Population Genetics</td>
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<tr>
<td>BIOLOGY 559</td>
<td>Cellular and Molecular Biology II</td>
</tr>
<tr>
<td>BIOLOGY 574</td>
<td>Cell Motility and the Cytoskeleton</td>
</tr>
<tr>
<td>BIOLOGY 597</td>
<td>Plant Genomes and Genetic Systems</td>
</tr>
<tr>
<td>BIOLOGY 621</td>
<td>Topics in Plant Ecology</td>
</tr>
<tr>
<td>BIOLOGY 697C</td>
<td>Plant Cell Biology</td>
</tr>
<tr>
<td>ENTOMOL 572</td>
<td>Forest and Shade Tree Entomology</td>
</tr>
<tr>
<td>ENTOMOL 581</td>
<td>Integrated Pest Management</td>
</tr>
</tbody>
</table>
Plant and Soil Sciences

Graduate Faculty

Stephen Rich, Associate Professor and Head of the Department of Plant, Soil, and Insect Sciences, B.S., St. Lawrence, 1989; M.S., Vermont, 1993; Ph.D., California at Irvine, 1997.

Geunhwa Jung, Assistant Professor and Graduate Program Director, B.A., Chungnam National University, Korea, 1988; M.S., Nebraska, 1991; Ph.D., 1997.

Wesley R. Autoio, Professor, B.S., Virginia Polytechnic Institute, 1979; M.S., Massachusetts at Amherst, 1982; Ph.D., 1985.


Prasanta C. Bhowmik, Professor, B.S., Calcutta, 1964; M.S., Indian Agricultural Research Institute, 1966; M.S., Guelph, Canada, 1970; Ph.D., Wisconsin, 1981.

Daniel R. Cooley, Associate Professor, B.S., Harvard, 1974; M.S., Vermont, 1978; Ph.D., Massachusetts at Amherst, 1986.

Douglas A. Cox, Associate Professor, B.S., Massachusetts at Amherst, 1975; M.S., Cornell, 1979; Ph.D., 1981.

Lyle E. Craker, Professor, B.S., Wisconsin, 1963; Ph.D., Minnesota, 1967.

Michelle DaCosta, Assistant Professor, B.S., Rutgers, 2000; Ph.D., 2006.

Carolyne J. DeMoranville, Associate Professor, B.S., Massachusetts, 1976; M.S., Maryland, 1979; M.S., Yale, 1983; Ph.D., Massachusetts at Amherst, 1992.


Duane W. Greene, Professor, B.S., Colgate, 1964; M.S., Michigan State, 1966; Ph.D., 1969.

Susan S. Han, Associate Professor, B.S., National Taiwan University, 1980; M.S., Missouri, 1984; Ph.D., California at Davis, 1988.


Francis X. Mangan, Associate Professor, B.S., Massachusetts at Amherst, 1987; M.S., 1991; Ph.D., 1998.


Om Parkash, Assistant Professor, B.S., Maharishi Dayanand, India, 1985; M.S., Kurukshetra, India, 1987; M.Ph., 1988; Ph.D., Durham, England, 1998.

Deborah J. Picking, Lecturer, B.S., East Stroudsburg, 1985; M.S., 1993; Ph.D., Massachusetts at Amherst, 2002.


Patricia Vittum, Professor, B.A., College of Wooster, 1974; M.S., Cornell, 1979; Ph.D., 1980.


Baoshan Xing, Professor, B.S., Heilongjiang Agricultural Land Reclamation University, China, 1984; M.Sc., Alberta, 1990; Ph.D., 1994.

Adjunct/Associate Faculty

Abolhassan Masoud Hashemi, Adjunct Associate Professor.

Hilary A. Sander, Adjunct Assistant Professor.

The Plant and Soil Sciences Program of the Department of Plant, Soil, and Insect Sciences offers graduate work in plant, soil, and environmental science areas. Specialization and thesis problems related to the physiology, genetics, and pathology of horticultural and agronomic plants, to the fertility, chemistry, and physics of soils, and to environmental and ecological problems are available to both Master's and Doctor of Philosophy degree candidates.

The department has no foreign language requirements for the doctoral degree.

All courses carry 3 credits unless otherwise specified.

505 General Plant Pathology (1st sem)

Causes, nature, and control of plant diseases. Diagnosis of plant diseases. Mechanisms, biochemistry, and genetics of plant disease induction, development, and control. Prerequisite: a course in plant biology. Credit, 4. Mr. Wick
515 Microbiology of the Soil (2nd sem)  
Microbial processes in the soil and sediment environment; ecology of the various microbial communities; the decomposition of organic matter, carbon transformation, nitrogen, sulfur, phosphorus and other mineral transformations. Chemistry of these reactions and their biogeochemical implications. Biological equilibrium, the rhizosphere, and microbial associations. Prerequisites: basic biology and chemistry courses. Consent of instructor for other than junior and seniors. Also listed as ENVIRSCI 515. Mr. Simkins

530 Plant Nutrition (1st sem)  
With lab. The acquisition, transport, translocation, distribution, and function of the essential inorganic elements in plants. Genetic control of plant nutrition and ecological adaptation to nutritional variables. Diagnosis of nutritional disorders. Credit, 4. Mr. Barker

535 Diagnostic Plant Pathology (2nd sem, odd yrs)  
Methods of diagnosing plant diseases caused by fungi, bacteria, viruses, nematodes, and abiotic agents considered using specimens collected by students. Prerequisite: PLNTSOIL 505. Credit, 4. Mr. Wick

540 Plant Breeding (1st sem)  
An introduction to the principles of plant breeding. Topics cover basic breeding methods, genetic engineering, reproductive systems of crop plants, inbreeding depression and hybrid vigor, interspecific hybridization, use of genetic markers for crop improvement, breeding for disease resistance, conservation of germplasm and crop evolution. Students also gain hands-on experience in the greenhouse and lab. Prerequisite: BIOLOGY 283 or equivalent.

545 Postharvest Physiology (2nd sem, even yrs)  
The basic biochemical and physiological processes occurring in fruits, vegetables, and flowers after harvest; postharvest treatments to modify these processes. Prerequisite: CHEM 110 or 111; PLSOILIN 397P desirable. Credit, 4. Ms. Han

550 Plant Growth Regulators in Agriculture (2nd sem)  
The involvement of naturally occurring plant hormones and the influence that synthetic plant growth regulators have on the physiology and development of the plant. Also, the use and potential use of plant growth regulators in food, fiber and flowering plant production. Mr. Greene

555 Urban Environment and Plant Growth (1st sem)  
How environmental stress factors affect growth and success of ornamental plants, trees, shrubs, and turf in urban/suburban locations. Tolerance and avoidance mechanisms. Develops criteria to fit plants to various types of urban sites. Prerequisite: PLSOILIN 397P. Mr. Manning

560 Advanced Weed Science (2nd sem, odd yrs)  
Ecological concepts in weed management; historical and ecological perspectives. Weed-crop competition and allelopathy; reproductive strategy; seed dormancy, seed production, allocation of resources in perennial weeds. The physiology and biochemical processes of herbicides in plants and their relationships with the soil environment. Prerequisite: PLSOILIN 310 or consent of instructor. Mr. Bhowmik

565 Soil Formation, Classification and Land Use (2nd sem)  
With lab. Effect of environmental factors on soil formation and land use. Relationship between soil morphology, classification, and use interpretations. Application of soils information to on-site sewage disposal, wetland identification, and other environmentally significant problem areas. Prerequisite: introductory course in chemistry, geology, soil, or environmental science; or consent of instructor. Credit, 4. Mr. Veneman

575 Environmental Soil Chemistry (1st sem)  
With lab. Chemical reactions that occur in soils. Topics include the nature and properties of soil minerals, cations exchange, soil acidity, and chemical relations in soils of plant nutrients and soil amendments. Prerequisites: CHEM 110 or 111, PLSOILIN 105. Credit, 4. Mr. Xing

591A Plant Biotech Journal Club (both sem)  
Open to both graduate students and advanced undergraduate students who have an interest in reviewing the current scientific literature in the field of plant biotechnology. Credit, 1. Mr. Parkash

597A Phyto/bioremediation (1st sem, even yrs)  
The use of hyper-accumulator and transgenic plants, and their associated microbes with the purpose of environmental clean-up of contaminated soil, sediments, and water. Various strategies for a wide range of toxic pollutants, both organic and elemental, with emphasis on toxic metals. Prerequisite: BIOLOGY 100 or 103, or PLSOILIN 397P or equivalent course. Mr. Parkash

597C Special Topics in Plant Nutrition (1st sem)  
Instruction and discussions to enhance students' comprehension of lecture and laboratory topics in PLNTSOIL 530. Prerequisite or co-requisite: consent of instructor or concurrent registration in PLNTSOIL 530. Credit, 1. Mr. Baker

597D Wetland Plant Identification and Ecology (1st sem, even yrs)  
Introduction to the ecology and characteristics of wetland types found in the eastern United States. The ecology of each type, emphasizing their plant communities. Laboratory exercises largely devoted to visiting local wetlands for the purpose of identifying characteristic plants in the field. Prerequisite: course in basic biology or botany. Mr. Tiner

597F Intermediate Soil Science (1st sem, all yrs)  
A comprehensive survey of soil science topics including soil physical, chemical, biological, and morphological properties. Emphasis on soil properties as they relate to solving real-world environmental problems. Includes several field trips. Prerequisite: basic course in soil science, geology, environmental sciences, or related course. Note: This class available only through the university’s Division of Continuing & Professional Education and presented during alternate Saturdays at a central location in Massachusetts. Mr. Veneman

597L Wetland Delineation, Federal Procedure (1st sem, odd yrs)  
All aspects of the federal procedure for wetland identification and delineation. Includes wetland classification, wetland plant identification, hydric soils recognition and various delineation procedures. Classroom instruction, followed by field exercises; individual delineation project; literature studies required for final report. Mr. Veneman

597M Topics in Turf Pathology  
Review and discussion of concepts and issues related to turfgrass diseases. Weekly readings of scientific papers and trade journals required. Guest speakers from the turfgrass industry present many of the topics and lead subsequent class discussions. Prerequisite: PLNTSOIL 505. Credit, 2. Mr. Jung
597O Organic Contaminants in Soils, Waters, and Sediments
(1st sem, even yrs)
Transport and fate of manmade compounds in natural and managed environments: abiotic and biotic effects including partitioning, interfaces, concentration, biodegradation and biotransformation. Examination of specific examples of compounds and classes of contaminants in affected environments, such as haloorganics and petroleum products in soil and ground water. Prerequisite: CHEM 250 or 261. Mr. Simkins

597V Integrated Turf Management
(2nd sem)
Integrates material from several turf courses. Concepts of Integrated Pest Management, including stress management and pest management, emphasized. Each student develops an ITM plan for a turf setting. Prerequisites: PLSOILIN 107, 340 and 505 or equivalents. Ms. Vittum, Mr. Ebdon

597W Artificial Wetlands for Wastewater Treatment
(1st sem, even yrs)
Aquatic plant selection, sizing, and design techniques. Pollution parameters of primary concern include BOD, suspended solids, nutrients, heavy metals, pathogens, organics. Treatment applications include primary and secondary effluents and sludges; storm water and agricultural runoff; solid and hazardous waste leachates, liquid industrial wastes. Field trips, student projects. Prerequisites: college algebra, introductory chemistry, introductory physics, biology; or consent of instructor. Mr. Lavigne

602 Research Literature (both sem)
Critical review of the scientific literature in an area of specialization.

661 Intermediate Biometry (1st sem)
Supplies background necessary to design and analyze field and laboratory experiments. Focus on statistical analysis for agricultural scientists. Primary emphasis on analysis of variance, regression, and experimental design. Computer-assisted analysis presented. Prerequisites: a course in basic statistical analysis. Credit, 4. Mr. Autio

696 Independent Study (both sem)
Selected research problems not related to a candidate’s Master’s thesis. Credit, 1-6.

691A Research Proposal Presentation
(both sem)
Master’s and Ph.D. candidates attend and present their research proposals and prospecti in a regular seminar meeting open to all Plant and Soil Sciences graduate students. Credit, 1. Mr. Autio

697A Data Analysis and Interpretation
(both sem)
Informal discussion class, focusing on students’ problems, concerns, or enthusiasm with their own experimental designs, data analyses, or interpretations of results, including computer- (particularly SAS) generated output. New techniques presented by the instructor or guest instructors as requested by the class. Students gain practical experience with data analysis and a better understanding of the approaches necessary for their own thesis or dissertation work. Prerequisite: a course in intermediate statistical analysis. Credit, 1. Mr. Autio

699 Master’s Thesis
Maximum credit, 9.

791A Seminar Methods (2nd sem)
Training and experience in oral communication. Required once of all candidates for advanced degrees and should be taken in the first year of enrollment in the program. Mr. Herbert

792A Seminar (both sem)
Attendance at weekly departmental seminar. Expected of Master’s candidates. Credit, 1.

793A Seminar (both sem)
Presentation at departmental seminar. Master’s candidates present results of their thesis research to faculty and students at a seminar meeting open to the public. Credit, 1.

802 Research Literature (both sem)
Critical review of the scientific literature in an area of specialization.

830 Advanced Soil Chemistry
(2nd sem, even yrs)
Lecture and discussion of current theories of the chemistry of soils. Consent of instructor required. Mr. Xing

892A Seminar (both sem)
Same as PLNTSOIL 792A; available to doctoral candidates. Credit, 1.

893A Seminar (both sem)
Same as PLNTSOIL 793A; required of doctoral candidates. Credit, 1.

896 Independent Study (both sem)
Selected research problems not related to a candidate’s doctoral dissertation. Credit, 1-6.

899 Doctoral Dissertation
Maximum credit, 10.
Political Science

Graduate Faculty


Srirupa Roy, Associate Professor and Graduate Program Director, B.A., Dartmouth, 1992; Ph.D., Pennsylvania, 2000.


Ivan Ascher, Assistant Professor, A.B., Brown, 1993; M.A., California at Berkeley, 1997; Ph.D., 2007.

Maryann Barakso, Assistant Professor, B.A., Barnard, 1990; Ph.D., Massachusetts Institute of Technology, 2001.

Angélica Bernal, Assistant Professor, B.A., Wellesley, 1998; Ph.D., Yale, 2008.


Barbara R. Cruikshank, Associate Professor, B.A., California at Berkeley, 1984; Ph.D., Minnesota, 1993.


Peter M. Haas, Professor, B.A., Michigan, 1977; Ph.D., Massachusetts Institute of Technology, 1986.


Tatishe M. Nteta, Assistant Professor, B.A., Maryland, 1998; M.A., California at Berkeley, 2000; Ph.D., 2006.


Frederic Schaffer, Assistant Professor, B.A., Bucknell, 1984; Ph.D., California at Berkeley, 1994.

Brian Schaffner, Assistant Professor, B.A., Georgia, 1997; Ph.D., Indiana, 2002.


Stuart Shulman, Assistant Professor, B.A., Boston University, 1989; Ph.D., Oregon, 1999.


The Department of Political Science offers graduate work leading to the Master of Arts and Doctor of Philosophy degrees. Detailed information on requirements for degrees may be obtained from the Department of Political Science.

The M.A. and Ph.D. programs are intended to prepare students for careers in research, in college or university teaching, or in public service. The department’s view of the discipline of political science is eclectic, based on the assumption that the study of politics is not reducible to any single set of methodological premises through which certainty and comprehensiveness of knowledge can be established. Instead, the department attempts to maintain a broadly based overview of political science, using whatever theories and methods seem likely to provide appropriate responses to the central questions of politics.

M.A. and Ph.D. students are required to do course work in each of three major subdivisions of political science: political theory, American government and politics, and international relations and comparative government. A thesis or analogous evidence of research capacity is required of all M.A. candidates. Ph.D. candidates will be required to complete comprehensive examinations in two fields of concentration prior to undertaking the Ph.D. dissertation. Competency in foreign languages and or quantitative techniques must be demonstrated by all M.A. and Ph.D. candidates.

Committed to cross-field fertilization within the discipline of political science, the Department of Political Science has introduced three research and curricular initiatives in the areas of Global Forces, Governance and Institutions, and Democracy, Participation, and Citizenship. The department believes that often the most interesting and important political questions transcend disciplinary fields and encourages faculty and students to work at these intersections.

The cross-field commitments of the department are reflected in the graduate curriculum. The department is committed to maintaining graduate program excellence in the traditional fields of political science—American national politics, comparative politics, international relations, political theory, public law, and public policy and administration. In addition, the department offers coursework and encourages doctoral students to pursue research questions that cross the domains of two or more fields. Course offerings include broad survey courses of the fields as well as the following cross-field seminars: Comparative Democratization; Collective Action and Political Change; Political Participation; Foundings; Violence and the State; Nationalism; Political Dissent; Language and Politics; Feminist Theory and Politics; Technology, Power, and Governance; International Environmental Politics; Civic Political Engagement; and Democracy and the Public Sphere. In addition, the department has launched cross-field workshops engaging faculty and graduate students in presentations of work in progress in each of the three Initiative areas.

A degree of Master of Public Policy and Administration is offered through the Public Policy and Administration program, described in its own section in this Bulletin.

All courses carry 3 credits unless otherwise specified.

Thesis and Dissertation

699 Master’s Thesis
Credit, 6.

899 Doctoral Dissertation
Credit, 10.
**American National Government and Politics**

701 Directed Studies in American Government and Politics

702 The American Presidency
Constitutional framework and politics of the modern institutional presidency. Problems of presidential leadership and decision making in selected areas of domestic and foreign policy. Analysis of presidential power and responsibility.

703 The Legislative Process
Analysis of the structures, procedures, and norms of the U.S. Congress. Emphasis on congressional elections, representation, committees, legislative parties, roll call votes, and congressional interaction with interest groups and the executive branch.

704 American Federalism
American system of federalism as it has developed and expanded from the early years of the Republic to the present time. Emphasis on changing nature of intergovernmental relations in both legal and programmatic terms.

705 The American Founding
Survey of American political thought from the Puritans through the Civil War. Emphasis on the framing of the Constitution and its interpretation. Focus on the development of republican institutions and the nature of the federal union.

707 The American Voter

708 American Political Party Systems
Structure and activities of American national and state parties. Origin and dynamics of the party system. Impact on individual and group political behavior and on government and public policy.

**Public Administration**

524 Administrative Law
The law governing public administration. Attention to legal reasoning, liability, due process, informality, and public access. The apparatus of administration.

620 Public Administration
Organization of bureaucracy, bureaucratic life, constitutional position and political role of governmental bureaucracy. Not open to candidates for graduate degrees in Political Science.

730 Proseminar in Public Administration

731 Tutorial in Public Administration

732 Problems in Public Administration
Special seminars on issues and controversies in the study and practice of public administration and management.

733 Public Management
Public administration as activity, profession, and discipline; attention to the contributions and limitations of organization theory and political science.

734 Public Administration: Responsibility
Ethical obligations of the public administrator. Whether membership in a large governmental bureaucracy vitiates individual moral responsibility. To whom or what the public administrator has moral obligations: elected officials, the law, hierarchical superiors, professional standards, agency ethos, regime values, universal moral standards.

735 Public Personnel Administration
Comprehensive examination of employee relations in government, covering issues such as hiring and firing, political executives and the career service, work organizations and institutional authority, employee rights and collective action.

736 Public Budgeting
Theory and techniques of budgeting in governmental fiscal relations and the political processes that relate to decision making within the governmental organization.

737 Public Sector Labor Relations
Nature of labor relations processes and practices at all levels of American government. Attention to the political variables that distinguish public sector from private sector labor relations.

**Comparative Politics and Area Studies**

631 Political Development and Modernization
Issues of generating and managing political change in the third world; formal and informal roles of institutions such as parties, legislatures, bureaucracy, and the military; analysis of institutional underdevelopment; stabilizing and preserving the state; leadership; theories of political development.

632 Government and Politics of Scandinavia
The rise of the Scandinavian states—Denmark, Finland, Norway, and Sweden; emphasis on the interplay of political, social, and economic factors in shaping democracy. The Scandinavian welfare state model and its domestic and international dimensions.

636 Government and Politics of Russia
Historical and ideological influences on politics; the interconnection of social and political institutions and processes; membership, organization, and operation of political parties; the constitution and the governmental structure and their operation; the politics of change, resistance, and ethnicity; and prospects for the future.

640 Government and Politics of South America
Comparative analysis of interest groups, political parties, and government institutions of the South American countries. Emphasis on background and political culture in which Latin American politics and government take place. Alternative models of social and political modernization.

641 Government and Politics of Central America and the Caribbean
Comparative analysis of the interest groups, political parties, and government institutions of the Central American and Caribbean countries. Emphasis on revolution and the role of the U.S. Globalization, democratization, and development.

643 Government and Politics of East Africa

645 Government and Politics of the Caribbean
Comparative political analyses of four English-speaking Caribbean nations: Jamaica, Trinidad and Tobago, Guyana, and Grenada. Course examines the political institutions, processes and movements which give expression to the forces at work in these societies, especially those of race, class, ethnicity, relations of production, and global capitalism.

685 Comparative Public Policy
Political aspects of economic and social policy in advanced industrial states. Focus
on political economy and policy innovations in several Western industrial states. Areas compared: economic management, including taxation, stabilization, and distribution, labor relations, health, and education.

710 Proseminar in Comparative Politics
New methodologies and theories that focus on institutions, ideologies, and systems. Also, interdisciplinary theoretical approaches to the study of culture and history. Guest speakers with expertise in area studies.

711 Tutorial in Comparative Politics

712 Directed Studies in Comparative Politics

771 Tutorial in Area Studies

772 Directed Studies in Area Studies

777 Latin American Politics
Comparative study of Latin American politics and government.

778 European Politics
A comparative study of major contemporary themes and issues in western European democratic politics including historical and institutional development, parties, interest groups and elections, public policy, and issues of integration and globalization. Analysis includes the nation-state, and subnational and supranational entities, and combines theoretical and empirical approaches.

793A Nationalism, Ethnicity and Identity
The diverse methodological and epistemological approaches to the study of nationalism; the relationship between nationalism and other axes of social, cultural, and political identity, such as those forged around gender, race, ethnicity, and class; the various manifestations of nationalist ideology and practice in different spatial and temporal contexts. Topics include nationalism and state-formation, modernity and nationalism, colonialism and nationalism, nationalism and ethnic conflict, and globalization and nationalism.

International Relations

650 Russian, Soviet, and Post-Soviet Foreign Policy
Major aspects of Soviet foreign policy from 1917 to 1991 and of the current transitions. Soviet and post-Soviet goals, motivations, and capability; the relation between domestic and foreign policy; continuity and change among the Imperial, Soviet and post-Soviet eras; changes in the foreign policy decision-making process; relations with the U.S. and policy towards other regions.

654 International Relations
The nation-state and conceptions of national interest in modern world politics. Emphasis on forms and distribution of power, making of foreign policy, and issues of war and peace.

656 International Law
Examination of the basic legal rules regulating relations among states and between states and other entities. Analysis of theories of international law and of how and to what extent legal rules and legal reasoning affect the policies of governments.

658 International Relations: Asia
Introduction to general problems in Asia, focusing primarily on the period since 1859. Emphasis on China, Japan, and other states of East and Southeast Asia in their regional and global relations.

720 Proseminar on International Relations
Survey of theory, research, and methodology in the field of international relations; its interdisciplinary dimensions.

721 Tutorial in International Relations
Guided reading and discussion of specific topics as agreed with a faculty member.

722 Directed Studies in International Relations
Research on an international relations topic of the student’s choosing under guidance of a faculty member.

723 Problems of International Relations
Analysis of selected contemporary problems in international relations. A recent offering examined contemporary world order projects.

724 International Institutions
Research seminar combining discussion of selected aspects of international institutions, broadly defined, with student preparation and presentation of research papers.

725 Theory and International Politics
Conceptualization and analysis of the forces and drives that shape world politics.

Public Law and the Judicial Process

660 Constitutional Law
Development of American constitutional law and a study of the Supreme Court as a policy-making institution. Emphasis on landmark cases and the substantive impact of the Supreme Court in the American political system during different political eras.

661 Civil Liberties
Developments in American constitutional law with regard to the concept of civil liberty, including the fields of free speech and religion, fair trial, and race discrimination. The function of courts in determining the scope of these liberties.

662 Politics, Law and Judicial Behavior
American court systems, including examination of the processing of cases, judicial backgrounds and selection, judicial decisional behavior, some major court policies and the responses to them from groups and institutions within the larger political system.

740 Constitutional Interpretation

741 Tutorial in Public Law

742 Directed Studies in Public Law

743 Law and the Political Process
Interrelationships between law and politics, and the functions of law in organized societies.

744 Jurisprudence
Theories of law, jurisprudence, and judicial behavior.

Political Theory

670 Ancient and Medieval Political Thought
Examination of Western political thought from Classical Greek philosophy to its confrontation with the Judeo-Christian tradition. Focus on the relationship of political theory to history, drama, and theology, and consideration of particular issues of special interest to individual instructors such as the problem of slavery, the function of prophecy, and the role of women and the family in the tradition.

671 Modern Political Thought
Development of political thought and its relation to culture and institutions from the rise of the modern state to the present.

674 Issues in Contemporary Political Theory
Some basic problems of political science, political ethics, and political philosophy through study of selected classical and modern political thinkers.

675 Feminist Theory and Politics
Examination of the foundation of different forms of feminism in relation to classical
and contemporary political theory. The distinction between public and private, production and reproduction, and “difference” as an issue of race, class, sexual preference, and religious and ethnic identity.

761 Tutorial in Political Theory
Seminars involving various problems and themes of mutual interest among faculty and graduate students. Recent topics have included studies of Christianity, Greek tragedy, theories of interpretation, theories of conspicuous consumption.

762 Directed Studies in Political Theory
Consideration of themes and problems from contemporary political, social, and cultural theories.

Public Policy

685 Comparative Public Policy
Comparative analysis of policy formation; process of social and economic policy decision making in selected industrial societies; interaction of institutions, ideas, and power in decisions concerning social welfare, economic policies, and related policy areas.

687 American Public Policy
In-depth study of selected areas of American policy. May include theory of, and approaches to, the study of public policy.

780 Policy Studies
Theories and techniques of decision making and implementation, logical and ethical aspects of social choice, with illustrative case studies from different substantive policy fields.

782 The Political Economy of Public Policy
Nature and functions of public policy and problems of choice within the constraints of law, politics, and resource scarcity. Concepts of public interest and public goods; problems related to revenue and taxation. Basic economic and mathematical tools as appropriate.

783 Public Welfare Policy
Critical examination of American welfare state development. Analysis of the nature of social policy and of the social, political, economic, and cultural conditions that contribute to the adoption and implementation of particular policies at particular times.

784 Environmental Policy
The capacity of the American political system and the American political economy to cope with the challenge of ecological scarcity and environmental degradation. The policy-making process and the politics of implementation of selected environmental programs.

785 Criminal Justice Policy
Theories of criminal motivation and the philosophies of punishment related to them. The criteria by which one selects the most appropriate conceptual paradigm for the analysis of crime in a liberal society. Comparison of sociological, economic, and political perspectives on crime and deviant behavior.

786 Policy Evaluation
Information sources on state and federal governments, methods of legal research and census analysis, field research study design, data collection, tabular presentations, and report writing.

787 Policy Analysis and Choice
Survey of techniques for systematic analysis and evaluation of policy questions and programs, formulation of policy alternatives, cost-benefit analysis, and application of statistical computer models.

Research Methods

750 Research Design
Introduction to the principles of research design, with particular emphasis on qualitative methods. Topics include philosophy of science, concept formation, case studies, causal inference, fieldwork, and content analysis. Practical aspects of research also covered, such as finding grant opportunities, preparing proposals, and completing a dissertation prospectus.

Polymer Science and Engineering
Website: www.pse.umass.edu

Graduate Faculty

Shaw L. Hsu, Professor and Head of the Department of Polymer Science and Engineering, B.A., Rutgers, 1970; Ph.D., Michigan, 1975.

Todd Emrick, Associate Professor and Graduate Program Director, B.S., Juniata College, 1992; Ph.D., Chicago, 1997.

Harry Bermudez, Assistant Professor, B.S., Massachusetts at Amherst, 1998; Ph.D., Pennsylvania, 2003.

Alejandro L. Briseno, Assistant Professor, B.S., California at Los Angeles, 2002; M.S., 2004; Ph.D., Washington, 2008.

James Capistran, Senior Lecturer, B.S., Massachusetts at Amherst, 1981; M.S., 1984.


E. Bryan Coughlin, Associate Professor, B.A., Grinnell College, 1988; Ph.D., California Institute of Technology, 1993.

Alfred J. Crosby, Associate Professor, B.S., Virginia, 1996; Ph.D., Northwestern, 2000.


Samuel P. Gido, Associate Professor, B.S.E., Princeton, 1988; Ph.D., Massachusetts Institute of Technology, 1993.

Gregory Grason, Assistant Professor, B.A., Pennsylvania, 2000; Ph.D., 2005.

Ryan Hayward, Assistant Professor, B.S.E., Princeton, 1999; Ph.D., California at Santa Barbara, 2004.


Weiguo Hu, Lecturer, B.S., Tsinghua, China, 1992; M.S., 1995; Ph.D., Massachusetts at Amherst, 1999.

Alan J. Lesser, Professor, B.S., Colorado, 1982; M.S., Case Western Reserve, 1987; Ph.D., 1989.
Thomas J. McCarthy, Professor, B.S., Massachusetts, 1978; Ph.D., Massachusetts Institute of Technology, 1982.

Murugappan Muthukumar, Wilmer D. Barrett Distinguished Professor, M.S., Madras, India, 1972; Ph.D., Chicago, 1978.

Thomas P. Russell, Silvio O. Conte Distinguished Professor, B.S., Boston State, 1974; M.S., Massachusetts, 1976; Ph.D., 1979.


James Watkins, Professor, B.S., Johns Hopkins, 1987; M.S., 1988; Ph.D., Massachusetts at Amherst, 1997.

Doctor of Philosophy Degree Program

Admission Requirements
1. A B.S. or B.A. in chemistry, physics, engineering, materials science, chemical engineering, biomedical engineering or related field.
2. Undergraduate coursework in the following: organic chemistry, physical chemistry, physics, mathematics (preferably through ordinary differential equations). Laboratory experience in chemistry. Courses in at least three of the following: solid state or condensed matter physics, mechanics of materials, materials science and engineering, statistical thermodynamics, analytical chemistry, polymer science and engineering.

General Information
The Ph.D. program in Polymer Science and Engineering is highly interdisciplinary, providing a broad-based and fundamental introduction to all the major polymer subfields. Although many students enter the program with previous polymer experience, either academic or industrial, a polymer background is not required. Flexibility in the curriculum, particularly in the second and later semesters, allows students to undertake basic coursework in related disciplines (chemistry, biochemistry, physics, or engineering) and/or more specialized coursework in polymers. The core courses, normally taken in the first two semesters, are designed to provide students with sufficient fundamental knowledge to competently conduct their thesis research and then to accept either an academic or industrial position in the polymer field; these courses also cover many of the topics tested on the comprehensive examinations.

Suggested Program
Undergraduate courses under 2, above. Core courses as follows (3 credits each): 602 Polymer Characterization Laboratory; 603 Polymer Synthesis Laboratory; 604 Introduction to Polymer Engineering; 607 Introduction to Synthetic Polymer Chemistry; 608 Physical Chemistry of Polymers I; 720 Polymer Morphology; 760 Organic Polymerization Reactions; 789 Physical Chemistry of Polymers II; 797X Advanced Polymer Engineering, Polymer Science and Engineering and outside electives (1-5 credits each, to total 10-20 credits); 891 Polymer Science and Engineering Seminar (1 credit each semester); 786 Research Proposal (1 credit); comprehensive examinations as approved by the department and required by the Graduate School; 899 Dissertation (18 credits).

Master of Science Degree Program

Admission Requirements
The Polymer Science and Engineering Department is primarily a Ph.D.-granting program, and terminal M.S. candidates are rarely admitted. When they are, admission requirements are the same as those for the Ph.D. program.

All courses carry 3 credits unless otherwise specified.

501 Introduction to Polymer Science and Engineering
Physical and organic chemistry of polymers for persons with a basic training in chemistry, physics, or engineering. A survey of preparative methods of polymers; physical chemistry of polymer molecules in solution, liquid, and solid phases; thermodynamics and statistics of polymers; methods of characterization; mechanical properties, fabrication techniques. Prerequisites: one semester of physical chemistry and one semester of organic chemistry. For non-P&S&E students. Coughlin, Santore

602 Polymer Characterization Laboratory
Characterization of polymers by up to fifteen methods, including spectroscopic (nuclear magnetic resonance, Raman, infrared), mechanical (tensile, dynamic mechanical, rheological), microscopic (electron microscopy), physicochemical (intrinsic viscosity, differential scanning, calorimetry, gel permeation chromatography) and scattering (light, x-rays). Molecular simulation techniques introduced. Lectures provide state-of-the-art description of these and additional polymer characterization methods. Hayward, Watkins

603 Polymer Synthesis Laboratory
Preparation and characterization of the most important types of polymer types. Radical, cationic, anionic polymerization, copolymerization, Ziegler-Natta polymerization, step-growth polymerization; suspension and emulsion polymerization; group transfer polymerization; metathesis polymerization. Tew, McCarthy

604 Introduction to Polymer Engineering
Physical and mathematical principles required to understand and solve engineering problems encountered with polymeric materials. Vectors and tensor operations, stress-strain analysis in solids, fluid mechanics, transport equations for mass and energy, nonlinear physical properties, overview of polymer processing. Crosby, Bermudez

607 Introduction to Synthetic Polymer Chemistry

608 Physical Chemistry of Polymers I
Review of classical and statistical thermodynamics, configuration and conformation of isolated polymer chains, the rotational isomeric state model, thermodynamics and statistical mechanics of polymer solutions, scaling theory, single chain dynamics, scattering (light, x-ray, neutron). Muthukumar, Gido, Grason

696 Introduction to Research
Independent student research on a specific project in polymer science or engineering, selected to teach research methods and techniques and to acquire new knowledge. Credit, 1-3. Hsu

699 Master’s Thesis
Credit, 6-10.

720 Viscoelasticity
Molecular foundations of polymer viscoelasticity, Rouse-Bueche theory, Boltzmann superposition principle, mechanical models, distribution of relaxation and retardation times, interrelationships between mechanical spectra, the glass transition, secondary relaxations, dielectric relaxation. Hoagland

721 Polymer Morphology
Methods of structural characterization for important morphological classes of
polymers. Overview of scattering physics leading to a discussion of specific techniques such as small and wide angle x-ray and transmission electron microscopy. Polymeric materials surveyed include mesophases, liquid crystalline polymers, polymer blends, block copolymers, crystalline polymers forming lamellae or spherulites. Gido

731 Polymer Properties

Techniques for predicting the engineering and physical properties of polymers from their molecular structures. Empirical, semi-empirical, and theoretical methods, with emphasis on the group additivity approach. Properties discussed include refractive index, density, glass transition temperature, modulus, and compatibility. Lesser, Hsu

733 Micromechanics

Effects of microstructure on the mechanics of polymeric media: deformation modes, yield, rubber toughening, alloys and blends, fatigue and fracture of highly filled systems. Lesser

735 Interaction of Radiation with Matter

Maxwell’s equations, wave propagation and dispersion, index of refraction and polarizability, absorption and the “Golden Rule,” introduction to nonlinear optics, scattering. Russell

736 Polymer Surfaces and Adsorption

Discussion of theoretical and experimental methods providing insight into polymer interfacial phenomena. Theoretical: surface dynamics, Gibbs isotherm, gradient-square theory of interfaces, wetting. Experimental: IR, optical, neutron, and x-ray reflectivity, contact angle, surface tensiometry, scanning probe microscopy (atomic force, scanning tunnel), electron probes (ESCA, EELS). McCarthy

737 Polymer Reaction Engineering

Engineering principles applied to the analysis and design of polymerization processes. Mathematical modeling of polymerization kinetics, ideal polymerization reactors, heat and mass transfer, reactor dynamics and optimization, mixing effects. Case studies of important industrial processes. Coughlin

740 Vibrational Spectroscopy of Macromolecules

Infrared and Raman spectroscopy. Concepts and algorithms of normal mode analysis, symmetry analysis, Fermi resonance interactions, defect-induced vibrational transitions, polarization phenomena, surface characterization. Hsu

742 Biopolymers

Structure, function, and physical properties of naturally occurring polymers, including proteins, polysaccharides, polyesters, and DNA. Methods of characterization (nuclear magnetic resonance, electron spin resonance, circular dichroism, centrifugation, electrophoresis, chemical modification), polymer chemistry of biological processes (visual transduction, synaptic transmission, ion transport, chemical recognition). Bermudez

745 Colloidal Phenomena

Classical and modern developments in colloid science. Colloid preparation, Brownian motion, surface forces, particle-particle interactions (floculation and stabilization), thermodynamics, electrokinetic effects, mechanical properties. Prerequisite: one semester of physical chemistry. Hoagland, Santore, Muthukumar

757 Polymer Rheology

Definition and measurement of the material functions of complex fluids, continuum mechanics of stress and deformation, constitutive equations derived from both continuum and molecular theories, interrelation of material functions for both shear and elongational flows, linear and nonlinear elasticity and viscoelasticity, material functions of important classes of polymeric fluids, the role of rheological properties in material characterization and polymer processing. Prerequisite: POLYMER 604 or an equivalent background in fluid mechanics. Hoagland, Crosby

758 Polymer Processing

Application of engineering principles to the analysis of polymer processes such as extrusion, roll coating, mixing, etc. Applied fluid dynamics with attention to heat and mass transfer. Prerequisite: POLYMER 604 and 757. Watkins

760 Organic Polymerization Reactions

Mechanisms, kinetics, and thermodynamics of the principal polymerization reactions. Recent special topics included liquid crystalline polymers, piezoelectric polymers, biopolymers, olefin metathesis polymerization. Prerequisite: POLYMER 607. Carter, Emrick, McCarthy, Tew

786 Research Proposal

Students write and defend a proposal for experimental investigation of a research problem not directly related to their thesis topic. Project selected requires approval of thesis committee, and involves primarily library research. Credit, 1. Hsu

789 Physical Chemistry of Polymers II

Rubber elasticity, glass transition phenomena, phase separation kinetics, crystallization thermodynamics and kinetics, physics of polymer crystals, description and determination of crystalline and amorphous orientation. Grason, Hayward, Muthukumar

797E Sptp-Polymer Solutions

Hoagland

797N Advanced NMR Spectroscopy

Modern pulsed FT NMR spectroscopy, including two-dimensional methods and CP-MAS spectroscopy. Hands-on operation of instruments. Hu

797NN Introduction to Scientific Teaching

For graduate students in all science and engineering disciplines interested in academic careers that involve undergraduate education. Concepts discussed also relevant for education at other levels, including in industrial settings. In-class discussions and activities designed to highlight current research on effective pedagogical strategies for teaching science. Students design and present short teaching modules, and begin to assemble a teaching portfolio targeted towards college and university job applications. Prior teaching experience not required. Credit, 1. Hayward

797PP Theory of Soft Molecular Assembly

An introduction to theoretical models of soft molecular assembly; thermodynamics and kinetics of aggregation, mean-field models of copolymer assembly, molecular models of liquid-crystals and surfactants, a phenomenological approach to liquid-crystalline phases and the effect of thermal fluctuations in soft assemblies. Grason

797PT Polymer Theory

Random walks, fractals, scaling, perturbation and renormalization group theories, phase diagrams, spinodal decomposition, liquid crystallinity, gelation, and percolation. Tew

797Q 1D and 2D NMR of Polymers and Biomolecules

An in-depth introduction to modern nuclear magnetic resonance of polymers and biomolecules, both in solid state and in solution. Understanding of NMR pulse sequences developed, starting at quantum-mechanical foundations. Development progresses to two-dimensional NMR spectroscopy, for elucidating molecular and supramolecular structure, for studying molecular dynamics, and for characterizing orientational order. Hu
797R Advanced Polymer Technologies
Lecture series by visiting industrial scientists focused on the important materials and technologies of the polymer industry. Recent topics have included water-soluble polymers, polymers for nonlinear optics, polymers in photoimaging, engineering plastics, polymer composites, intellectual property rights, and fibers. Capistran

797X Advanced Polymer Engineering
An overview of advanced polymer engineering concepts including yield and fracture, viscoelasticity and rubber elasticity, and polymer rheology/fluids. Continuation of material in POLYMER 604. Crosby, Hoagland, Bermundez

891 Seminar
Invited lectures by visiting academic and industrial scientists. Held regularly on Friday afternoons throughout the academic year. PS&E students required to register and attend. Credit, 1. Bermundez

899 Doctoral Dissertation
Credit, 18.

Graduate Faculty

Marvin Daehler, Professor and Associate Chair of the Department of Psychology, B.A., Illinois, 1964; M.A., Minnesota, 1966; Ph.D., 1968.

Neil E. Berthier, Professor and Graduate Program Director, B.S., Virginia Polytechnic Institute and State University, 1975; M.S., Massachusetts at Amherst, 1978; Ph.D., 1981.


David Arnold, Professor, B.A., Dartmouth, 1987; Ph.D., New York at Stony Brook, 1993.


Craig Blatz, Assistant Professor, B.A., Alberta, Canada, 2003; Ph.D., Waterloo, Canada, 2008.

Jeffrey D. Blaustein, Professor, B.S., Massachusetts, 1973; M.S., 1975; Ph.D., 1977.

Richard S. Bogartz, Professor, B.A., California at Los Angeles, 1957; Ph.D., 1961.


Kyle Cave, Professor, B.A., Harvard, 1983; Ph.D., Massachusetts Institute of Technology, 1989.

Eric Cheries, Assistant Professor, B.A., Massachusetts at Amherst, 1998; M.Phil., Yale, 2004; M.S., 2005; Ph.D., 2007.

Andrew L. Cohen, Assistant Professor, B.A., Stanford, 1993; M.Sc., Texas A&M, 1996; Ph.D., Indiana, 2002.


Nilanjana Dasgupta, Associate Professor, A.B., Smith, 1992; M.S., Yale, 1994; M.Phil., 1996; Ph.D., 1998.

Matthew C. Davidson, Assistant Professor, B.S., Lethbridge, 1991; M.S., Oregon, 1993; Ph.D., 1997.

Geert De Vries, Professor, Kandidaats, Free University, Amsterdam, 1976; Doktoraal, 1980; Ph.D., 1985.


Harold D. Grotevant, Professor, B.A., Texas at Austin, 1970; Ph.D., Minnesota, 1977.


Elizabeth Harvey, Associate Professor, B.A., Dartmouth, 1990; M.A., New York at Stonybrook; Ph.D., 1995.

UnJa L. Hayes, Assistant Professor, B.A., Dartmouth, 1996; Ph.D., Southern California, 2002.

Linda Isbell, Associate Professor, B.A., New York at Stony Brook, 1983, Ph.D., Illinois at Urbana-Champaign, 1999.

Elizabeth Jakob, Professor, B.S., Cornell, 1983; Ph.D., California at Davis, 1989.


Elizabeth Kohler, Lecturer, B.S., Virginia Polytechnic Institute and State University, 1974; M.S., Massachusetts at Amherst, 1976; Ph.D., 1979.

Agnès Lacreuse, Assistant Professor, DEUG I, Université François Rabelais, 1987; DEUG II, 1988; License, Université Paul Sabatier, 1989; Matrise, 1990; M.S., 1991; Ph.D., 1994.

Brian Lickel, Associate Professor, B.A., Bois, 1990; Ph.D., California at Santa Barbara, 2000.


Christopher E. Overtree, Lecturer, A.B., Princeton, 1996; Ph.D., Massachusetts at Amherst, 2003.

Paula Pietromonaco, Associate Professor, B.A., California at Los Angeles, 1975; Ph.D., Michigan, 1983.


Rebecca E. Ready, Assistant Professor, B.A., Northwestern, 1995; Ph.D., Iowa, 2001.

Caren Rotello, Professor, B.S., Michigan, 1989; Ph.D., Stanford, 1993.

Lisa D. Sanders, Assistant Professor, B.A., Rice, 1995; M.S., Oregon, 1997; Ph.D., 2001.


Lisa S. Scott, Assistant Professor, B.S., Minnesota, 1999; Ph.D., 2004.

Rebecca M. C. Spencer, Assistant Professor, B.A., Hope, 1997; Ph.D., Purdue, 2002.


Adjunct/Associate Faculty

Peter DeVilliers, Professor of Psychology, Smith College, Northampton, Mass.

Lyn Frazier, Professor of Linguistics.

Ronald K. Hambleton, Professor of Education.

Clifford Konold, Adjunct Lecturer, Senior Research Associate, Scientific Reasoning Research Institute.

Neil MacMillian, Professor, Brooklyn College.

Charles Powers, Adjunct Lecturer, Forensic Mental Health Services, Hampden County Juvenile Court Clinic, Springfield, Mass.

Arnold Trehub, Adjunct Professor of Psychology.

The department is organized into four divisions, each representing one or more areas of specialization. In Division I, biopsychological perspectives are emphasized, and graduate work may lead to a doctorate in either Psychology or Neuroscience and Behavior, an interdepartmental program with somewhat different requirements. Division II contains two specialty areas: cognitive and developmental. Division III provides training in personality and social psychology, and Division IV in clinical psychology.

The Neuroscience and Behavior Program also offers a five-year B.S./M.S. degree track that is designed specifically for University of Massachusetts students who are enrolled in either the Biology/Neurobiology or Psychology/Neuroscience concentration. For more information on this program, see the description of programs in the Neuroscience and Behavior section of this Bulletin.

Designed to train scientists and teachers who will pursue careers in one of the emphasized areas, the aim of the graduate program is achieved by a variety of course offerings as well as by experience in research and teaching. All students are required to take, directly or by examination, three courses outside their primary area of study in order to gain breadth of knowledge in psychology. Requirements also include two statistics courses. These “core” courses are complemented by specialized offerings, including field experience where applicable. A strong emphasis is placed on research, first with faculty, and then on individual student research which culminates in the doctoral dissertation. In addition, because a large percentage of our Ph.D.s pursue their careers in an academic setting, all students are required to obtain teaching experience.

All students are admitted to work toward the Ph.D. degree. However, the Master of Science degree is ordinarily earned after completion of 30 credits of study including a Master’s thesis. The M.S. should be attained in two years, and the Ph.D. in four, except for the Ph.D. in Clinical Psychology for which an additional year’s internship is required. Students may complete these requirements in less time. Students are not admitted for a Master’s degree only, nor are they admitted for part-time status.

For admission, applicants should have 18 credits or semester hours of psychology courses beyond an introductory course. Included in these courses should be one in statistics and one in experimental psychology. The latter may be a laboratory course in either physiological, sensory, emotion and motivation, cognition, or learning. Applicants who have done outstanding work in other areas of study, but do not have the required undergraduate credits in psychology may also apply for admission.

Ordinarily, applications are accepted only for fall semester admission. Deadlines for receipt of applications are December 1 for the clinical area and January 2 for all other programs. In the clinical program, applicants are required to rank order two faculty with whom they would be most interested in working.

All courses carry 3 credits unless otherwise specified.

530 Human Neuropsychology

Introduction to the causes, diagnosis, effects and treatment of human neurological and neuropsychological disorders. Emphasis on inferences that can be made about human brain functions from the effects of neurological disorders. Prerequisite: PSYCH 330 or equivalent.

535 Drugs and Behavior

Principles of pharmacology, behavioral testing, brain structure and neuron morphology, neurochemistry, mode and site of action of antianxiety and antipsychotic drugs, analgesics, hypnotics, sedatives and anesthetics. Recreational drugs such as tobacco, alcohol, cocaine, amphetamines. Prerequisite: introductory psychology. Some chemistry recommended.

572 Neurobiology

Biological and cellular interactions in nervous systems. Lectures integrate structural, functional, developmental, and biochemical approaches. Topics include neuronal anatomy and physiology, membrane potentials, synapses, development of neuronal connections, visual system, cerebellum and control of movement, and neural plasticity. Prerequisites: BIOLOGY 523 or 560; or both PSYCH 330 and BIOLOGY 102.

581 Applied Behavior Analysis

Basic professional and paraprofessional skills of applied behavior analysis. Topics include: goals and objectives, observational recordings, ethics, selection of procedures; increasing, teaching, and reducing behavior via positive procedures; evaluation. Prerequisite: introductory psychology.

586 Psychology of Persuasion

Psychological processes underlying persuasion. Theory and research of persuasive communication in relation to strategies of belief, attitude, and behavior change. Implications for advertising, voting, and other applied areas. Prerequisite: PSYCH 100; PSYCH 360 recommended.

591-595 Seminar in Psychology

For advanced undergraduates and graduate students. A survey and critical evaluation
of literature pertaining to selected topics in psychology. Many different topics offered each semester.

605 Advanced Educational Psychology
Psychological principles and concepts as related to educative process and their application to teaching. Primarily for graduate students in education, psychology, and related fields.

607 Industrial/Organizational Psychology
Applications of psychological principles and of research methodology to human problems in industrial and organizational settings. Motivation, attitudes, group behavior, leadership, personnel selection, performance appraisal, and training. Prerequisite: graduate standing with background in social-behavioral sciences.

617 Applied and Basic Cognition and Its Development I
Basic processes in intelligence, including attention, pattern recognition, and perception; their development, and applications in education. Various approaches to the study of intelligence, emphasis on the information-processing approach. Note: may be taken in sequence with PSYCH 618 or independently.

618 Applied and Basic Cognition and Its Development II
Analysis of knowledge, its use, its development, and application of such knowledge. Topics include semantic and episodic memory, conceptual knowledge, propositional knowledge, schemata, and discourse processing.

620 Learning and Animal Behavior
Survey of learning and behavior from a biological perspective. Topics include conditioning, generalization and discrimination, motivation, language and communication, memory, ethology, behavioral ecology, and sociobiology.

630 Research Topics in Behavioral Neuroscience
Intensive overview of the field. Topics include introduction to neuroanatomy, techniques used in investigations of brain function, physiological bases of emotion, motivation, reward and punishment, species-specific behavior, learning, and memory.

640 Statistical Inference in Psychology I (1st sem)
Application of statistical procedures to analysis of psychological data and to problems of measurement in psychology and related fields. Prerequisites: PSYCH 100 and 240 or STATISTIC 111.

641 Statistical Inference in Psychology II
Continuation of PSYCH 640. Introduction to analysis of variance and correlational techniques, related to the general problem of inference in the social sciences. Prerequisite: PSYCH 640.

642 Correlation and Regression
Reasoning and assumptions underlying correlation and regression analysis, inference; trend analysis and analysis of variance and covariance as special cases of multiple regression analysis; introductions to reliability, factor analysis, causal analysis, and multivariate techniques. Prerequisites: PSYCH 640 and 641 or equivalent.

643 Research Methods in Social Psychology
Introduction to the scientific methods and practical aspects of conducting research in social and personality psychology. Emphasis on the development of such skills as experimental design, construction of reliable and valid measurement procedures, critical analysis of research literature, and effective writing of empirical papers. May be repeated for additional credit; maximum credit, 12.

644 Orientation to Clinical Psychology
Introduction to the clinical psychology program and the nature, history and current issues in the field of clinical psychology, including research-practice models, social cultural considerations, and clinical observation. Required of and limited to entering clinical psychology graduate students.

645 Nature and Methods of Inquiry/Psychometrics
Fundamentals of research, the varieties of method, and practicalities of application in clinical psychology research. Generally limited to beginning graduate students in clinical psychology. Required of clinical psychology students. Others by consent of instructor. Credit, 2-3.

650 Brain Development and Behavior
Survey of current literature relating to the physiological and neural bases of psychological development: pre- and post-natal brain-behavior relationships, effects of early experience, early brain damage and behavior, sex differences in brain-behavior development. Prerequisite: course in physiological psychology or neurobiology.

660 Advanced Social Psychology
Overview of theory and experimental research in social psychology. Topics include social perception, attitude structure and change, dyadic interaction, and group processes.

661 Attitudes and Opinions
Theory, methods, and data concerned with the nature and structure of attitudes and opinions, formation of attitudes, and attitude change in response to communication and interpersonal influence.

664 Group Dynamics
Interpersonal and group processes: attraction, influence, group structure, communication, cooperation, leadership, group performance. Focus on theory, experimentation, and special problems of the field. Prerequisite: a course in psychology and statistics.

670 Personality
Basic concepts and principles, including theoretical research issues. Emphasis on recent research in specific areas of personality.

680 Psychopathology
Introduction to alternative views of abnormality; clinical theory and research on psychopathology.

681 Assessment I
Introduction to clinical interviewing, observation, and testing. Directed by clinical supervisors. Consent of instructor required.

683 Advanced Psychological Assessment
Projective testing and diagnostic foundations. Directed by clinical supervisors. Consent of instructor required.

684 Behavioral Perspectives in Clinical Psychology
Part of the core course sequence within the Clinical Training Program. A seminar in generic behavioral therapy, covering theorety, research, and practice taking a behavioral-empirical approach to clinical issues. Topics include overview of clinical behavior therapy; specific assessment and intervention procedures for different clinical problems.

685 Psychodynamic Perspectives in Clinical Psychology
Psychological phenomena and pathology, including general processes of clinical diagnosis and treatment. Required of clinical psychology students; others with consent of instructor.
686 Social Ecology Perspectives in Clinical Psychology
Psychological phenomena and pathology, including general processes of clinical diagnosis and treatment. Required of clinical graduate students; open to other psychology graduate students; others with consent of instructor.

691-695 Seminar (Varied Titles)
Selected topics of current significance in psychology. Research studies analyzed and theoretical advances explored. Credit, variable; may be repeated for additional credit.

696 Independent Study (Readings)
Credit, variable; may be repeated for additional credit.

697 Special Topics
Credit, variable.

698 Practicum
Credit, variable.

699 Master's Thesis
May be repeated for additional credit. Minimum credit, 1; maximum, 10.

704 History and Systems of Psychology
General structure of psychological theory and historical and comparative consideration of the backgrounds, viewpoints on scientific methodology, research interests and techniques, and component variables, hypotheses, and laws of structural, Gestalt, functional, and behavioristic movements.

705 Social Psychology in the Schools
Review and analysis of social psychological literature as it pertains to school and educational issues. Emphasis on social interaction in the classroom.

706 Cognitive Approaches to Instruction
Review and analysis of findings of psychology that pertain to instruction. Emphasis on practical control of learning activities, especially in the classroom.

707 Environment, Behavior and Design Evaluation
Interdisciplinary and problem oriented. Focus on a multifactor approach to design evaluation, including user-based evaluations, as an important component of the design process. Concepts, techniques, and qualitative and quantitative approaches from both the behavioral sciences and design professions. Lectures, discussions, practicum sessions.

711 Sensory Processes
Processes of encoding external stimuli through detailed examination of different sensory systems.

714 Perception
Primarily vision and audition. Stress on perceptual process, as opposed to sensory processes. Perception of form, space, depth; perceptual development and learning, etc. Prerequisite: PSYCH 310 or equivalent.

721 Conditioning
Fundamental principles and findings of classical conditioning. Topics include contemporary and traditional theories of conditioning, critical evaluation of relevant research literature, and physiological bases of conditioning.

723 Learning
Presentation of major concepts and findings from research on basic learning processes, and exploration of their implications for complex behavior. Basic processes include classical and operant conditioning, stimulus control, reinforcement, and aversive control. Complex behaviors include attention, memory and dysfunctional behavior. Topics may vary with student interests.

731 The Neuroanatomical Basis of Behavior
Structure and function of the mammalian nervous system as related to sensory-motor and motivational systems. Prerequisite: PSYCH 330 or equivalent.

732 Neurochemistry
In-depth survey of the biochemistry of the mammalian nervous system. Brain energy metabolism, brain lipids and myelin, blood-brain barrier, axonal transport, and major neurotransmitter systems. Prerequisites: biochemistry and either physiological psychology or neurobiology.

733 Psychopharmacology
Basic principles of pharmacology, behavioral pharmacology, review of neurotransmitter systems, psychotropic drugs and psychopathology, abused drugs, and theories of addiction. Prerequisite: PSYCH 330 or equivalent.

740 Topics in Quantitative Psychology
Topics vary. Some possibilities: regression analysis, experimental design, mathematical models of behavior. Prerequisites: PSYCH 640 and 641. May be repeated for credit.

750 Learning and Memory Processes in Children
Theoretical and experimental approaches to topics in learning and memory.

751 Cognitive Processes in Children
Piagetian, behavioristic, and information-processing approaches to research in conceptual development.

752 Perceptual Development in Children
Introduction to theories of perceptual development, consideration of sensory and perceptual capabilities of the infant, and analysis of developmental changes in perception in the infant and older children.

753 Personality and Social Development in Children
Review and analysis of literature on personality development and socialization process in children. Prerequisite: PSYCH 370 or equivalent.

762 Social Cognition
Attribution and other social judgment processes. Implicit causal theories in the interpretation and explanation of own and others’ behavior. Motivational and cognitive biases in social cognition. Prerequisite: PSYCH 660.

763 Social Learning
Theories of social learning, analysis of effectiveness of social reinforcement and observational learning. Prerequisite: PSYCH 620 or equivalent.

765 Affect and Cognition
Topics include the biological bases of emotion; the interface between emotion and cognition; cultural variation in emotion; and individual differences. Prerequisite: advanced graduate standing in psychology or related fields.

789 Clinical Practicum
Practice in application of psychological techniques to clinical settings and counseling. Taught with staffs of cooperating institutions and agencies. Credit, variable; may be repeated for additional credit.

791-795 Seminar (Varied Titles)
Selected topics of current significance in psychology. Research studies analyzed and theoretical advances explored. Credit, variable; may be repeated for additional credit.

796 Independent Study (Readings)
Credit, variable; may be repeated for additional credit.
Public Health

The Department of Public Health, within the School of Public Health and Health Sciences offers programs leading to the Master of Public Health, Master of Science, and Doctor of Philosophy degree with concentrations in: biostatistics; community health education; environmental health sciences; epidemiology; health policy and management; and nutrition (see information under the Department of Nutrition). The Department of Public Health is organized into three divisions: Biostatistics and Epidemiology, Community Health Studies, and Environmental Health Sciences.

The mission of the School is to optimize the public health and quality of life through education, research, outreach, and practice using an innovative model that addresses complex transdisciplinary health issues by integrating core areas of public health and the health sciences. Graduate programs prepare individuals for professional health and health sciences careers in accordance with societal needs. The School fosters and maintains an involvement in community and agency activities, especially in Massachusetts and the New England region.

Ordinarily, applications are only accepted for fall admission. For further information on all public health programs, contact: Department of Public Health Admissions Coordinator, Arnold House, 715 North Pleasant Street, University of Massachusetts, Amherst, MA, 01003-9304; tel. (413) 545-2861; email: dwolf@schoolph.umass.edu.

Division of Biostatistics and Epidemiology
Website: www.umass.edu/sphhs/bioepi/

Graduate Faculty

Edward J. Stanek III, Professor of Biostatistics and Division Head, Biostatistics and Epidemiology Division, B.S., Wisconsin, 1971; M.S., Massachusetts, 1977; Ph.D., North Carolina at Chapel Hill, 1983.


Related Courses

Biology

550 Animal Behavior
565 Human Physiology
567 Comparative Physiology
569 Experimental Endocrinology
580 Developmental Biology
750 Advanced Animal Behavior
755 Systematics and Evolutionary Mechanisms

Education

705 School Psychology Educational Assessment
735 Advanced Theory and Practice of Testing I
736 Advanced Theory and Practice of Testing II

Entomology

511 Insect Behavior

Linguistics

601 Intensive Introduction to Transformational Grammar
711 Psycholinguistics: Language Acquisition
712 Psycholinguistics: The Perception of Linguistic Form

Sociology

704 Advanced Sociological Theory
715 Survey Design and Analysis
726 Complex Organizations
728 Social Movements

Special Topics

797 Credit, variable.
798 Recommended for all doctoral candidates. Experience in procedures, leading discussion groups and teaching labs. Close supervision by faculty members. Meets once a week to discuss problems in teaching. Credit, variable; may be repeated for additional credit.

891-895 Seminar (Varied Titles)
Selected topics of current significance in psychology. Research studies and theoretical advances. Credit, variable; may be repeated for additional credit.

896 Independent Study (Readings)
Credit, variable; may be repeated for additional credit.

897 Credit, variable.

898 Clinical Internship
Year-long, full-time clinical experience. Intensive practical experience necessary for professional work. A requirement for the Ph.D. in Clinical Psychology; must be done at an internship facility accredited by the American Psychological Association or one approved by the Clinical faculty. Student eligibility must be certified by the Director of Training before acceptance of an internship. Prerequisites: successful completion of all required course work for the Ph.D. in Clinical Psychology, completion of a Master's degree, a comprehensive project, and approval of a doctoral dissertation proposal.

899 Doctoral Dissertation
Credit, 10.
Lisa Chasan-Taber, Associate Professor of Epidemiology and Acting Associate Dean of the School of Public Health and Health Sciences, B.A., Pennsylvania, 1987; M.P.H., Massachusetts at Amherst, 1990; Sc.D., Harvard, 1995.


Rongheng Lin, Assistant Professor of Biostatistics, B.A., University of Science and Technology, China, 2000; Ph.D. Johns Hopkins, 2006.

Penelope S. Pekow, Research Assistant Professor of Biostatistics, B.A., Brown, 1977; M.S.P.H., North Carolina at Chapel Hill, 1982; Ph.D., 1991.

Elaine Puleo, Research Associate Professor of Biostatistics, B.A., Colorado, 1973; M.S., Colorado State; Ph.D., Massachusetts at Amherst, 1989.

Katherine W. Reeves, Assistant Professor, B.S., Yale, 2002; M.P.H., Ohio State, 2003; Ph.D., Pittsburgh, 2008.


Brian Whitcomb, Assistant Professor, B.A., California at Berkeley, 1994; Ph.D., Maryland at Baltimore, 2006.

Adjunct/Associate Faculty

John F. Acquavella, Professor, Senior Fellow-Epidemiology, Monsanto Company, St. Louis, Mo.

Marianne H. Alciati, Associate Professor, President, Management Solutions for Health, Inc., Reston, Va.

Paul J. Amoroso, Associate Professor, United States Army Research Institute for Environmental Medicine, Natick, Mass.

Mark S. Baptiste, Assistant Professor, Director, Division of Chronic Disease Prevention and Adult Health, New York State Department of Health.

Gregory Bogdan, Assistant Professor, Epidemiologist, Division of Communicable Disease Epidemiology, Harrisburg, Pa.

Gary Burkholder, Assistant Professor, Senior Research Analyst, Institute of Community Research, Hartford, Conn.

Scott Chasan-Taber, Assistant Professor, President, Pioneer BioDiligence, Amherst, Mass.

Stuart R. Chipkin, Associate Professor, Chief, Division of Endocrinology, Diabetes, and Metabolism, Baystate Medical Center, Springfield, Mass.

Jacalyn Coglin-Strom, Assistant Professor, Department of Family and Community Medicine, University of Massachusetts Medical School, Worcester.

Bruce A. Cohen, Assistant Professor, Officer in Charge, Naval Undersea Medical Institute, U.S. Navy, Groton, Conn.

Bruce B. Cohen, Assistant Professor, Director of Research and Epidemiology, Bureau of Health Statistics, Research and Evaluation, Massachusetts Department of Public Health, Boston.

James R. Cook, Assistant Professor, Department of Cardiology, Baystate Medical Center, Springfield, Mass.

Letitia Davis, Assistant Professor, Director, Occupational Health Division, Bureau of Health Statistics, Research and Evaluation, Massachusetts Department of Public Health, Boston.

N. Lynn Eckhart, Professor, Dean, Center for International Health Professions Education, University of Massachusetts Medical School, Worcester.

Paul H. Etkind, Epidemiologist and Deputy Director, Division of Public Health and Community Services, City of Nashua, N.H.

William Fisher, Associate Professor of Psychiatry, University of Massachusetts Medical School, Worcester.

Edward Fitzgerald, Associate Professor, Assistant Director, Bureau of Environmental and Occupational Epidemiology, New York State Department of Health.

Patty Freedson, Professor, Department of Kinesiology.

Daniel J. Friedman, Associate Professor, Population and Public Health Information Services, Brookline, Mass.

Susan T. Gershman, Assistant Professor, Director, Massachusetts Cancer Registry, Bureau of Health Statistics, Research, and Evaluation, Massachusetts Department of Public Health, Boston.

Robert Goldberg, Professor of Medicine and Epidemiology, Department of Medicine, University of Massachusetts Medical School, Worcester.

Rita Hindin, Assistant Professor, Senior Research Fellow in Epidemiology, Department of Biostatistics and Epidemiology, School of Public Health and Health Sciences, University of Massachusetts Amherst.

Chung-Cheng Hsieh, Professor, Director, Division of Biostatistics and Epidemiology, University of Massachusetts Cancer Center; Professor of Medicine, University of Massachusetts Medical School, Worcester.

Jennifer L. Kelsey, Professor Emeritus, Health Research and Policy, Division of Epidemiology, Stanford University School of Medicine, Stanford, Calif.

Stanley Lemeshow, Professor, Director, Center for Biostatistics, and Dean, School of Public Health, Ohio State University, Columbus.

David A. Lombardi, Assistant Professor, Injury Epidemiologist, Quantitative Analysis Unit, Liberty Mutual Research Institute for Safety, Hopkinton, Mass.

Roger Luckmann, Assistant Professor, Department of Family and Community Medicine, University of Massachusetts Medical School, Worcester.

Martin C. Mahoney, Associate Professor, Director, Risk Assessment and Screening, Division of Population Sciences, Roswell Park Cancer Institute, Buffalo, N.Y.

David X. Marquez, Assistant Professor, Department of Kinesiology.

Stephen A. Metz, Associate Professor, Vice Chairman and Chief, Division of Gynecology, Baystate Medical Center, Springfield, Mass.

Arthur Michalek, Professor, Dean of Graduate Education, Roswell Park Cancer Institute, State University of New York at Buffalo.

Ira S. Ockene, Professor of Medicine, Associate Director, Division of Cardiovascular Medicine and Director, Preventive Cardiology Program, University of Massachusetts Medical School, Worcester.

Jon C. Olson, Assistant Professor, Epidemiologist, Office of Health Care Quality, Connecticut Department of Public Health, Hartford.

Harris Pastides, Professor, University of South Carolina, Columbia.

Nancy A. Potischman, Associate Professor, Epidemiologist, Applied Research Branch, National Cancer Institute, Rockville, Md.
The primary goals of biostatistics are to create the theoretical and applied statistical methods necessary to design laboratory, medical, and public health studies; to undertake quantitative evaluation and measurement; and to use statistical inferences to arrive at appropriate conclusions from medical and public health data.

The primary goal of epidemiology is to foster the prevention or early detection of disease by describing the distribution of various diseases in human populations, identifying the determinants of diseases through research, and aiding in the development and evaluation of health programs.

General Admission Requirements

All applicants must meet the general requirements of the Graduate School. For those persons with an advanced professional or doctoral degree, the Graduate Record Examination may be waived at the discretion of the department. A TOEFL exam with a minimum acceptable score of 250 (computer-based), 600 (paper-based) or 100 (internet-based) and a GRE exam are required for foreign nationals.

Master of Public Health Degree Program

M.P.H. Degree Program in Biostatistics

The primary focus of the Master of Public Health degree program in biostatistics is to prepare individuals to undertake meaningful teaching, research, and service roles in the fields of medicine and public health. Graduates of this program are expected to understand the role that statistics play in helping to identify and resolve contemporary health problems, and undertake analysis and draw appropriate conclusions from the collected data.

M.P.H. applicants must have an advanced professional degree in a health field (M.D., D.V.M., D.D.S., D.O.), have completed a master’s or doctoral degree in a health-related field, or have considerable experience in a health-related field.

The degree program can be completed in three academic semesters and a 10-week summer practice experience, although many students choose to spread the program over two years. The total number of credits required for graduation is 42, 15 of which must be earned in Public Health core courses (PUBHLTH 540, 565, 601, 620, 630), 9 credits in Epidemiology core courses (PUBHLTH 632, 640, 796 for three semesters), 3 credits for the practicum experience, 3 credits for culminating experience (which may be fulfilled either by an M.P.H. project, a capstone course, or a comprehensive exam), and 12 credits from elective courses.

All M.P.H. students are required to complete a practicum as part of their degree requirements. Culminating experience options include one or more of the following: a capstone course, an M.P.H. project or a comprehensive examination.

Master of Science Degree Program

M.S. Degree Program in Biostatistics

The major focus of the Master of Science degree program in Biostatistics is to prepare highly qualified individuals with advanced research skills to undertake public health research responsibilities. The program emphasizes the applied aspects of biostatistical research in measuring and investigating contemporary biomedical and public health problems.

M.S. applicants are accepted with backgrounds in the quantitative sciences, and from associated fields.
The degree program is generally completed within two years.

Degree requirements include a minimum of 45 credits:
9 credits of public health core courses
21 credits of biostatistics core courses
6 credits: STAT 515 and 516
9 credits of elective courses, of which 6 credits can be for M.S. thesis and oral defense or a two-course non-thesis option with exam.

A practicum is required.

M.S. Degree Program in Epidemiology
The Master of Science degree program in epidemiology is designed for the student without professional training but with a career interest in epidemiological research. It provides methodological skills in research design, study implementation, and data analysis. Each student develops a focus area in epidemiology through a combination of elective courses, course papers, choice of summer practice experience, and selection of thesis topic.

M.S. applicants are accepted with backgrounds in a variety of fields but most commonly in the natural, social or behavioral sciences.

The degree program is generally completed within two years. The time taken to complete the thesis is the major factor determining the length of the student’s program.

Degree requirements include a minimum of 45 credits:
9 credits of public health core courses
21 credits of epidemiology core courses
6 credits of epidemiology elective courses
3 credits of other elective courses
3 credits for M.S. thesis and oral defense
3 credits for practicum experience.

Doctor of Philosophy Degree Program

Ph.D. Degree Program in Biostatistics

The doctoral degree program prepares individuals for teaching and research in academic institutions, and for leadership positions in health-related organizations and industry. Biostatistics doctoral applicants often have completed a master's degree in biostatistics or an equivalent advanced degree. Candidates generally have backgrounds in mathematics, biostatistics, statistics or other quantitative fields and have demonstrated basic research competency.

Applicants may enter the doctoral program in one of two ways:
1. Applicants who have completed a master’s degree or other advanced degree in biostatistics or a related field may be admitted directly into the doctoral program. Usually, they have demonstrated basic research competency through a required thesis or its equivalent. Students with a prior master’s degree may waive up to one half of the 24 biostatistics major credits, and up to one half of the 12 minor credits.
2. Applicants who have completed a four-year bachelor’s degree in mathematics, statistics or a related field, but have not completed a master’s degree may apply to the master’s/doctoral program in biostatistics. Students entering directly from a bachelor’s degree program will be evaluated by the faculty after their first year of full-time graduate study. Those who demonstrate exceptional work in the courses, and outstanding aptitude, will be considered for admission into the doctoral degree program.

All applicants should submit a statement of interest, provide detailed information on their background and competencies, and indicate areas of preferred major and minor concentration.

Degree requirements include a minimum of 57 credits:
24 credits in major concentration of biostatistics
12 credits in minor concentration
3 credits in research seminar
18 credits of dissertation.

A qualifying written examination in the major and minor are taken at the completion of coursework. A subsequent oral defense of the dissertation proposal qualifies the student to begin the dissertation.

A candidate, entering with a satisfactory background without curricular deficiencies, can expect to take two years for coursework and about two additional years for completion of the dissertation.

Ph.D. Degree Program in Epidemiology

Epidemiology doctoral applicants generally have backgrounds in the natural, social or behavioral sciences. Applicants should have sufficient preparation in the natural sciences and mathematics and in the social or behavioral sciences to provide a sound foundation for doctoral study. Candidates who enter with deficiencies must make them up without credit toward the degree. Prospective applicants should consult the department website for the latest information concerning admission and degree requirements.

All applicants should complete a statement of interest, provide detailed information on their background and competencies, and indicate areas of preferred major and minor concentration.

Degree requirements include a minimum of 72 credits beyond the bachelor’s degree which are distributed as follows:
24 credits in the major concentration of epidemiology
12 credits in a biostatistics minor concentration
12 credits in a second minor concentration
6 credits in research seminar
18 credits of dissertation work.

Applicants may enter the doctoral program in one of two ways:
1. Applicants who have completed a master’s degree or other advanced degree with backgrounds in the natural, social or behavioral sciences may be admitted directly into the doctoral program. These applicants usually have demonstrated basic research competency through a required thesis or its equivalent. Preference is given to candidates with work experience in epidemiology, but other outstanding individuals are accepted. A candidate entering with a satisfactory background without curricular deficiencies can expect to take two years for coursework and one to two additional years for completion of the dissertation. Students with a prior master’s degree may waive up to one half of the 24 epidemiology and 24 minor course credits.
2. Applicants who have completed a four-year bachelor’s degree in the natural, social or behavioral sciences, but have not completed a master’s degree may apply to the master’s/doctoral program in epidemiology. Students entering directly from a bachelor’s degree program will be evaluated by the epidemiology faculty after their first year of full-time graduate study. Students who demonstrate exceptional work in their courses in epidemiology, biostatistics, and other areas of public health during their first year of study will be officially admitted into the doctoral degree program.

All courses carry 3 credits unless otherwise specified.

540 Introductory Biostatistics
Principles of statistics applied to analysis of biological and health data, evaluation of public health and clinical programs.

630 Principles of Epidemiology
An epidemiological perspective on health. General approaches for describing patterns of disease in groups of people, and elucidating various processes involved in creating differing levels of health in human groups. Lecture and lab examples of a wide range of contemporary health problems.

631 Epidemiologic Investigation
Provides students with the necessary analytic techniques, technical resources, and writing expertise to design and write their own thesis proposal and final thesis manuscript in the field of epidemiology. Also applies to students preparing to publish in
journals and write grant proposals. Based on structure of a research proposal, beginning with sessions on conducting a literature review, progressing through methods and results, to the discussion. Students prepare a written proposal and a class presentation, and critique another student’s presentation. Prerequisite: PUBHLTH 630.

632 Applied Epidemiology
Intermediate level course. Application of epidemiologic methods to study the etiology, control, and impact on society of selected diseases. Prerequisite: PUBHLTH 630.

633 Communicable Disease Epidemiology
Review of selected infectious diseases; emphasis on current theories of distribution, transmission, and control.

634 Nutritional Epidemiology
Epidemiologic study design problems and issues; major methods of dietary assessment; non-dietary nutritional assessments; and the relative strength of evidence in support of diet-disease relationships.

635 Psychosocial Epidemiology
Links between life styles of populations and risks to which individuals in these populations are vulnerable. Models linking social stress and physiological responses, psychosocial mediators, and social support systems as they promote or reduce susceptibility to disease. Consent of instructor required.

639 Cancer Epidemiology
Background in the principles of oncology and a review of epidemiological strategies used in cancer research. The major cancer risk factors and the key strategies of prevention.

640 Intermediate Biostatistics (2nd sem)
Principles of statistics applied to analysis of biological and health data. Continuation of PUBHLTH 540 including analysis of variance, regression, nonparametric statistics, sampling, and categorical data analysis. Prerequisite: PUBHLTH 540.

691F Data Management and Statistical Computing
An introduction to data management for research projects in the biomedical sciences using microcomputers. Topics include design of data collection forms, data entry, computer managed documentation and statistical computing using SAS.

696D Special Problems in Public Health
Special investigational or research problems for M.P.H. candidates or advanced students.

Scope of the work can be varied to meet specified conditions. Credit, 3-6.

698 Practicum
Opportunity for supervised field observation to gain practice experience in selected public health agencies.

699 Master’s Thesis (M.S. candidates only)
Independent research leading to a thesis on a public health subject. Results should be suitable for publication. Credit, 3-6.

734 Environmental Epidemiology
The human health effects associated with selected environmental exposures of the general populace. The methodology of the related epidemiological studies evaluated. Prerequisite: PUBHLTH 630.

737 Advanced Methods in Epidemiology
A methodologic core course. Details of concepts and quantitative techniques used in modern epidemiology. Prerequisites: PUBHLTH 630 and 632.

740 Mixed Models and Longitudinal Data Analysis (2nd sem)
Integration of linear models with experimental design and sampling, considering applications with unbalanced and missing data. In-depth discussion of mixed models including parameterizations, analysis of covariance, unequal numbers of observations per cell, missing cells. Repeated measure designs and longitudinal data analysis emphasized, with many examples illustrated using SAS. Prerequisites: PUBHLTH 640 and 691F or equivalent. Recommended: PUBHLTH 744.

741 The Design and Analysis of Experiments in the Health and Pharmaceutical Sciences (1st sem)
Fundamental concepts in experimental design, with specific application to medical, public health, and pharmaceutical research. Extensive use of computer programs; many illustrative examples. Prerequisite: PUBHLTH 640.

742 Advanced Methods in Biometric Research
Statistical methods in biological and public health research. Methods of statistical estimation, correlation theory, multivariate tests of significance including discriminant analysis, stepwise and multiple regression. Topics in nonparametric methods, and statistical methods for clinical trials. Prerequisite: PUBHLTH 640.

743 Analysis of Categorical Data in the Health Sciences (1st sem)
In-depth examination of the use of the logistic regression model with applications. Analyses using a computer program. Prerequisite: PUBHLTH 744.

744 Computer Analysis of Health Sciences Data (1st sem)
Applications of the linear regression model. Emphasis on use and interpretation of statistical software output. Prerequisite: PUBHLTH 640.

745 Sampling Methods for the Health Sciences
Application of widely used sampling methods to situations commonly occurring in public health research. Alternative sampling strategies compared; emphasis on design of sample surveys. Types of samples stressed: simple random sample, stratified sample, systematic sample, and cluster sample. Also the combined ratio estimate, and large-scale, ongoing sample surveys such as the Health Examination Survey of the National Center for Health Statistics. Prerequisite: PUBHLTH 540.

746 Nonparametric Methods in Public Health Research
The application of nonparametric methods to commonly occurring problems in public health research. Data from one, two, and multisample problems from environmental health, epidemiology, health administration, and health education. Prerequisite: PUBHLTH 540.

747 Multivariate Methods in Public Health Research
Multivariate statistical theories and methods applied to public health data. Emphasis on consideration of alternative statistical procedures simultaneously for analyzing many variables. Prerequisite: PUBHLTH 744.

748 Survival Theory in Public Health and Science
The analysis of time to event data focusing on applications of regression models to right censored data. Particular emphasis on the use and interpretation of the proportional hazards model. Prerequisite: PUBHLTH 744.

749 Statistical Methods for Clinical Trials
Major designs used in clinical investigations; alternative approaches to the analysis of gathered data. Prerequisite: PUBHLTH 640.
Division of Community Health Studies: Community Health Education; Health Policy and Management

Website: www.umass.edu/sphhs/chs/

Graduate Faculty

David Ross Buchanan, Professor and Division Director, Community Health Studies, B.A., California at Berkeley, 1974; M.P.H., 1979; Dr.P.H., 1989.


Michael E. Begay, Associate Professor and Head of the Department of Public Health, B.A., California State Polytechnic, 1981; M.A., California at Santa Barbara, 1984; Ph.D., 1990.

Maria T. Bulzacchelli, Assistant Professor, B.A., Bowdoin, 1995; Ph.D., Johns Hopkins, 2007.


Aline Gubrium, Assistant Professor, B.A., Indiana, 1995; M.A., Florida, 2000; Ph.D., 2005.

Shirley A. Mietlicki, Extension Assistant Professor, B.S., Mansfield, 1972; M.A., Connecticut, 1978; Ed.D., Massachusetts at Amherst, 1996.

Maria Rodriguez-Mongio, Assistant Professor, B.S., University Carlos III, Madrid, Spain, 1994; Ph.D., Barcelona, Spain, 2001.

Paula L. Stamps, Professor, B.S., Missouri, 1968; M.S., Oklahoma, 1970; Ph.D., 1972.

Lisa Wexler, Assistant Professor, B.A., West Florida, 1991; M.S.W., Florida State, 1996; Ph.D., Minnesota, 2005.

Adjunct/Associate Faculty

Gloria DiFulvio, Research Assistant Professor, University of Massachusetts Amherst.

Glendene A. N. Lemard, Assistant Professor, Institute for Global Health, University of Massachusetts Amherst.

Sally Linowski, Lecturer, University Health Services.

Craig N. Melin, Lecturer, CEO, Cooley Dickinson Hospital, Northampton, Mass.

John Rapoport, Professor of Economics, Mount Holyoke College, South Hadley, Mass.

S. Priscilla Reddy, Director of Health Promotion and Research Development, South African Medical Research Council, Cape Town, South Africa.

Frank Robinson, Assistant Professor/Senior Consultant, BayState Health Systems, Springfield, Mass.


Maria Idali Torres, Associate Professor, University of Massachusetts Boston.

Thomas Wolff, Assistant Professor, Director of Community Development, Area Health Education Center, Amherst, Mass.

Jane Zapka, Professor, University of Massachusetts Medical School, Worcester.

Community Health Education

The mission of the Community Health Education (CHE) area is to enable people to gain control over the social, political, and personal conditions that affect their health. Coursework prepares public health professionals to design and implement programs to assist all people to participate in their life situations to the fullest extent of their capabilities.

Health Policy and Management

The Health Policy and Management (HPM) area prepares public health professionals for managerial and administrative positions in health organizations and institutions, both voluntary and private, and in planning and regulatory bodies of federal, state, and local health agencies. The HPM area develops and uses theories and models based in the social and behavioral sciences, such as organizational theory, economic theory, decision theory, and motivation theory to understand the health care system; identify and analyze its strengths and weaknesses; and design, implement, evaluate, and improve programs.

Admission Requirements

Applicants should meet the following minimum criteria for admission to the program:

1. Have earned a baccalaureate degree from an accredited institution in the United States, or a foreign equivalent.
2. Have a cumulative grade point average (GPA) of at least 3.00 (B average on a 4.00 scale) in their baccalaureate degree.
3. Meet the general requirements of the Graduate School for admission (see www.umass.edu/gradschool/).

Applications need to submit an official report of the Graduate Record Examination (GRE), which is required if they do not have a doctoral degree. Test scores must not be more than five years old.

All master’s degree applicants who are not U.S. citizens and/or whose native language is not English must obtain an official Test of English as a Foreign Language (TOEFL). To be considered for admission, the applicant must achieve a score of 600 on the paper-based exam, a score of 250 on the computer-based exam, or a score of 100 on the internet-based exam.

Applicants may also submit copies of any pertinent publications or reports that they have authored, which would be helpful in evaluating their potential for success in public health.

Preference may also be given to applicants with an advanced professional degree (e.g., M.D.) or other graduate degree, to physician assistants or nurse practitioners, or to applicants who have two or more years’ work experience in the field of public health. Students without two years of professional experience in health education are
required to complete a supervised field training internship of 200-400 hours, depending on experience. The field training internship is in addition to the required curriculum.

Master of Public Health Degree Program

This degree program offers experienced health workers an opportunity to complete a course of study that leads to a professional degree. Working health professionals expand their knowledge base in public health, extend and sharpen their professional skills, broaden their perspective on public health problems, and prepare to assume greater professional responsibility.

The basic requirement of the M.P.H. degree is the completion of a minimum of 42 credits of academic work depending upon area of concentration, and practice experience. Candidates may enroll either full time, in which case they should be able to complete degree requirements in three semesters and an intervening summer, or part time, in which case they are expected to complete degree requirements within three years of matriculation.

Community Health Education

The total number of credits required for graduation is 42, 15 of which must be earned in Public Health core courses (PUBHLTH 540, 565, 601, 620, 630), 15 credits earned in Community Health Education core courses (PUBHLTH 690SJ, 602, 603, 604, 622, 704), 3 credits for the practicum experience, 3 credits for a culminating experience, which may be fulfilled either by an M.P.H. project or the capstone course, PUBHLTH 691S, and 6 credits from elective courses.

Health Policy and Management

The total number of credits required for graduation is 42, 15 of which must be earned in Public Health core courses (PUBHLTH 540, 565, 601, 620, 630), 3 credits for the practicum experience, 3 credits for a culminating experience (which may be fulfilled either by an M.P.H. project or a capstone course), and 21 credits from Health Policy and Management courses. The courses in Health Policy and Management have been classified under three content areas: Health Care Management and Administration (PUBHLTH 525, 621, 628, 691G, 780), Health Policy (PUBHLTH 524, 525, 580, 614, 629, 630, 726, 780), and Health Services Research (PUBHLTH 608, 622, 624, 628, 640, 704, 726). The remaining credits may be earned through a combination of elective courses, practicum experience, and M.P.H. project (or other culminating experience).

All M.P.H. students are required to complete a practicum as part of their degree requirements. Practice experiences may be paid or unpaid. Culminating experience options include one or more of the following: a capstone course, an M.P.H. project or a comprehensive examination.

Master of Science Degree Program

The M.S. degree program for both Community Health Education and Health Policy and Management is designed for candidates whose career goals include research and teaching. Graduates of the program will obtain skills in important areas of public health including how to analyze research methodology, the interaction of technical, social, economic, and political determinants of health problems and the way these factors influence processes of social change. The degree program provides a sound methodological preparation for working in a research setting or for pursuing an advanced academic degree.

The basic requirement for the M.S. degree is the completion of a minimum of 48 credits of course work including the thesis. The normal time for satisfying requirements for the M.S. degree in the School of Public Health and Health Sciences is two academic years and the intervening summer (21 months).

Each student is expected to conduct an individual investigation or research project as one of the requirements for the Master of Science degree. This is done as a thesis, conducted under the guidance of two or more members of the graduate faculty. As part of the requirement, each thesis is defended orally before at least three members of the graduate faculty.

Doctor of Philosophy Degree Program

Graduates will be well prepared for teaching and research in academic institutions and for positions of professional leadership in health agencies with research missions.

Each candidate selects an academic major in community health education or health policy and management. In addition, candidates select one minor concentration which may be in Public Health or in another Ph.D. degree program, such as anthropology, economics, management, psychology, or sociology. Minimal expectations are 24 credit hours of study in the major concentration, 12 hours in the minor concentration, and participation in a research seminar. Most candidates will be involved in additional elective courses and/or individual studies. Students also complete 18 hours of dissertation credits. Of total credits, at least six must be in research methodology. These are in addition to the required seminar in public health research, PUBHLTH 892A and B.

Each candidate is assigned a faculty adviser in the major area of interest. Prior to or soon after matriculation, the candidate and adviser outline a course of study in both major and minor areas. This, in essence, becomes the candidate's individual contract with the faculty.

Each candidate takes a comprehensive examination, usually during the fourth semester of full-time study. It must be completed before beginning the sixth semester. The exam is coordinated by the Graduate Program Director and consists of two options.

Students may choose to take a sit-down, nine-hour exam, in three parts over three consecutive days (three hours each day), or they may choose to complete three position papers consisting of substantive theoretical discussions in their major and minor areas as well as research methodology. Either option must be defended in an oral exam, to be taken after completion of the written parts.

The dissertation is conducted under the guidance of a Dissertation Committee composed of at least three members of the Graduate Faculty. At least one member must be from outside the School of Public Health and Health Sciences. The candidate negotiates the topic and substance of dissertation research with the Dissertation Committee.

A candidate who enters the program with a satisfactory background may expect to complete the program in three to four years.

All courses carry 3 credits unless otherwise specified.

505 Current Issues in Health Education

Overview of health education principles in the context of legislative and public policy considerations, substance abuse, sexually transmitted infections, nutrition, and the health concerns of youth, women, and the aged.

524 Introduction to Health Politics and Policy

Examines the determinants of health politics and policy in the U.S., including decisions and non-decisions made by institutional and political actors at all levels of government and by private sector actors.

525 Ethical Issues in Health

Theoretical framework of ethics as applied to the health field with a special emphasis
621 Health Care Organization and Administration
The theory of organization and management applied to health care organizations. Analysis of management functions. Interrelationship between health institutions, their surrounding communities, and government.

622 Program Evaluation in Health Administration
Concepts of program evaluation and their application to the health field. Emphasis on theoretical concepts and their application to development of practical skills in program evaluation.

624 Research Methods in Health Services Administration
Major methodologies useful in health research. Topics include philosophy of scientific investigation, field research, participant survey research, experimental design, construction of questionnaires, and attitudes scales; and for writing a research prospectus.

625 Hospital Administration
History, types, and organizational structure of hospitals in the U.S. Discussions and case studies on the major operating divisions, their functions and relationships. Prerequisites: PUBHLTH 620 and 621.

627 Long Term Care, Policy and Management
The impact of aging, chronic disease, disability, and dependency on the organization and delivery of long-term care services. Management issues and current research in long-term care. Prerequisites: PUBHLTH 620 and 621.

628 Financial Management of Health Institutions
The fundamental tools for management control and decision making in health care organizations. The budgeting and financial management process. Prerequisite: PUBHLTH 620.

629 Politics of Tobacco Control in the United States
The practical problems of controlling tobacco use in the United States. The politics of developing and implementing federal, state, and local tobacco control policies.

696D Special Problems in Public Health
Special investigational or research problems for M.P.H. candidates or advanced students. Scope of the work can be varied to meet specified conditions. Credit, 3-6.
Division of Environmental Health Sciences
Website: www.umass.edu/sphhs/ehs/

Graduate Faculty

C. Marjorie Aelion, Professor and Dean of the School of Public Health and Health Sciences, B.S., Massachusetts at Amherst, 1980; S.M.C.E., Massachusetts Institute of Technology, 1983; Ph.D., North Carolina, 1988.
Edward J. Calabrese, Professor and Division Director, Environmental Health Sciences Division, B.S., Bridgewater State, 1968; M.A., 1972; Ph.D., Massachusetts, 1973.
Paul T. Kostecki, Professor and Vice Provost for Research, B.S., Massachusetts, 1973; M.S., 1978; Ph.D., Michigan, 1981.
Christine Rogers Assistant Professor of Environmental Health Sciences, B.Sc., Toronto, 1989; Ph.D., 1996.

Adjunct/Associate Faculty

Barbara A. Callahan, Associate Professor, Senior Toxicologist, University Research Engineers and Associates, Grantham, N.H.
James Dragan, Professor, Soil Chemist, President, Dragan Corporation, Farmington Hills, Mich.
Donald E. Gardner, Professor, President, Inhalation Toxicology Associates, and Editor, Journal of Inhalation Toxicology, Raleigh, N.C.
George R. Hoffman, Professor of Biology, College of the Holy Cross, Worcester, Mass.
A. Wallace Hayes, Professor, Toxicology, Environmental and Health, Inc., Andover, Mass.
Margaret E. McCarthy, Assistant Professor, Department of Physics, Springfield Technical Community College, Springfield, Mass.
Donald A. Robinson, Professor, Director, Environmental Health and Safety, University of Massachusetts Amherst.

Edward J. Zillioux, Associate Professor, Florida Power and Light Company, Juno Beach.

The Division of Environmental Health Sciences combines the public health sciences of biostatistics, environmental health, and epidemiology with natural sciences, mathematics, and engineering. Students are prepared to provide a quantitative approach to measure and monitor the effects of environmental stress on human health. Environmental Health Sciences professionals meet the public health needs of society by developing and applying the modern tools available in the public health sciences.

Admission Requirements for M.S. and M.P.H. Degree Programs

Applicants for admission to the Division of Environmental Health Sciences must meet the general admission requirements of the Graduate School, with an overall cumulative grade point average of 2.75 on a scale of 4.0. The department’s basic admission requirements are a grade point average of 3.0 on a scale of 4.0. Applicants should have completed undergraduate coursework in basic biology and chemistry.

Master of Public Health Degree Program

Applicants for the M.P.H. degree program must have earned an advanced degree in a health-related area or have at least two years’ postbaccalaureate experience directly relevant to the academic program.

This program offers experienced health workers an opportunity to complete a course of study that leads to a terminal professional degree. Working health professionals enhance skills, broaden their perspective of environmental health problems, and prepare to assume greater professional responsibility.

Candidates for the M.P.H. degree may enroll either full time, in which case they should be able to complete degree requirements in three to four semesters plus an intervening summer, or part time, in which case they are expected to complete degree requirements within three years of matriculation. The program prepares students with prior undergraduate/graduate education to be leaders, with technical knowledge, skills and abilities necessary to assume expanded roles in evaluating and regulating environmental exposures to humans. The program provides the Environmental Health Science core course for all public health majors and specialty courses for graduate students majoring in general environmental health. Environmental Health courses are also available to graduate students majoring in Engineering, Health Sciences, and Natural Sciences.

The M.P.H. degree program provides graduate education for practicing professionals with relevant environmental-health experience. The total number of credits required for graduation is 42, 15 of which must be earned in Public Health core courses (PUBHLTH540, 565, 601, 620, 630), 21 credits in Environmental Health Science courses and other electives, 3 credits for the practicum, and 3 credits for the culminating experience (M.P.H. project or comprehensive exam).

All M.P.H. students are required to complete a practicum.

Master of Science Degree Program

The M.S. degree program introduces candidates to the analysis of problems in environmental health sciences and generates skills in important areas of environmental health sciences. Important among these skills is competence in basic research methodology. Graduates should appreciate the interaction of technical, social, economic, and political determinants of environmental health problems and the way these factors influence the development of changes in environmental quality.

The M.S. degree program provides a sound methodological preparation for working in a research setting or for pursuing an advanced academic degree. M.S. degree students usually spend two years in residence to complete a minimum of 42 credits.

Accelerated M.S. Degree

An Accelerated Master of Science degree option is available to students who graduate with a B.S. degree from the Environmental Sciences major in the University’s College of Natural Resources and the Environment, or with a B.S. degree from the School of Public Health and Health Sciences with a major in the Science track of Public Health. This option may be completed within one academic year and an intervening summer, assuming that students have completed 30 credits in the Environmental Health Option in the Environmental Major, in the College of Natural Resources and the Environment. Students with the aid of their adviser start their Environmental Health program at the beginning of their senior year. Students on this track must complete a minimum of 30 credits, produce a thesis, and pass a comprehensive examination as a culminating experience.
For further information on graduate degree programs contact: Environmental Health Sciences, Morrill I, 639 North Pleasant Street, University of Massachusetts, Amherst, MA 01003-9298; tel. (413) 545-2288.

Doctor of Philosophy Degree Program

The goal of the Ph.D. program is to prepare professionals to assume leadership positions in teaching, research, and public service.

The Curriculum

The Environmental Health Sciences (EHS) division considers for admission qualified candidates only after they have found a division faculty member willing to mentor them on a funded research project. Applicants must have a background in natural sciences, engineering, or a closely related field. Minimal expectations are 24 credit hours of study in the EHS concentration, and participation in a research seminar. Most candidates will be involved in additional elective courses and/or individual studies. Students also complete 18 hours in dissertation credits.

Before or soon after matriculation, the candidate and dissertation adviser outline a course of study in both major and minor areas. This specifies any deficiencies in background that must be made up without credit toward the degree.

All students take a Preliminary Comprehensive Exam within a 12-month period following completion of all required coursework. It consists of a literature review and concept proposal for their planned dissertation research. For each student, a dissertation committee of at least three graduate faculty is created, with the chair being a faculty member in the EHS division.

A candidate who enters the program with a satisfactory background may expect to complete the program in three to four years.

Prospective applicants should consult the program website for the latest information concerning admission and degree requirements.

All courses carry 3 credits unless otherwise specified.

562 Air Quality Assessment
Present air pollution as a major public health problem. Topics include: air pollutants and their sources, health and economic effects, meteorology, sampling and analysis, air quality criteria and standards, control technology, control regulations and programs.

563 Biological Effects of Ionizing Radiation
Effect and control of radiation in the mammalian system. Includes sources, measurements, radiosensitivity, radiation chemistry, cellular effects, and acute and delayed effects in occupational, medical, and environmental exposures. Prerequisites: at least one year each of undergraduate chemistry, physics, and mathematics.

565 Environmental Health Practices
Concepts of control methods used by environmental health and engineering practitioners. Topics include water, wastewater, solid wastes, food sanitation, vector control, housing, and accident control measures.

567 Environmental Compliance Regulations
Principles of environmental compliance obligations, common law, trespass, nuisance, and negligence. The major federal environmental laws affecting companies and agencies, and selected state and local regulations. Civil and criminal penalties and liabilities attached to environmental regulations. Strategies for compliance including proactive and environmental management as a method for reducing legal exposure to environmental issues.

590M Introduction to Aerobiology
Introduction to airborne pathways of human exposure to microorganisms and their products. Topics include aerosolizations, dispersal and deposition of allergens, bacteria, mold, viruses, and induction of infectious diseases and asthma.

590N Indoor Environment and Health
Introduction to indoor environmental exposures with important implications for human health. Issues include building characteristics; physical factors; chemical and biological contaminants; and irritant, allergenic, carcinogenic, and toxic effects.

600 Issues in Environmental Health Policy and Law
Describes and analyzes a range of major environmental policy and law issues. Subjects include the National Environmental Protection Act, the Clean Air Act, and the Clean Water Act.

666 Environmental and Occupational Toxicology I
The toxicological activity of toxic substances found in the general environment and in industrial settings. Topics include biochemical mechanisms for absorption, excretion, tissue distribution, metabolic transformations, and conjugations; comparative metabolism of animal species; special applications to the toxicology of heavy metals, pesticides, and other industrial chemicals.

667 Environmental and Occupational Toxicology II (2nd sem)
Continuation of PUBHLTH 666, which is a prerequisite.

671 Risk Assessment and Management
Toxicological and epidemiological basis of occupational and environmental health standards for heavy metals, gases, and carcinogens. Economic and legislative components.

691B Graduate Seminar—Research Methods
Graduate students research and present one-hour seminar on a topic related to Environmental Health, and research a topic for a term paper.

696 Independent Study
Credit, 3-9.

696D Special Problems in Environmental Health
Special investigational or research problems for M.P.H. candidates or advanced students. Scope of the work can be varied to meet specified conditions. Credit, 3-9.

697 Special Topics

698 Practice Experience Practicum
Opportunity for supervised field observation to gain practice experience in selected public health agencies.

699 Master’s Thesis (M.S. candidates only)
Independent research leading to a thesis on a public health subject. Results should be suitable for publication. Credit, 6-9.

791L Seminar—Advanced Toxicology
Explores recent developments in molecular toxicology with particular emphasis on mechanisms of toxicity and tissue repair following damage. Focus on factors that affect the shape of the dose response, especially in the low-dose zone, and how this is affected by mechanisms of toxicity and the adaptive capacity of the organism. The implications of such recent developments in molecular toxicology for the risk assessment process also considered.

891 Research Seminar
Research seminar for doctoral candidates. Credit, 1-3.

899 Doctoral Dissertation
Credit, 18.
General Public Health
Master’s Options

The following two master’s degree options are designed to accommodate the needs of working professionals.

M.P.H. Degree Program at
the University of
Massachusetts Medical
School, Worcester

A general Master of Public Health (M.P.H.) degree is offered at the University of Massachusetts Medical School in Worcester as part of the degree program of the University of Massachusetts Amherst School of Public Health and Health Sciences. The curriculum is designed to enable health care professionals to earn this advanced degree while engaged in professional activities. Classes are scheduled in the early evening to accommodate working students. The courses cover a wide variety of topic areas in epidemiology, biostatistics, environmental health sciences, health policy and management, community health education, research methods, and program planning and evaluation. The requirements for the M.P.H. degree include a total of 42 credits. All students are required to take 15 credits of core courses: PUBHLMTH 540, 565, 601, 620, and 630.

Students have the option of taking fourteen (3-credit) courses and a final oral review or twelve (3-credit) courses and a 6-credit supervised M.P.H. project. Courses are offered once a week during fall and spring semesters and two nights per week during two summer sessions that run for six weeks each. A practicum is required.

Master of Public Health in
Public Health Practice
(online)
Website: www.umass.edu/SPHHS

Graduate Faculty

Daniel S. Gerber, Assistant Professor of Community Health Studies and Director of the Public Health Practice M.P.H. Online Program.

Carol Bigelow, Research Associate Professor of Biostatistics and Epidemiology and Graduate Program Director of the University of Massachusetts Worcester M.P.H. Program.

Edward J. Calabrese, Professor of Environmental Health Sciences.

Bruce Dan, Associate Professor, B.S., Massachusetts Institute of Technology, 1968; M.D., Vanderbilt Medical School, 1974.

Anthony DeCaprio, Professor of Environmental Health Sciences.

Gloria DiFulvio, Research Assistant Professor of Community Health Studies.

Anne Hewitt, Assistant Professor, B.S., Otterbein College; M.A., Immaculata College; Ph.D., Temple, 1993.

Myles Jacobson, Assistant Professor, B.A., Brandeis, 1966; J.D., Boston College Law School, 1977.

Linda Young Landesman, Assistant Professor, B.A., Michigan, 1971; M.S.W., 1974; Dr.P.H., Columbia, 1990.

Claudia Mikail, Assistant Professor, B.A., Princeton, 1993; M.P.H., Columbia, 2001; M.D., Mount Sinai School of Medicine, 1997.

Philip C. Nasca, Professor Emeritus of Biostatistics and Epidemiology.

Jon Olson, Assistant Professor of Biostatistics and Epidemiology.

Penelope S. Pekow, Research Associate Professor of Biostatistics.

Susan Sturgeon, Associate Professor of Biostatistics and Epidemiology.

Sandra Sulsky, Clinical Assistant Professor of Biostatistics and Epidemiology.

Jean E. Swinney, Associate Professor of Nursing.

Adjunct/Associate Faculty

Ann H. Cary, Professor.

Cynthia DiPasquale, Clinical Assistant Professor, Judicial Law Clerk for the Honorable William F. Morgan.

Jon Engel, Associate Professor, Associate Professor of Health Care Policy, Seton Hall University.

William Katz, Assistant Professor, Adjunct Faculty, Department of Health and Clinical Lab Sciences, University of Massachusetts Lowell.

Barry Klenowski, Clinical Assistant Professor, Judicial Law Clerk for the Honorable Paul H. Milin, President Judge.

William H. Wiist, Professor, Health Services Consultant.

Public Health Practice is a concentration under the Master of Public Health degree. As a completely online program, Public Health Practice offers a fully accredited Master’s degree in Public Health for health professionals anywhere in the world. Students are required to complete 42 credits for the online M.P.H. degree. Credit requirements are currently under review. Contact the Concentration Coordinator for the latest information. Further information is available at www.umass.edu/SPHHS or by contacting the program office at phonline@schoolph.umass.edu.

This program allows professionals to complete their degree by taking all courses online. There is no residency requirement. In online courses, traditional classroom exchanges are replaced with online chats, discussions, and assignments of critical learning activities necessary for a contemporary public health workforce. The program attracts students from the public health sector as well as those interested in career development in public health practice. Current students live all over the world and work as doctors, nurses, dentists, administrators/managers, laboratory staff, environmental and pharmaceutical personnel, educators, optometrists, and veterinarians, among other fields.

Eligibility Requirements

Students must have a bachelor’s degree, an undergraduate GPA of at least 2.75, three years of professional work experience in public health or health care, and be currently employed in public health or health care.

Admission Requirements

Students must submit a Graduate School application (with fee), a personal statement, GRE score report (unless holding a doctoral degree from a regionally accredited college or university in the U.S. or a foreign medical degree and ECFMG certification), original transcripts in duplicate, and two letters of recommendation.

Faculty

The faculty of the M.P.H. Program comes from the five core domains of public health in the School of Public Health and Health Sciences as well as from a field of national experts who have received appointments to the School. For the most current faculty listings, visit www.umass.edu/SPHHS.
Master of Science/Master of Public Health Dual Degree Program—Online

The M.S./M.P.H. program is now closed to all but currently admitted and matriculated students. Those interested in an advanced degree in public health and nursing should consult the Doctor of Nursing Practice (D.N.P.) in Public Health Nursing Leadership degree program in the Nursing section of this Bulletin or contact Karen Ayotte, tel. (413) 545-1302.

Core and Required Courses

PUBHLTH 540 Introductory Biostatistics
PUBHLTH 630 Principles of Epidemiology
PUBHLTH 601 Application of Social and Behavioral Theories in Public Health Interventions
PUBHLTH 620 Introduction to the U.S. Health Care System
PUBHLTH 624 Research Methods in Public Health
PUBHLTH 565 Environmental Health Practices
PUBHLTH 525 Ethical Issues in Public Health
PUBHLTH 690L Leadership in Public Health Systems
PUBHLTH 598 Practicum

Opportunity for supervised field observation to gain practice experience in selected public health agencies.

PUBHLTH 780 Public Health Law

Constitutional and social bases for public health law. Development of statutes and regulations and their effects on social problems, including review of court decisions and preparation of administrative regulations.

Elective Courses (choose 1 course)

PUBHLTH 524 Introduction to Health Politics and Policy
PUBHLTH 567 Environmental Regulation and Compliance
PUBHLTH 580 Comparative Health Care Systems
PUBHLTH 621 Health Care Organization and Administration
PUBHLTH 628 Financial Management of Health Institutions
PUBHLTH 671 Risk Assessment and Management
PUBHLTH 704 Health Program Planning
PUBHLTH 726 Health Economics and Reimbursement
PUBHLTH 750 Public Health Emergency Management

Provides an operational overview of public health management in preparing for and responding to disasters, which, by definition, cannot be effectively managed by the application of routine procedures or resources. Provides needed guidance in a variety of newly defined and emerging areas for the field of public health.

PUBHLTH 753 Current Topics in Public Health Practice

Ecological approaches frame how prevention, control, health promotion, protection, and emergency measures protect the public’s health. Topics include health disparity, cultural competence, geonomics, workforce planning, credentialing, and media communication.

PUBHLTH 757 Public Health Informatics

Informatics content applicable to administrative and clinical systems used in public health. Analyzes the application of information science and technology to public health practice.

PUBHLTH 790A The Relationship Between Health and Religion and Spirituality

Research-based study of the influence of religion and spirituality on health, limitations and controversies, and applications to public health practice.
Public Policy and Administration

Graduate Faculty

(See individual departments for degrees, institutions and years)

M.V. Lee Badgett, Associate Professor of Economics and Director, Center for Public Policy and Administration.

Michael Ash, Associate Professor of Economics and Public Policy.

Sylvia Brandt, Assistant Professor of Resource Economics.

Brenda Bushouse, Assistant Professor of Political Science and Public Policy.

Mari Castañeda, Associate Professor of Communication.

Paula Chakravartty, Associate Professor of Communication.

Eric S. Einhorn, Professor of Political Science.

Nancy R. Folbre, Professor of Economics.

Jane Fountain, Professor of Political Science and Public Policy.

Krista Harper, Assistant Professor of Anthropology.

Carol Heim, Professor of Economics.

John A. Hird, Professor of Political Science and Public Policy.

Raymond LaRaja, Assistant Professor of Political Science.

Kathryn McDermott, Lecturer.

David Mednicoff, Assistant Professor of Legal Studies.

Joya Misra, Associate Professor of Sociology and Public Policy.

Maureen Perry-Jenkins, Associate Professor of Psychology.

Dean Robinson, Associate Professor of Political Science.

David Scherer, Lecturer of Psychology.

Charles Schweik, Associate Professor of Natural Resources Conservation and Public Policy.

John K. Stranlund, Professor of Resource Economics.

Master’s of Public Policy and Administration Degree Program

The Master’s Degree in Public Policy and Administration program is a professional academic program intended to prepare students for careers as public managers, policy analysts, advocates, and public leaders. The program welcomes and encourages both recent college graduates and mid-career professionals with diverse backgrounds to apply. A bachelor’s degree or equivalent international degree is a prerequisite for admission.

Students are encouraged to specialize in a substantive or methodological field of interest. Those students who choose to build their own specializations are encouraged to do so by drawing upon the rich resources of the entire University, allowing for flexibility and focus in individual program design.

Further information concerning the Master’s in Public Policy and Administration program can be obtained by calling the department’s office, tel. (413) 545-3940, or by visiting its website at www.masspolicy.org.

General Requirements

The Master’s Degree in Public Policy and Administration is awarded for completion of a two-year, 48-credit degree program and a full-time summer internship usually taken between the first and second years. The program welcomes part-time students, and offers core courses at times convenient for working students. The internship requirement is waived for part-time students with relevant experience.

Core Course

Core courses are designed to provide students with a strong analytical foundation, applicable to a wide variety of policy and management careers. The following seven core courses are required: Politics of the Policy Process (or Comparative Public Policy), Public Management, Microeconomics for Public Policy and Administration, Research Methods for Public Policy and Administration, Introduction to Statistical Methods for Public Policy and Administration, Public Policy Analysis, and the Capstone Seminar.

Program Electives

Program electives provide students with a deeper understanding of areas that affect professionals in the public and nonprofit sectors. Students are required to take three program electives, one from each of the three sections: Policy, Management, and Methods. The following are program elective courses: Ethics and Public Policy, Comparative Public Policy, Globalization, Nonprofit Management, Information Technology, Organization Theory and Design, Applied Public Sector Economics, Advanced Qualitative Methods for Public Policy and Administration, and Advanced Quantitative Methods.

Electives and Specializations

The program encourages students to take elective courses from the wide array available at the University. In addition to the program electives, elective courses may be chosen to lead to specialization in various fields.

Elective courses may be taken from various departments of the University with the approval of the student’s adviser.

Specializations can be developed to help students build a body of knowledge in a particular area of interest, guide students as they design their program, and connect students with faculty involved in their chosen area of research and teaching. Although not a requirement of the program, some students choose to focus on a particular specialization. Students in the program have specialized in areas including Education Policy, Environmental Policy, Food Science Policy, Health Policy, International/Comparative Policy, Public and Nonprofit Management, Science and Technology Policy, and Social Policy.

In addition, there are substantial resources on campus to develop specializations in information technology, conflict resolution, macroeconomic policy, advanced quantitative methods, labor policy, and media and public policy.

M.B.A./M.P.P.A. Dual Degree Program

The Center for Public Policy Administration and the Isenberg School of Management offer an M.P.P.A./M.B.A. dual degree program. This is a 72-credit program in which students complete the Master of Business Administration and the Master of Public Policy and Administration degrees in two and an half years. The combined degree program allows students who are interested in both policy and public management issues and business administration to pursue an integrated and comprehensive course of study. Graduates would be prepared to move into careers at any level of government and various areas of the private sector. Students complete most of the required M.B.A. coursework in their first year. The second-year students enroll in a combination of M.B.A. and M.P.P.A. courses and complete an M.B.A. practicum. During the summer of the
second year, students complete an M.P.P.A. internship. In the final semester, students complete two M.P.P.A. courses and two electives. Students applying to the M.P.P.A./M.B.A. dual program must meet the respective admission standards for each program. They submit only one application, which is reviewed by both programs. Applicants must be accepted to both programs to enter the M.P.P.A./M.B.A. dual degree program.

Application and Financial Aid

Application for graduate study should be made directly through the Dean of the Graduate School, as described elsewhere in this Bulletin.

Admission to the Master’s program is for the fall semester only.

The program offers teaching and research assistantships to qualified students; these carry a stipend and a waiver of tuition and curriculum fees.

All courses carry 3 credits unless otherwise specified.

601 Politics and the Policy Process

Examination of the influence of political factors, including institutions and interests, on the initiation, formulation, and implementation of public policy. Examines the role of information and expertise in politics.

602 Public Management

Overview of organization theory including theories of administration, motivation, budgeting, decision making, inter-organizational relationships, and ethics. Uses case studies to provide a broad range of policy areas and organizations.

603 Public Policy Analysis

Integrates material from core courses and applies it to actual and hypothetical policy issues in many areas. Looks at social, economic, organizational, political, and other influences on policy decisions. Students complete a client-based project.

604 Program and Policy Evaluation

Examines the relationship between evaluation research and public policy. Introduction to the ways in which evaluations at all levels of government influence and are influenced by the political process.

605 Economics and Public Policy

Introduction to microeconomics theory and policy analysis. Examines economic rationales for and against government policy and the economic consequences of public policy.

606 Applied Public Sector Economics

Examines economic implications of public policy changes. Review of market failure, non-market failure, public expenditure analysis, taxation and tax incidence, fiscal federalism, regulation, and other topics of applied public finance.

607 Policy Methods

Introduction to methodologies for analyzing, implementing, and evaluating public policy. Topics include research methods, participant observation survey research and questionnaire construction, research design, measurement theory and practice, and framing categories.

608 Introduction to Statistical Methods for Public Policy and Administration

Introduction to statistics including use and interpretation of statistics in policy research. Topics include statistical methods, descriptive statistics, probability theory, analysis of tabular data, correlation and regression, and multiple regression.

610 Capstone in Public Policy and Administration

Students synthesize what they learned in the M.P.A. program in a paper that addresses an important gap in knowledge about a particular issue in public policy or management.

621 Conflict Resolution

The theory and practice of conflict resolution. Based on seven principal propositions, explored and dissected through the assigned readings, class discussion, simulations and role-plays, guest lecturers, and individual research.

622 Ethics and Public Policy

Examination of the moral and ethical dimensions of decision making in public policy and administration, including individual responsibility for collective decisions, democratic theory, multiculturalism, and theories of injustice.

630 Nonprofit Management

For students interested in pursuing careers in the nonprofit sector. Covers management topics related to human resources, financial management, and managing for mission.

631 Information Technology

The role of information technology in public and nonprofit settings. Issues related to the management of information systems.
Graduate Faculty


Nathalie Lavoie, Associate Professor and Graduate Program Director, B.S., McGill, 1994; M.S., Saskatchewan, 1996; Ph.D., California at Davis, 2001.


P. Geoffrey Allen, Professor, B.Sc., Nottingham, 1967; M.S., California, 1969; Ph.D., 1972.


Barry C. Field, Professor, B.S., Cornell, 1956; M.S., 1959; Ph.D., California, 1967.


Sheila Mannen, Associate Professor, B.S., Women's Christian College, 1974; M.S., Purdue, 1976; Ph.D., Missouri, 1980.


Christian Rojas, Assistant Professor, B.A., Pontificia Universidad Catolica del Ecuador, 2000; M.A., Virginia Polytechnical Institute and State University, 2003; Ph.D., 2005.

John Spraggon, Associate Professor, B.Math., Waterloo, Canada, 1993; M.A., McMaster, Canada, 1994; Ph.D., 2000.

Thomas H. Stevens, Professor, B.S., Cornell, 1966; M.S., Delaware, 1968; Ph.D., Cornell, 1972.


The department offers Ph.D. and M.S. with Thesis degrees. The primary objective of the graduate program in Resource Economics is to provide graduate students with the advanced economic principles and quantitative tools necessary to function effectively as applied economists. Major fields of study included in the department’s program are: 1) Natural Resource and Environmental Economics, 2) Industrial Organization of the Food System, and 3) Applied Econometrics.

The doctoral degree requirements of the Graduate School apply to the Ph.D. program. The department requires a minimum of 45 credits beyond the B.S. degree. The student’s program of study is developed in accordance with his or her individual objectives. Coursework and Ph.D. qualifying exams in microeconomic theory and quantitative methods are required along with coursework in major and related fields. The Ph.D. student is required to demonstrate research competency by completing a Ph.D. dissertation. No foreign language competency is required.

The general requirements established by the Graduate School apply to the M.S. degree program. The M.S. degree requires 28 course credits plus 6 credits of thesis work. Two semesters each of microeconomic theory and quantitative methods are required. No foreign language competency is required.

All courses carry 3 credits unless otherwise specified.

696 Independent Study in Resource Economics
Independent study and research on selected problems in resource economics. Credit, 1-9.

698 Research Field Essay

699 Master's Thesis
Credit, 3-9.

701 Quantitative Methods
Introduction to quantitative techniques used in resource economics theory and applications. Basic mathematical concepts and methods of microeconomics and their uses in optimization and comparative statics analysis.

702 Econometric Methods
Introduction to econometric methods: the general linear models, nonparametric properties, generalized least squares, and restricted least squares. Also estimation with limited dependent variables, dichotomous choice and causality testing.

703 Topics in Advanced Econometrics

711 Microeconomic Theory I
Basic theory of monopoly and competitive markets; market equilibria; comparative statics; and adjustment process. Analysis of optimizing decisions for firms and consumers; production, cost, and utility functions; comparative static analysis; the derivation of supply and demand curves; risk and uncertainty.

712 Microeconomic Theory II
Principles of welfare economics; introduction to noncooperative game theory; theories of imperfect competition; the provision of public goods and the control of externalities, and the economics of information.

720 Environmental and Resource Economics
Economics of environmental quality and natural resource management; theory of externalities, public goods, and resource extraction. Benefit-cost analyses of natural resource use and preservation of unique resources.

721 Advanced Environmental and Natural Resource Economics
Economic models of renewable and nonrenewable natural resources; introduction to dynamic optimization; and the theory of environmental policy.

732 Industrial Organization I in Resource Economics
Application of industrial organization and strategic management theory to the marketing system. Empirical analysis of market power exertion, including market structure and performance, price discrimination, product differentiation, vertical control, cartel formation and sustainability, mergers, strategic behavior and firm organizations. Applied topics include branding, advertising, tradable pollution emission permits, environmental quality, biotechnology, intellectual property rights, and cooperatives.

791A Seminar in Resource Economics
Credit, 1.

796 Independent Study
Credit, 1-6.

797A Special Topics in Forecasting
Forecasting techniques and econometric time-series modeling. Discovering the data...

797M Industrial Organization II in Resource Economics
Use of advanced industrial organization and related models for analysis of horizontal markets and vertical channels of distribution in the marketing system. Sample topics include market entry, spatial competition, price discovery and transmission, product quality, and vertical restraints of trade.

899 Doctoral Dissertation
Credit, 18.

Graduate Faculty

Donald Tomaskovic-Devey, Professor and Chair of the Department of Sociology, B.A., Fordham, 1979; Ph.D., Boston University, 1984.
Sanjiv Gupta, Associate Professor and Graduate Program Director, B.A., Brandeis, 1989; M.S., Michigan at Ann Arbor, 1992; Ph.D., 1999.
Douglas L. Anderton, Professor, B.S., Utah, 1973; M.S., 1975; Ph.D., 1983.
Enobong A. Branch, Assistant Professor, B.S., Howard, 2002; Ph.D., New York at Albany, 2007.
Emily Erikson, Assistant Professor, B.A., California at Berkeley, 1996; M.A., Columbia, 2002; Ph.D., 2006.
Dan Lainer-Vos, Assistant Professor, B.A., Ben Gurion, Israel, 2000; Ph.D., Columbia, 2008.
Gerald M. Platt, Professor, B.A., Brooklyn College, 1955; M.A., 1957; Ph.D., California at Los Angeles, 1964.
Amy Schalet, Assistant Professor, B.A., Harvard, 1992; Ph.D., California at Berkeley, 2003.
Melissa E. Wooten, Assistant Professor, B.A., Kettering, 1999; Ph.D., Michigan, 2006.

The graduate program in sociology is primarily a doctoral program. All students entering the program with a bachelor’s degree complete the requirements for the M.A. degree en route to the Ph.D. degree. Persons entering with an M.A. degree may be required to take additional courses and/or other training if their M.A. training and course work do not correspond to the requirements for the M.A. degree in this department.

Graduate work in the department prepares students for careers in college or university teaching, social research, or public service. To accomplish this goal, the program is centered on two tasks: 1) the Comprehensive Examination which tests candidates for mastery of substantive subfields of sociology and competency in scholarship and research, and 2) the Ph.D. dissertation, an original contribution to scholarship and research. Students must also fulfill all the general requirements of the Graduate School.

A total of 51 hours of course credit is required for the Ph.D., of which 30 hours is applied to the M.A. degree. Students are required to take a two-semester course in sociological theory, two semesters of statistics, research design, and a writing course.

It is expected that comprehensive examinations will be taken in the second semester of the third year, and certainly not later than the first semester of the fourth year. Students entering the program with an M.A. from another institution should take the examinations in the second year of residence. Students select as their fields of concentration two accepted, broadly defined, areas in sociology. In all instances, the Graduate Studies Committee must approve the fields proposed by
the student. The Comprehensive Examination consists of four parts: 1. colloquium presentation of an original scholarly contribution, ordinarily a research paper suitable for publication in professional journals; 2. take-home examination in one field, or students may do a second paper area in lieu of the take-home examination; 3. proposed graduate course syllabus in the same field as the papers; and 4. an oral examination covering the preceding three parts.

Upon successfully passing the Comprehensive Examination and completing all course requirements, the student is admitted to candidacy for the Ph.D. degree and may proceed with the dissertation. A public oral final examination, not necessarily limited to the dissertation, is also required at its completion.

Applicants for admission to graduate study in sociology are expected to be familiar with fundamental sociological concepts and literatures. Candidates may be asked to remove deficiencies, without receiving graduate credit, prior to or after admission.

Applications for admission are not evaluated until all credentials have been received. These include Graduate Record Examination scores, three letters of recommendation, and a personal statement explaining reasons for application, the student is expected to be familiar with fundamental sociological concepts and literatures. Candidates may be asked to remove deficiencies, without receiving graduate credit, prior to or after admission.

Applications for admission are not evaluated until all credentials have been received. These include Graduate Record Examination scores, three letters of recommendation, and a personal statement explaining reasons for application, the student is expected to be familiar with fundamental sociological concepts and literatures. Candidates may be asked to remove deficiencies, without receiving graduate credit, prior to or after admission.

All courses carry 3 credits unless otherwise specified.

701 The Development of Sociological Theory
Selected European and American contributors and their systems of theory, in biographical, historical, and sociological perspective. Consent of instructor required.

702 Contemporary Sociological Theory
Modern sociological theory from 1920 to present. Prerequisites: SOCIOL 282 and 701, or consent of instructor.

704 Advanced Sociological Theory
Methodological analysis of contemporary sociological theory. Emphasis on theory construction, formalization and evaluation. Prerequisite: SOCIOL 701 and 702 or consent of instructor.

710 Research Methods I
Logical analysis of sociological inquiry; survey of major research techniques and examination of principal methodological problems in sociology.

711 Intermediate Statistics
A second statistics course for the social sciences. Topics include multiple regression analysis, use of qualitative independent variables, interaction effects, nonlinear effects, other topics related to the general linear model. Introduction to logistic regression. Prerequisite: a prior statistics course. Undergraduate students accepted with consent of instructor.

712 Graduate Statistics for the Social Sciences II
An intensive introduction to general linear models (multiple regression, analysis of variance, violations of regression assumptions, alternative estimation methods, simultaneous equation models) and qualitative data analysis (logistic regression, linear models and event history analysis). Prerequisite: SOCIOL 711 or consent of instructor in spring semester in time for any assigned summer preparation.

714 Research Methods II
Research techniques in sociology, including: formulating research objectives; collecting, processing, and analyzing data for a project organized around the problems of measurement in sociology.

715 Survey Design and Analysis
Design and analysis of sample surveys. All pertinent topics in design and analysis of survey data, including sampling, measurement, questionnaire design, field operations, coding and data reduction, scale and item analysis, mail and telephone surveys, interviewing techniques, and data analysis issues.

722 The Family
Examines trends and changes in U.S. family life—marriage, divorce, childbearing, gender roles—from a variety of theoretical perspectives, using demographic, historical, and ethnographic research sources.

723 Race and Ethnicity in the Sociological Imagination
Seminar emphasizing the social and historical construction of race, persisting patterns of racial and ethnic inequality, and the nature of racial privilege in the U.S. context of the Post-Civil Rights Era.

724 Social Class Inequality
The growing inequality of income and the erosion of the welfare state in the contemporary U.S., with some European comparisons. The contribution of several phenomena to these changes examined, including the decline of marriage, the increase in immigration, the expansion of the prison population, the growth in the service sector, the globalization of markets, and the success of “centrist” politics.

725 Political Sociology
The construction, legitimation, and delegitimation of political power; the formation of states, their expansion, and rebellion and revolution. Focus upon major theoretical perspectives, including pluralist, statist, institutionalist, class, feminist, and race-centered theories.

726 Complex Organizations
Overview of theories of organization structure, motivation, change efforts; impact of “globalization” on leaner, flatter structures; the effects of stock prices and institutional investors on management decisions, regarding outsourcing, downsizing, mergers.

728 Social Movements
Analysis of the origins and structure of social movements, including studies of selected movements.

741 Criminology
Criminological theories, past and present; emphasis on present research trends as they relate to theoretical formulations. Consent of instructor required.
Historical Demography
Seminar. Analysis of past demographic records from a contemporary demographic-sociological perspective. Develops familiarity with the variety of sources—parish registers and civil registrations, enumerations and censuses, genealogies and population registers, and organizational and institutional records—used in historical demographic research. A variety of analytical methods for historical application illustrated through discussions of the major substantive issues in population history.

Comparative Historical Methods
Fieldwork and Interviewing
Sexuality and Social Theory
Social Networks and Analysis
Classical Theory
Gender Seminar
Comparative Welfare State
Political Sociology II
Labor Force Inequality
Cultural Sociology
Transitional Feminist Movements
World Systems
Gender and Society
Concepts of gender including: influential historical processes; the contemporary creation of gendered identities and relations; the ‘multiplicity’ of gender and resulting conflicts and alliances; relation to politics and power; inequalities of gendered labor; and movements for change. Also specific topics designed to meet class members’ interests.

Families and Work
Work, families, and their changing relationship. Historical legacy of separation of work and families. Broad range of contemporary work and contemporary family structure. Movements for change implemented or resisted by the state and professionals, employers and unions. Also specific topics designed to meet class members’ interests.

Gender and Employment
Sexuality, Politics and Policy
Seminar on Race
Post-Colonial Theory
Race, Ethnicity and Immigration

Queer Theory
Teaching Sociology
Economic Sociology
Theory of Globalization
Ethnography
Race and Nation in Comparative Perspective
Science and Technology
Time Use: Theory and Empirical Analysis
Doctoral Dissertation Credit, 18.

Sport Management

Graduate Faculty
Lisa Pike Masteralexis, Associate Professor and Head of the Department of Sport Management, B.S., Massachusetts, 1987; J.D., Suffolk University Law School, 1990.
Stephen M. McKelvey, Associate Professor and Graduate Program Director, B.A., Amherst College, 1981; M.S., Massachusetts at Amherst, 1986; J.D., Seton Hall, 1992.
Carol A. Barr, Associate Professor, B.S., Iowa, 1983; M.S., Massachusetts at Amherst, 1991; Ph.D., 1994.
Sheranne Fairley, Assistant Professor, B.Business, Griffith University, Australia, 1998; Ph.D., 2006.
Kevin R. Filo, Assistant Professor, B.A., Wisconsin at Madison, 1998; M.S., Texas at Austin, 2004; Ph.D., Griffith University, Australia, 2008.
Mark A. McDonald, Associate Professor, B.A., Warren Wilson College, 1985; M.B.A., A.B., Freeman School of Business, Tulane University, 1988; M.S., Massachusetts, 1991; Ph.D., 1996.
Glenn M. Wong, Professor, B.A., Brandeis, 1974; J.D., Boston College Law School, 1977.

Curricular Requirements
Courses of study leading to both the M.S. and Ph.D. degrees are available through the department. These are described in detail on the Sport Management Department website: www.isenberg.umass.edu/sportmgt.

Master of Science
(30 credits)
Required are 623 Sport Marketing, 635 Sport and the Law, 636 Sport Organizational Behavior and Development, 661 Social-Historical Foundations of Modern Sport, 680 Sport Management
Policy, 624 Sport Finance and Business, 693A Applied Sport Marketing Research, and 694B Professional Development in Sport Management. Also required: 6 credits of elective courses plus 698 Practicum in Sport Management (6 cr.) or 699 Master’s Thesis (6 cr.) or two more elective courses (6 cr.).

M.B.A./M.S. Sport Management Dual Degree
(72 credits)
For students interested in an education that combines strong foundational work in business and an in-depth curriculum in sport management, the Isenberg School of Management offers an M.B.A./M.S. Sport Management dual degree. Students complete most of the required M.B.A. coursework (42 credits) during their first year and then focus on the M.S. Sport Management degree (33 credits) in the second year. During the summer between their two years of study, students complete a six-credit internship with a sport organization in an effort to learn more about the sport industry and their future career trajectory. Students applying to the M.B.A./M.S. dual degree program submit one application. However, that application is reviewed by both the M.B.A. program and the M.S. Sport Management program. Applicants must be accepted to both programs to be accepted to the M.B.A./M.S. Sport Management dual degree program.

Ph.D.
The department offers a Ph.D. in Management with a concentration in Sport Management. For further information, see the Management section of this Bulletin.

All courses carry 3 credits unless otherwise specified.

591, 592, 593, 594, 595 Seminar
Various topics related to the management, business, and financial functions of sport organizations.

594B Sport Event Management
Topics essential to the management of sports events: finance, sponsorship, advertising, public relations, site preparation, tournament operations and risk management. Theoretical understanding enhanced through application of information to an actual event. Mr. McDonald

595B Advanced Sport Marketing–Sales
Experiential learning course, providing students with an understanding of various sales methodologies used in sport organizations and teaches students to effectively design and implement sales campaigns. Mr. McKelvey

623 Sport Marketing
Concepts of marketing applied to professional, collegiate, amateur, and corporate settings. Emphasis on strategic marketing planning, marketing communication, branding, sponsorship development and fit, and promotional strategies and activities. Mr. Gladden

624 Sport Finance and Business
Analysis of the financial issues related to the operation of public and private sport organizations. Specific topics include: structure of sport industry; determinants of profitability; forms of ownership, taxation, and financing. Mr. Longley

635 Sport and the Law
The law as it applies to professional and amateur sport organizations. In-depth analysis of contract law, tort law, constitutional law, administrative law, antitrust law, labor law, collective bargaining, and arbitration as it relates to sport. Ms. Masteralexis

636 Sport Organizational Behavior and Development
Analysis of nature and scope of the sport enterprise; investigates organizational behavior within the management of sport organizations; explores the area of human resource management; examines contemporary social problems and the future of sport. Mr. Lachowetz

661 Social-Historical Foundations of Modern Sport
Critical historical analysis of sport as a social structure in the U.S. Key areas of exploration include sport as a cultural product, social relations within sport, sport management structures, and contemporary social issues. Mr. Crosset

676 College Athletics
Analysis of the organizational structures within college athletics, investigation of the management of college athletic departments and organizations, and discussion of the contemporary issues affecting college athletics. Ms. Wong

680 Sport Management Policy
Provides students with the skills and knowledge for building and sustaining sport organizations. Students required to take a multidisciplinary approach, applying concepts from law, marketing, finance, organizational behavior/development, and sociology. Mr. McDonald

688 Sport Labor Relations
Analysis of labor relations in the professional sport industry. Emphasis on negotiation, arbitration and the laws of contracts, antitrust, agency, and labor relations. Examination of the collective bargaining process through negotiation project. Ms. Masteralexis

691, 692, 693, 694 Seminar
Various topics related to the management, business, and financial functions of sport organizations.

692A Economics of Sports
Students use economic analysis to study a wide variety of issues affecting the sport industry. Both professional and college sports examined. Mr. Longley

693A Applied Sport Marketing Research
Survey design, implementation and analysis relating to sport audiences and consumers with a focus on brand management theory. Students participate in market research projects in conjunction with regional and national sport organizations. Lecture and field work. Ms. Schoenadel

694B Professional Development Seminar
A comprehensive overview of the various segments within the sport industry. Students assess their own personal and career interests and learn how to effectively research jobs, choose careers in line with interests, and market themselves to prospective employers. Credit, 2. Mr. McKelvey

696 Independent Study
Special projects, studies, or research. Credit, 1-6.

697A International Sport Management
Promotes critical thinking and understanding of international cultural issues as related to sport. Ms. Fairley

698 Practicum in Sport Management
Participation in management of a sport organization. Students work as interns within a diverse area of the sports industry: professional, collegiate, amateur or private corporations. Prerequisite: 3.00 GPA. Pass/ Fail only. Credit, 6.

699 Master’s Thesis
Credit, 6.

791, 792, 793, 794, 795 Seminar
Various topics such as research in sport management/theory.

796 Independent Study
Credit, 18.
The department of the theater at the University of Massachusetts Amherst offers professional training programs in directing and dramaturgy, and in costume, lighting, and scenic design. Graduates of the three-year program receive Master of Fine Arts degrees and are prepared to work in resident professional theaters, in colleges and universities, and in many other areas of performance. The program normally takes three years to complete. Graduates include actor Bill Pullman, director Greg Leaming, playwright Constance Congdon, and production designer Douglas Kramer.

The graduate program values personal mentorship, with the production season serving as a teaching laboratory. Students are able to tailor their programs of study to individual interests as a complement to the rigorous core curriculum. Most graduate students receive full tuition waivers and assistantships throughout the entirety of their three years.

The graduate program begins with a first year designed to create community and a shared language. Group studio focuses on models of collective experience and imagination. First-year students also take Text Analysis, which examines play texts as structures that imply potential productions. First-year students participate in production through the studios and workshops in their areas of specialty.

In the second and third year, students take courses in the world repertory and focus more closely on their M.F.A. program area: directing, design or dramaturgy. Depending on their interests, students may also take advantage of the academic resources of the University as a whole and the other institutions in the Five College consortium. All programs culminate in a third-year thesis project.

Graduate students are full participants in the Department of Theater production season, working collaboratively under the guidance of faculty artists. In an average year, the Department of Theater presents four to five fully mounted main stage productions. It also hosts a number of other coproductions and special events. Additionally, there are numerous opportunities for studio and lab work.

Outside the academic course of study, students in the design program sometimes assist faculty designers with their professional commitments. Departmental relationships with regional companies also give graduate students opportunities to undertake internships at such places as New WORLD Theater and Hartford Stage.

Applicants follow the procedures for admission established by the Graduate School at the University of Massachusetts Amherst. In addition, the Department of Theater requests that applicants submit a complete resume of production experience. Applicants in dramaturgy or directing must provide at least two sample essays which demonstrate research, analytic, and writing skills. Dramaturgy applicants may provide essays consisting of dramatic criticism, historical production research or criticism of witnessed theatrical performances. Directing applicants must provide essays on plays they have directed or would like to direct. Preference is given to applicants in dramaturgy who are proficient in a second language. Those who intend to focus their graduate training in design must provide a portfolio in a format of the applicant’s choosing. The portfolio may include renderings, photographs or slides of models and executed projects, or samples of graphic design. Descriptive accounts of each item in the portfolio should be included. Portfolios are returned upon request. After the faculty has reviewed all completed applicant files, those candidates selected for consideration are invited to campus for an interview. In some instances, this may be replaced by a regional or phone interview.

Completed application forms, transcripts, letters of recommendation and GRE scores should be sent directly to: Graduate Admissions Office, 530 Goodell, University of Massachusetts, Amherst, MA 01003.

Essays, portfolios, and other supporting materials should be sent to: Graduate Program Director, Department of Theater, 112 Fine Arts Center, University of Massachusetts, 151 Presidents Drive Ofc. 2, Amherst, MA 01003-9331. For more information, visit the website www.umass.edu/theater or call (413) 545-3490.

All courses carry 3 credits unless otherwise specified.

620 Theater in Society
The study of theatrical performance—text, acting, performance space, elements of spectacle, audience—in relation to changing social, economic, political, and aesthetic movements. Explores the widest possible range of theatrical conventions available to the theater artist. Focus on research techniques.

650 Acting Theory
Reading and practical research in the major theoretical treatises on the art of acting.

651 Directing Theory
Reading and practical research on the major theoretical treatises on the art of directing.

680 Group Studio
Approaches to collaboration in theater and other disciplines studied and explored through reading, discussion, and exercises in practical application. Graduate designers, directors, and dramaturgs encouraged to develop a shared understanding of collaborative processes and a common vocabulary of collaborative experiences to expand their understanding of the theatrical mode of production.

696-796 Independent Study
Independent projects by special contract. Credit, 1-6.

697-797 Special Topics
Reading and research in selected topics in dramaturgy, performance, and scenography. Examples include: World Drama: Contemporary Movements; Race and the American
Theater; Dramaturgy in Action: Towards an Inclusive Theater. Credit, 1-3.

728 Playwriting Workshop
Tutorial scripting, individually arranged, primarily for degree students concentrating in playwriting. Disciplined writing in private; regular critical consultation with the major professor in playwriting; rehearsal, analysis, and performance of the playwright’s original material in studio projects, and with faculty directors. Credit, 3-6.

729 Dramaturgy Workshop
Individually planned projects in production research and analysis. Credit, 3-6.

730 Textual Analysis
Seminar. The close reading of dramatic texts for contemporary production. Focus on finding original answers to directorial, design, and dramaturgical questions. Dramatic texts selected from a broad spectrum of world repertory.

750 Directing Studio
Problems in play direction. Work chosen and closely supervised by the performance faculty and presented in a production format determined by the student’s current needs and abilities and demands on the department’s performance facilities. Credit, 1-6.

760 Scenic Design Studio
A working studio in which scenic design students and faculty take on specific responsibilities for departmental productions. Depending on the needs and competence of the individual student, the work may include researching, conceptualizing, drafting, and designing all ongoing productions. Special attention to portfolio development. Credit, 3-6.

761 Lighting Design Studio
Tutorial projects in design theory and conceptualization and the solving of related technical problems. Over a three-year period, the course covers lighting technology, technical and artistic problem solving, graphics, research, critical and analytical skills, visual light lab projects, and portfolio development. Design, assistant design, and technical assignments on Department of Theater productions.

762 Costume Design Studio
Design and technical assignments on Department of Theater productions and varied tutorial projects in design and related technical problem-solving. May include research techniques, conceptualization, the study of characterization, elements of design, rendering techniques, draping, tailoring, make-up, and portfolio development.

769 Scenography Workshop
Special projects in concentrated periods of time on advanced topics in crafts of scenography such as scenic painting, furniture design and construction, make-up, use of plastics, millinery and wig construction, cobblerly, electronic control systems and their maintenance. Credit, 3-6.

799 M.F.A. Project
Culminating creative project in the degree program. Prerequisite: degree candidacy. Credit, 1-10.

Wildlife and Fisheries Conservation

Graduate Faculty

Paul R. Fisette, Professor and Head of the Department of Natural Resources Conservation, B.S., Massachusetts at Amherst, 1983; M.S., 1985.

Kevin McGarigal, Associate Professor of Landscape Ecology and Graduate Program Director, B.S., Virginia Polytechnic Institute, 1983; M.S., Oregon State, 1988; Ph.D., 1993.


Todd K. Fuller, Professor of Wildlife Ecology, B.Sc., California at Davis, 1975; M.Sc., Wisconsin, 1979; Ph.D., 1988.

Curtice R. Griffin, Professor of Wildlife Biology, B.A., Evergreen, 1974; M.S., Missouri, 1978; Ph.D., 1985.

Francis Juanes, Professor of Fisheries Biology, B.S., McGill, 1982; M.S., Simon Fraser, 1987; Ph.D., New York at Stony Brook, 1992.


Timothy O. Randhir, Associate Professor of Watershed Management and Water Quality, B.S., Annamalai, 1982; M.S., Tamil Nadu Agricultural University, 1988; Ph.D., Purdue, 1995.

Charles M. Schweik, Associate Professor of Technology and Environmental Policy, B.A., SUNY College at Potsdam, 1984; M.P.A., Syracuse, 1991; Ph.D., Indiana, 1998.


Adjunct/Associate Faculty

John G. Boreman, Deputy Center Director, Northeast Fisheries Science Center.

Doctor of Philosophy Degree Program in Wildlife and Fisheries Conservation

Students completing the Master’s degree at the university or elsewhere may be accepted into our doctoral program but are formally admitted to candidacy only after the completion of a successful written and oral preliminary comprehensive examination based on concepts in general biology, ecology, fisheries and wildlife science and management, and such other areas as may be stipulated by the student’s Guidance Committee. Selection of courses is done by the student and the Guidance Committee and usually extends into areas beyond biology, leading the student towards competency in independent research in either fisheries or wildlife conservation. A reading knowledge of one or more foreign languages sufficient to understand journal material may be required of doctoral students in certain areas of specialization. The degree normally requires at least three years of study beyond the Master’s degree.

Master of Science Degree Program in Wildlife and Fisheries Conservation

Applicants normally come from undergraduate biological backgrounds or from applied areas such as fisheries or wildlife. Students with backgrounds in areas tangential to the field of resource conservation may apply with the understanding that deficiencies could extend their time in the program; normally, two to three years are required for the completion of the Master’s degree. Candidates normally write theses worth 10 hours of credit and are given a final oral examination upon its completion. Students completing a thesis must take in addition a minimum of 20 graduate credits, at least 6 of which must be earned in 600-800 series courses. There is no language requirement for the Master’s degree.

Alternatively, some students may choose to complete a professional Master’s degree with a concentration in one of several particular areas of study previously outlined by the faculty. These non-thesis options require 30 academic credits (of which more than 12 must be 600- to 800-level courses) and a 6-credit practicum with a professional agency or organization. Two years are required for the completion of most options.

Professional Degree Concentrations are Wetlands Conservation, Watershed Science and Management, Spatial Data Analysis and Remote Sensing, Human Dimensions, and Conservation Education and Outreach.

General Information

Staff and facilities are available for supporting research in wildlife ecology, habitat management, landscape ecology and management, and conservation biology; and estuarine, anadromous, marine and freshwater fisheries research as well as in the broader areas of natural resource management. Graduate training is required for professional entrance into state, federal, and private employment in resource management and into teaching positions stressing applied ecological principles in both secondary and college-level programs. Applicants are encouraged to correspond with the Graduate Program Director in the department for answers to specific questions, but all application materials should be sent directly to the Graduate School; scores from the Graduate Record Examination must accompany all applications. Research support at both the master’s and doctoral level is frequently available either from grants to individual faculty members or through support provided by the Massachusetts Division of Fisheries and Wildlife, Massachusetts Division of Marine Fisheries and the U.S. Geological Survey Biological Research Division or other agencies. Undergraduates receiving wildlife or fisheries degrees from the University of Massachusetts are strongly urged to apply to other universities in order to vary their professional training.

All courses carry 3 credits unless otherwise specified.

NRC 549 Ecosystem Management (2nd sem)

Explores the historical context and key contributing ecological concepts of ecosystem management and alternative approaches for its implementation. Prerequisite: senior or graduate status in Natural Resources Conservation or consent of instructor. Credit, 4. Mr. McGarigal

NRC 592G Introduction to GIS for Natural Resources Management (1st sem)

Introduces students to the construction, display, and analysis of spatial information using Geographic Information Systems. Hands-on use of ArcGIS on a PC platform. Mr. Schweik
NRC 697D Social Conflict and Natural Resource Policy (1st sem)
Introduction to the social factors that influence social value formation, and how the different meanings and values ascribed to natural resources in modern society contribute to political conflicts over resource allocation and management. Develops awareness of strengths and limitations of approaches, tools, and techniques of conflict resolution in policy development. Mr. Sievert

NRC 697E Human Dimensions of Resource Management (2nd sem, odd yrs)
The social, behavioral, economic, and political aspects of natural resource management. Introduction to the concept of Human Dimensions, resource management as an expression of social value, and the contemporary resource management paradigm having Human Dimensions as a central component. Review of theoretical foundation, and case studies. Mr. Loomis

NRC 697F Information Technologies in the Public and Non-Profit Sectors (2nd sem)
Discussion of information technology management issues in public and non-profit organizations. Web system development, information technology planning, and relational database applications. Mr. Schweik

NRC 621 Landscape Ecology (1st sem, odd yrs)
Introduction to the evolving discipline of landscape ecology, with emphasis on the theoretical underpinnings. Focus on ecological scaling; landscape structure; agents of landscape structure; consequences of landscape structure to populations, communities, and ecosystem processes; landscape dynamics; and landscape management. Emphasis on modeling. Prerequisite: graduate standing in Organismic and Evolutionary Biology or Wildlife and Fisheries Conservation, Forestry, or consent of instructor. Credit, 4. Mr. McGarigal

NRC 697I Wildlife Habitat Management (1st sem, even yrs)
The dynamics and management of forested, open woodland, and savanna habitats in North America and elsewhere. Topics include wildlife ecology, habitat classification, resource utilization, impacts on humans, and management techniques. Prerequisite: W&FCONSV 261. Credit, 4. Ms. McComb

NRC 697J Wildlife Population Dynamics and Management (1st sem)
Basic techniques and concepts of the management and population dynamics of wildlife populations; emphasis on estimating animal population parameters, development of population growth models, and principles of population management. Includes field and laboratory techniques for estimating population parameters for wildlife. Prerequisites: W&FCONSV 261, RES-ECON 211 or Introductory Statistics. Credit, 4. Mr. Griffin

NRC 565 Wildlife Population Dynamics and Management (1st sem)
Basic techniques and concepts of the management and population dynamics of wildlife populations; emphasis on estimating animal population parameters, development of population growth models, and principles of population management. Includes field and laboratory techniques for estimating population parameters for wildlife. Prerequisites: W&FCONSV 261, RES-ECON 211 or Introductory Statistics. Credit, 4. Mr. Griffin

NRC 597W Advanced Watershed Management (2nd sem)
Seminar on the latest topics and research in watershed management. Students lead, and discuss research papers, write critical summaries, and develop a review paper on a topic. Mr. Randhir

564 Wildlife Habitat Management
The dynamics and management of forested, open woodland, and savanna habitats in North America and elsewhere. Topics include wildlife ecology, habitat classification, resource utilization, impacts on humans, and management techniques. Prerequisite: W&FCONSV 261 or equivalent. Ms. McComb

571 Fisheries Science and Management
Introduction to the principles of fish stock assessment, with emphasis on harvest modeling and forecasting techniques. Implications of overfishing and habitat degradation. Prerequisite: W&FCONSV 470. Credit, 4. Mr. Juanes
577 Ecosystem Modeling and Simulation  
(1st sem, odd yrs)

Systems modeling and analysis used to understand the complexities of natural systems. System representations, modeling, experimentation, optimization, and policy modeling. Computer modeling using Stella and GIS. Cross-listed with FOREST 577. Mr. Randhir

587 Digital Remote Sensing  
(2nd sem)

Computer processing of digital images as a means of obtaining information about natural resources. LANDSAT images primarily used. Image processing, classification, and image enhancement techniques discussed and applied. Mr. Finn

597M Water Resources Management and Policy  
(1st sem, even yrs)

Concepts in water resources management through regional and global ecosystems, systems analysis and planning, water management, and conservation and policy. Mr. Randhir

597W Wetlands Assessment and Field Techniques  
(2nd sem, odd yrs)

Supplemental field techniques to provide in-depth information on the Massachusetts wetlands regulatory program. Also field techniques for wetlands classification, boundary delineation, wetland plant identification, and wildlife habitat evaluation. In-class and field sessions to develop essential skills needed to conduct a wetlands environmental review as required under the Massachusetts Wetlands Protection Act. Consent of instructor required. Mr. Griffin

697A Conservation Biology  
(2nd sem, even yrs)

Seminar reviewing the ecological principles of conservation biology and strategies used to conserve biological diversity. Emphasis on ecological, community, and population processes. Topics include conservation genetics, population demography and viability analyses, and insular ecology, including edge effects, habitat fragmentation, connectivity, and reserve design. Journal articles provide case histories for examining conservation strategies. Mr. Griffin

697I Interpretation of Ecological Data  
(all yrs)

Examines the literature to see how basic analysis tools are interpreted for common ecological problems. Examples of different types of research questions, related approaches to analyses, and use of technical knowledge of the organism and the system to try to interpret the analyses in a meaningful way. Prior statistics and ecology courses required or a willingness to do extra work to keep up. Ms. Mather

697R Trophic Dynamics  
(2nd sem, odd yrs)

Seminar exploring predator-prey dynamics from theoretical and empirical perspectives. Students analyze and interpret large food habits databases and lead weekly discussions on selected topics. Mr. Juanes

697U Urban-Suburban Wildlife Ecology and Management  
(1st sem, even yrs)

Current topics in urban wildlife ecology, such as altered biotic community structure, invasive species, altered trophic dynamics, urban evolutionary biology, and urban ecological theories. Other issues and topics determined by the composition of student enrollment. Ms. Warren

697V Urban-Suburban Wildlife Ecology and Management Lab  

Credit, 1. Ms. Warren

699 Master’s Thesis  

Credit, 1-10.

720 Ecological Interactions of Fishes  
(2nd sem, even yrs)

Overview of fish population interactions with their biological environment. Consent of instructor required. Ms. Mather

757 Advanced Fisheries Management  
(1st sem, odd yrs)

Scientific basis for modern fisheries management, emphasizing coldwater fishes, anadromous species, large reservoir and river fisheries, and conflicts of interest with other water uses. Mr. Juanes

758 Advanced Wildlife Research and Management  
(1st sem, even yrs)

A discussion course with varying current topics in wildlife management, including habitat assessment and management, migratory bird management and conservation, and suburban wildlife ecology and management. Mr. Fuller

768 Advanced Wetland Ecology  
(2nd sem, odd yrs)

Ecological functions and assessment of resource values of wetlands. Major wetlands of the world used as case history studies. Consent of instructor required. Mr. Griffin

791 Seminar: Communicating Science  

Final presentations of research by Wildlife and Fisheries Conservation graduate students. Credit, 1. Mr. Fuller

796 Independent Study

Credit, 10.

899 Doctoral Dissertation  

Credit, 10.
Certificate Programs

Advanced Feminist Studies Graduate Certificate

The Graduate Studies Committee of the Women’s Studies Program administers the certificate program and advises interested students. Committee members are:

Joyce Berkman, Professor of History
Marta Calás, Associate Professor of Management
Nancy Campbell Patteson, Graduate Program Coordinator
Laura Doyle, Professor of English
Nancy Folbre, Professor of Economics
Linda Smircich, Professor of Management
Ximena Zuniga, Associate Professor of Education

Women’s Studies Faculty


Alexandrina Deschamps, Associate Professor, C.Ed., West Indies, 1975; M.A., Massachusetts, 1975; Ed.D., 1996.

Dayo Gore, Assistant Professor, B.A., Northwestern, 1993; Ph.D., New York University, 2003.


Sarah Richardson, Assistant Professor, B.A., Columbia, 2002; Ph.D., Stanford, 2008.

Svati Shah, Assistant Professor, B.A., North Carolina at Chapel Hill, 1992; Ph.D., Columbia, 2006.


In addition to the Women’s Studies faculty, the Certificate in Advanced Feminist Studies draws upon associated faculty in other University departments. Women’s Studies faculty and associated faculty are available to serve students as advisers in their graduate studies. Teaching faculty for the Certificate in Advanced Feminist Studies vary each semester depending upon course offerings.

The Program

The Graduate Certificate in Advanced Feminist Studies is an interdisciplinary program designed to broaden and enrich disciplinary scholarship for students enrolled in a master’s or doctoral degree-granting program. The purpose of the certificate is to enable students interested in feminist scholarship to pursue a coherent, integrated curriculum in the field and to credential them as knowledgeable in Feminist Studies, thus qualifying them for positions requiring such expertise. Students work closely with faculty and associated faculty from Women’s Studies and with a faculty adviser from their degree-granting discipline. Students completing the certificate will have the opportunity to bring a feminist perspective to bear on the practices and ideas of their own discipline, thereby increasing the body of feminist theory and research.

Admission to the certificate program is contingent upon: 1) prior acceptance to the Graduate School of the University into a graduate degree-granting program; or 2) after completion of a graduate degree and acceptance to the Graduate School as a non-degree student.

The candidate should demonstrate a commitment to, and evidence of, research or organizational experience in feminist concerns. Knowledge of feminist scholarship is expected, but an undergraduate major in Women’s Studies is not required.

Requirements

The program consists of the following requirements to fulfill the minimum 15 credits:

1. Five Women’s Studies approved courses:
   A. Two core Women’s Studies courses:
      1. WOMENSST 791B Feminist Theory: A background in theory is required for admission and, in addition, this Women’s Studies course is both a foundational core requirement and a prerequisite for WOMENSST 691B Issues in Feminist Research. Course content explores paradigms of feminist theory from the interaction of race, class, gender, and sexuality in a national and/or global perspective. This course is offered fall semester only.
      2. WOMENSST 691B Issues in Feminist Research Seminar: A three-credit methods seminar that includes readings on questions of feminist methodology and ethics of research. This course is restricted to certificate students and offered spring semester only.
   B. Two interdisciplinary electives from the following approved categories:
      1. Feminist Approaches to History, Literature and the Social and Natural Sciences: Students choose an approved elective focusing primarily on women’s roles, issues and concerns, and are guided by feminist principles.
      2. Intercultural Perspectives: Students choose an approved course that examines the lives of populations of women of color.

A list of approved courses may be obtained from Nancy Campbell Patteson, Graduate Program Coordinator, 208 Bartlett Hall, tel. 545-1922.

C. WOMENSST 793A Final Research Project:

In addition to the coursework, all certificate students must complete a Final Research Project. A committee of two faculty mentors must be named and a research prospectus submitted for approval to the Graduate Certificate Program Director before starting work on the final research project. Once approved, students are expected to work closely throughout the project with both committee members and the Women’s Studies Graduate Certificate Program Director.

Research project options include but are not limited to a master’s thesis or doctoral dissertation, a publishable research paper or project of outstanding quality, a book chapter, a performance or multimedia presentation. Whatever the field of study, the research project must focus on the intersection of race, class, gender, sexuality and, if relevant, transnational issues. It can be developed from: a) a paper submitted to meet one of the core requirements; b) prior research; c) a practicum or other project.

The project is evaluated by the committee of faculty mentors. A final copy of the research project to is to be filed with the Women’s Studies Program.

Students completing the certificate are eligible to apply for the Glennie L. Jones Memorial Award for Outstanding Graduate Feminist Scholarship, an award sponsored by an undergraduate alumna.

Courses are offered and coordinated by core, adjunct, and associated graduate faculty of the Women’s Studies Program. A program coordinator is available for advising and the Graduate Program Director provides supervision of research.

For further information, contact the Women’s Studies Program, 208 Bartlett Hall, University of Massachusetts, Amherst, MA 01003, tel.: (413) 545-1922; fax: (413) 545-1500; website: www.umass.edu/wost; and email: womens-studies@wost.umass.edu.

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The Graduate Certificate in African Diaspora Studies (ADS) is organized through the graduate program in the W.E.B Du Bois Department of Afro-American Studies. In addition to the Du Bois Department faculty members and affiliated faculty in other campus departments, participating faculty from Amherst, Hampshire, Mount Holyoke and Smith Colleges may offer courses in the ADS certificate program. The ADS Coordinator is Professor A. Yemisi Jimoh, who administers the program in conjunction with a rotating ADS Advisory Council made up of faculty members from the Five College consortium.

Participating Faculty:
All Faculty of the W.E.B. Du Bois Department
Sonia Alvarez, Professor of Political Science
and Center for Latin American, Caribbean,
and Latino Studies
Joye Bowman, Professor of History
Ginetta E.B. Candelario, Associate Professor of
Sociology and Latin American and Latina/o
Studies, Smith College
Tanya Fernando, Assistant Professor of English
John Higginson, Professor of History
Daphne Lamothé, Assistant Professor of Afro-
American Studies, Smith College
Augustine Laó-Montes, Assistant Professor of
Sociology
Kara Lynch, Associate Professor of Video Pro-
duction, Hampshire College
Roberto Marquez, Professor of Latin American
Studies, Mount Holyoke College
Dorothy Mosby, Associate Professor of Spanish, Mount Holyoke College

Purpose
The purpose of the ADS graduate certificate is to provide specialized credentials for individuals whose intellectual and professional interests would be enhanced by advanced study of diverse peoples and by studies in internationalism. The certificate also prepares its awardees to teach and to conduct advanced research in this specialized and increasingly important area of African American studies.

The Program
The faculty in the Graduate Certificate Program in ADS engage students in the scholarly study of the African Diaspora within the context of the historical, political, and social reality as well as the consequent aftermath of slavery, colonialism, neo-colonialism, and imperialism. In this cross-disciplinary program, ADS faculty members also place special emphasis on the aforementioned issues in relation to their various intersections among African descendants in the Caribbean and the Americas.

Requirements
Five content courses, AFROAM 790A Diaspora Research course, and a publication-quality paper or an approved scholarly project. Content courses are to be selected from among the following:
1. AFROAM 690E African Diaspora/Pan-
Africanism: Foundational Theories and
Concepts
AFROAM 690F Special Topics in African
Diaspora Studies
2. One or more content courses from the ADS
course list, available from the ADS Coordi-
nator
3. Two elective content courses (approved by
the ADS Coordinator) on Diaspora-related
topics, selected from the current course of-
ferings of all participating faculty. Students
are strongly encouraged to select one course
that provides a substantial focus on a Diaspora
group other than the African Diaspora. For
gradient students in the Du Bois Depart-
ment’s Ph.D. program, elective courses that
apply to the requirements toward the Graduate
Certificate in African Diaspora Studies cannot
be applied to the Ph.D. degree.

For AFROAM 790A Diaspora Research
course and the Scholarly Paper or Project, stu-
dents will select an ADS faculty member to lead
the course and two additional faculty members,
selected by the student in consultation with the
lead faculty, to comprise a three-person commit-
tee to guide the final paper or project.

As part of AFROAM 790A Diaspora Research,
students in the ADS program must also present
a public talk that focuses on their publication-
quality paper or on their scholarly project. With
the approval of a student’s graduate degree-
granting program and the ADS Coordinator,
the public talk for the Graduate Certificate in ADS
may be presented as part of the master’s thesis
or doctoral dissertation defense. In such cases,
a substantial portion of the thesis must focus on
issues related to the African Diaspora among
peoples in the Caribbean and/or the Americas.

The Graduate Certificate Program in ADS will
not accept transfer credits; all courses must be
selected among those offered by faculty from
the Five College consortium during the student’s
course of study for the Graduate Certificate in
ADS; that is, course work applied to a degree
received before admission to the ADS program
will not be applied to the ADS certificate.

Admission
The Graduate Certificate Program in ADS welcomes applications from persons who have gained admission into a graduate degree-granting program at the University of Massachusetts Amherst or have earned a bachelor’s or graduate degree from an accredited university and have made application for and gained admission to the University of Massachusetts Amherst as a non-degree student through the Graduate Ad-
missions Office.

All applicants for the Graduate Certificate in ADS must demonstrate a basic familiarity with the scholarship in Diaspora studies along with strong research and analytical skills.
Cognitive Science
Graduate Certificate

The Cognitive Science Certificate Steering Committee administers the certificate program and considers student requests to join the program. Current members are:
Kyle Cave, Psychology, convenor
Jane Baran, Communication Disorders
Roderick Grupen, Computer Science
Lyn Frazier, Linguistics
Hilary Kornblith, Philosophy

The Program

Cognitive Science, the study of cognitive systems, cuts across a variety of traditional disciplines. At the University of Massachusetts Amherst, the departments of Communication Disorders, Computer Science, Linguistics, Philosophy, and Psychology are most heavily involved in cognitive science. Other members of the Five College consortium—Amherst, Hampshire, Mount Holyoke, and Smith colleges—also provide rich offerings in cognitive science and their faculty often participate in training university graduate students.

Pioneering work in cognitive science depends on identifying new questions and approaching them in novel ways. Although this can be done within the bounds of a traditional discipline, contact with related disciplines may serve as a catalyst. It may equip researchers with the skills needed to take on issues at greater depth than would be possible with a single discipline, and contact with faculty and students in other departments often has unforeseen benefits to all involved.

The Cognitive Science Certificate promotes interdepartmental contact in a self-designed, flexible but coherent program that draws on the academic strengths of the university and the interests and talents of individual students. Further information about the program is available online at www.umass.edu/cogsci.

Requirements

Matriculated graduate students at the master’s or Ph.D. level in the university departments of Communication Disorders, Computer Science, Linguistics, Philosophy, and Psychology can complete the requirements of the Graduate Certificate Program in Cognitive Science and receive formal recognition of such completion. Matriculated graduate students in other departments may petition the Cognitive Science Certificate Steering Committee for admission to the program. Program requirements are:

a) Students must take 15 credits of approved graduate courses in one or more departments other than their major degree department, selected from the offerings of the departments of Communication Disorders, Computer Science, Linguistics, Philosophy, and Psychology. A list of suitable courses is available from the steering committee or the Cognitive Science website. Students may appeal to the steering committee to substitute up to six credits of courses for courses on this list. Such appeals must be accompanied by persuasive rationales for the substitutions and must be approved by a majority of the steering committee.

b) Up to six of the 15 credits may be earned for conducting original research outside the student’s major department.

c) Students must submit a plan of study to the steering committee as early as possible in their graduate career. They must have completed no more than nine credits of coursework toward the certificate when the plan of study is submitted. The plan of study must specify a cohesive package of courses to be taken and provide a rationale for the particular selection of courses by demonstrating how the courses constitute a coherent approach to cognitive science. The plan of study must also designate a member of the graduate faculty as a certificate adviser and the adviser must indicate his or her approval of the plan of study.

d) The steering committee must review each student’s accomplishments at or before the time that the student receives his or her terminal degree and, if the student has fulfilled the requirements, vote to award the certificate.

e) The Cognitive Science Certificate will be awarded only at the time the student receives his or her terminal degree in his or her major department.

For further information, contact any member of the steering committee or visit the website www.umass.edu/cogsci.
Graduate Certificate in Film Studies

**Graduate Program Coordinator:** Assistant Professor Anne Ciecko
Email: ciecko@complit.umass.edu

**Director:** Professor Catherine Portuges, Interdepartmental Program in Film Studies
Email: portuge@complit.umass.edu

**Adviser:** Nancy Inouye, Interdepartmental Program in Film Studies
Email: film@hfa.umass.edu

The Graduate Certificate in Film Studies offers graduate students the opportunity to have their work and interest in film studies formally acknowledged as an important part of their graduate training and as evidence of relevant knowledge for those seeking academic positions and developing related careers. Certificate students benefit from advanced study in a growing field, mentored by internationally renowned, award-winning faculty specialists in the arts, humanities, and social sciences. Academic institutions often seek candidates from traditional fields who can also demonstrate pedagogical and scholarly strengths in cinema studies. This certificate program responds to these intellectual and professional currents, providing a clear but flexible curriculum for graduate students whose work intersects with film studies, preparing them with skills and knowledge to research and teach film in order to advance their own work in the field. The Graduate Certificate in Film Studies, as part of a graduate degree, acknowledges and formalizes this specialty area.

Beginning with the assumption that the moving image is ubiquitous in contemporary discourse across cultures and disciplines, the certificate trains future scholars, teachers, researchers, and other film studies professionals in historical, theoretical, methodological, and critical perspectives. In addition, courses in production focus on the relationships between theory and practice. Ranging from the silent era to new media, courses include documentary film; French, Maghrebi and Francophone cinemas; Central and East European film; German and Scandinavian film, Spanish, Portuguese, and Italian film; Middle East and pan-Asian cinemas; African and African diasporic cinemas; Hollywood and American independent cinema; Latin American cinemas; emerging and Third World Cinemas; melodrama and film noir; gender and representational studies; digital media; photography; visual anthropology; film theory; and curatorial studies.

Students acquire critical skills and knowledge of both film studies as a discrete discipline with its own methodology and of related perspectives from the disciplines in which they are matriculated. This exceptional intellectual and cultural environment is complemented by colloquiums, collaborative research and publishing projects, community service learning and volunteer opportunities, academic exchange, invited lectures and annual film festivals including the Massachusetts Multicultural Film Festival, Arab Cinema Panorama, Youth Film Showcase, New Asia Cinema, the Pioneer Valley Jewish Film Festival, and the Northampton Independent Film Festival, and film series from the DEFA Film Library at the University of Massachusetts Amherst. It provides an ideal setting for the next generation of visionary educators, scholars, artists, curators, administrators, business leaders, and policy makers.

Certificate students are defined as those matriculated for a master’s degree or doctoral candidates in any graduate program at the University of Massachusetts Amherst whose application for admission has been approved by the Graduate Film Certificate Program and who are pursuing the requirements for the certificate.

**Requirements**

1. An application submitted to the Graduate Film Certificate Program, containing a completed application form, transcript, and personal statement of interest in and qualifications for undertaking the Graduate Certificate, which can only be earned in conjunction with a film-focused master’s thesis, doctoral dissertation, or approved final project and terminal graduate degree in a University of Massachusetts Amherst program.

2. Students must complete 15 credits of approved graduate film courses, selected from a list of courses to be determined by the Graduate Film Certificate Program, to include the following:
   a. one course in introductory film theory (3 credits)
   b. a minimum of two courses (six credits) taken outside their degree-granting department and college
   c. a minimum of two courses (six credits) with an international and/or intercultural focus

3. Upon completion of coursework, certificate students submit an updated transcript and a written statement to the Graduate Film Certificate Program demonstrating the ways in which their coursework constitutes an integrated, interdisciplinary film studies concentration. If a student’s comprehensive exams are certificate-related, a written statement must be submitted to the Graduate Film Certificate Program.

4. The Graduate Film Certificate Program must approve film-oriented master’s theses or doctoral dissertations at the prospectus stage and upon filing the completed thesis or dissertation with the Graduate School, students must submit to the Graduate Film Certificate Program a copy of the abstract, table of contents, and signatory pages.

5. The Graduate Certificate will be awarded only upon completion of these requirements and by approval of the program’s Advisory Committee at the time students receive their terminal graduate degree.

**Restrictions**

1. A maximum of two 3-credit independent study courses may be applied to the certificate requirement.

2. A minimum of three approved graduate film courses, of at least 3 credits each, must be taken at the University of Massachusetts Amherst.

3. Students may appeal to the Graduate Film Certificate Program for course substitutions up to 6 credits for work undertaken elsewhere, such as augmented upper-level Five College courses and graduate courses from other accredited academic institutions.

The Film Studies website www.umass.edu/film contains information about application deadlines, course listings, and related topics.
Latin American, Caribbean, and Latino Studies Graduate Certificate

**Requirements**

2. Four area study courses at the 500 to 800 level in three disciplines from a listing of “core” courses. Core courses are defined as those containing at least 25 percent Latin American, Caribbean or Latino studies content.*
   i) One of the four courses may be a “support” course if the student writes a research paper on a Latin American, Caribbean or Latino studies theme.*
   ii) One of the four courses may be an independent study.
   iii) Up to two undergraduate courses may be taken as graduate independent studies if the student writes an additional research paper on a Latin American, Caribbean or Latino studies theme for the course. This option is subject to the instructor’s approval.
   iv) Two undergraduate courses at the 300 or 400 level may be substituted for one graduate level course.
   v) A grade of B or better must be obtained in all courses; only one course may be taken on a Pass/Fail basis.

3. All course work must be above and beyond that completed as an undergraduate, with the exception of language proficiency (see 4. below).
4. Language Proficiency: demonstrated reading knowledge and conversational ability in Spanish or Portuguese. This may be met by having completed language studies through the third year (Spanish 301 and 310, 311 or 312; or Portuguese 301 and 302 at the university, or their equivalent at other institutions) or by examination.
5. Master’s thesis or doctoral dissertation on a Latin American, Caribbean or Latino studies theme. In departments in which qualifying exams are offered in the field of Latin American, Caribbean or Latino studies, these may be substituted for the Master’s thesis. In departments that offer a Master’s degree without a thesis requirement or a comprehensive exam in Latin American Studies, students complete a special Master’s Project, of at least three credits, with the approval of the Center for Latin American, Caribbean and Latino Studies Executive Committee. Credits toward the master’s Project will be above and beyond the credits required in 2. above.
6. A presentation of research results in the Center for Latin American, Caribbean and Latino Studies Research Workshop.

* A list of approved courses may be obtained at the Center for Latin American, Caribbean and Latino Studies office, 522 Thompson Hall.

**For further information, contact Sonia E. Alvarez, Director, tel. 545-4648, 518 Thompson Hall, or Gloria Bernabe-Ramos, Associate Director, tel. 545-4868, 520 Thompson Hall.**
Graduate Certificate in Public History

The Public History Program of the Department of History administers the certificate program in collaboration with allied faculty from departments across campus. Committee members are: Madeline Blais, Professor of Journalism; David Glassberg, Professor of History; Mark Hamin, Lecturer in Landscape Architecture and Regional Planning; Laetitia LaFollette, Associate Professor of Art History; Marla Miller, Associate Professor of History and Certificate Program Director; Jon Olsen, Assistant Professor of History; Max Page, Associate Professor of Architecture and Design; Robert Paynter, Professor of Anthropology/Certificate Program in Native American Indian Studies; David Toomey, Assistant Professor of English; James Young, Professor of English and Judaic Studies.

The Graduate Certificate in Public History is an interdisciplinary program open to students enrolled in an M.A. or Ph.D. program at the University of Massachusetts Amherst. Public history is an inherently multidisciplinary field that requires students to develop broad training across a range of university departments. The certificate enables students to develop and demonstrate depth of study in the many ways history and heritage shape contemporary life. Certificate students from across campus come together in seminars and field service projects that harness the strength of collaboration across disciplines as they undertake substantive study of public history theory and principles. The program prepares students to engage in the methods and concerns associated with their chosen area of practice and to cultivate professional skills and networks.

Admission to the certificate program is contingent upon prior acceptance to the Graduate School of the University of Massachusetts Amherst into a graduate degree-granting program.

Requirements

The program consists of the following requirements:

1. HISTORY 659 Public History graduate seminar.
2. Two courses in a defined area of public history practice, e.g., archives management*, community and oral history, cultural resource management, digital history/new media, museum studies, and writing for popular audiences; students may also design their own program, with the consent of their certificate adviser. At least one of these courses must be outside the student’s home department.

Some sample tracks:

**Museum Studies**

HISTORY 662 Museum and Historic Site Interpretation and ART-HIST 634 History of Decorative Arts, ART-HIST 782 Museum Studies or ANTHRO 597AE New Approaches to Public Commemorations and Social Memory

**Historic Preservation**

LANDARCH 609 Studio X – Historic Preservation and ART 597V American Urbanism or ART-HIST 642 19th-Century Architecture; or LANDARCH 544 History and Theory and HISTORY 697U/797U Landscape and Memory

**Writing for Popular Audiences**

HISTORY 691W Writing History and JOURNAL 497M Art of the Profile

**New Media**

HISTORY 693B Digital History

**Cultural Resource Management**

ANTHRO 525 Archaeology and Law and HISTORY 662 Museum and Historic Site Interpretation or LANDARCH 597B Cultural Landscapes

3. 300 hours (6 credits) of internship experience. Internships may be paid or unpaid, but must conform to the policies set forth at www.umass.edu/history/ph/internship.html. Students may complete this requirement at a single site, or divide the time between two separate sites.

For further information, contact Associate Professor Marla Miller, Public History Program, Herter Hall, University of Massachusetts, Amherst, MA 01003, tel.: (413) 545-1330 fax: (413) 545-1500; website: www.umass.edu/history/ph.

*The Archival Management track is available through courses at Simmons College, offered on the campus of Mount Holyoke College. See http://www.simmons.edu/gslibacademics/programs/ms/am.shtml.
Faculty Emeriti

Afro-American Studies

Animal Biotechnology and Biomedical Sciences
Donald L. Black, Professor Emeritus (1994).
Thomas W. Fox, Professor Emeritus (1986).
Charles Smyser, Professor Emeritus.

Anthropology
Dena F. Dincauze, Professor Emeritus (2000).
Ralph Faulkingham, Professor Emeritus (2009).
Alfred Hudson, Associate Professor Emeritus (1998).
Donald A. Proulx, Professor Emeritus (2002).
Alan Swedlund, Professor Emeritus (2006).

Art
Paul Berube, Professor Emeritus (2000).
Hanlyn Davies, Professor Emeritus (2006).

Herbert S. Paston, Professor Emeritus (1993).
William Patterson, Professor Emeritus (2002).
Carleton Reed, Professor Emeritus (1986).
Dale Schlappi, Professor Emeritus (2002).

Art History
Craig Harbison, Professor Emeritus (2006).
Anne Mochon, Professor Emerita (2002).

Astronomy

Biochemistry and Molecular Biology
Thomas L. Mason, Professor Emeritus (2002).

Biology
Peter K. Hepler, Professor Emeritus (2002).
Donald E. Kroodsma, Professor Emeritus (2004).
Bruce Levin, Professor Emeritus.
Rodney Murphey, Professor Emeritus (2007).
H. Duncan Rollason, Jr., Professor Emeritus.
Seymour Shapiro, Professor Emeritus (1990).
Dana Snyder, Professor Emeritus (1985).
Barbara J. White, Assistant Professor Emeritus (1978).
Christopher L. Woodcock, Professor Emeritus (2007).

Chemical Engineering
Marcel Vanpee, Professor Emeritus (1989).
Chemistry
Ramon M. Barnes, Professor Emeritus (2000).
Paul E. Cade, Professor Emeritus (2002).
Roberta O. Day, Professor Emerita (2002).
Clifford P. Lillya, Professor Emeritus (2002).
Everett L. Reed, Assistant Professor Emeritus (1995).
Marion B. Rhodes, Professor Emerita (2000).
Everett E. Turner, Assistant Professor Emeritus (2002).
Peter C. Uden, Professor Emeritus (2004).

Chinese
Alvin P. Cohen, Professor Emeritus (2007).

Civil Engineering
F. Erskine Crossley, Professor Emeritus (1980).


Classics
Robert Goar, Professor Emeritus.

Communication
W. Barnett Pearce, Professor Emeritus.
Savert Jay Savereid, Professor Emeritus.

Communication Disorders

Comparative Literature
Lucien M. Miller, Professor Emeritus (2004).

Computer Science
Allen R. Hanson, Professor Emeritus (2008).

Consumer Studies
Nylda Glickman, Professor Emerita.
Sarah Hawes, Professor Emerita.
Merle Howes, Professor Emeritus.
Aurelia Miller, Professor Emerita.
Harriet Wright, Professor Emerita.

Economics
James Crotty, Professor Emeritus (2007).

Carmen D. Deere, Professor Emerita (2007).
Herbert Gintis, Professor Emeritus (2002).

Education
Liane Brandon, Professor Emerita (2005).
Richard Clark, Professor Emeritus (2000).
Roberta Collard, Professor Emerita.
Grace Craig, Professor Emerita (2004).
Patricia H. Crosson, Professor Emerita (2001).
Patt S. Dodds, Professor Emerita (2004).
George E. Forman, Professor Emeritus (2002).
Atron A. Gentry, Professor Emeritus (1999).
Patricia S. Griffin, Professor Emerita (2004).
Sonia Nieto, Professor Emerita (2006).
Kenneth A. Parker, Professor Emeritus (2002).
Judith Placek, Professor Emerita (2007).
Irving Seidman, Professor Emeritus (2006).
Hariharan Swaminathan, Professor Emeritus (2002).

**Electrical and Computer Engineering**
David M. Pozar, Professor Emeritus (2004).

**English**
Gary Aho, Professor Emeritus (1997).
Normad Berlin, Professor Emeritus.
George Carey, Professor Emeritus (1994).
Jules Chametzky, Professor Emeritus.
David R. Clark, Professor Emeritus (1985).
Margo Culley, Professor Emerita (2004).
George Cuomo, Professor Emeritus (1994).
Peter Elbow, Professor Emeritus (2000).
Andrew Felter, Professor Emeritus (1990).
Floriana Hogan, Associate Professor Emerita (1979).
Leonta Horrigan, Associate Professor Emerita (1986).
Paul L. Mariani, Professor Emeritus (2000).
Alex Page, Professor Emeritus (1987).
Meredith B. Raymond, Professor Emerita (1992).
Seymour Rudin, Professor Emeritus (1985).
Kathleen M. Swaim, Professor Emerita (1999).
John C. Weston, Professor Emeritus (1986).

**Entomology**
John Edman, Professor Emeritus (1999).

**Food Science**
Ernest Buck, Professor Emeritus.
Fergus Clydesdale, Professor Emeritus (2008).
Edward Pira, Professor Emeritus.
Henry Schwartzberg, Professor Emeritus.

**Forest Resources**
Robert Bond, Professor Emeritus.

**French and Italian Studies**
Frederick Busi, Professor Emeritus (2002).
Patricia Johnson, Professor Emerita (1996).
Daniel Martin, Professor Emeritus (2002).
Agnes Raymond, Professor Emerita.
Harold Smith, Associate Professor Emeritus (1990).


Richard Tedeschi, Associate Professor Emeritus (1992).

Anthony Terrizzi, Associate Professor Emeritus (2001).

Zina Tillona, Professor Emerita (1989).

Geosciences


Stephen Haggerty, Professor Emeritus (2002).


Howard Jaffe, Professor Emeritus.


Sterns A. Morse, Professor Emeritus (1998).


Peter Robinson, Professor Emeritus (1999).


Germanic Literatures and Linguistics

Sigrid Bauschinger, Professor Emerita (1999).


Klaus Peter, Professor Emeritus (2004).

Albert Reh, Professor Emeritus.

Lawrence Ryan, Professor Emeritus (1996).

Eva Schiffer, Professor Emerita (1988).


Hispanic Literatures and Linguistics

Pedro M. Barreda, Professor Emeritus (1997).


Fresia Bradford, Professor Emerita.

Sabra MacLeod, Professor Emerita.


Nina M. Scott, Professor Emerita (2002).


History


Winfred E.A. Bernhard, Professor Emeritus (1994).

Milton Cantor, Professor Emeritus (2002).


Fred W. Drake, Professor Emeritus (2002).


Robert Hart, Professor Emeritus.


Robert A. Potash, Professor Emeritus (1986).


Roland Sarti, Professor Emeritus (2002).


Marvin Swartz, Professor Emeritus (2007).


Mary B. Wickwire, Professor Emerita (2001).

Barbara Hall Partee, Distinguished University Professor Emerita of Linguistics and Philosophy (2003).

Management

Wynn Abramovic, Professor Emeritus of Finance and Operations Management (2002).
Gordon Chen, Professor Emeritus of Management (1989).
Sidney Claunch, Professor Emeritus (1986).
Robert Plattner, Professor Emeritus.
Donald E. Stone, Associate Professor Emeritus of Accounting (1996).

Mathematics and Statistics

Donald E. Catlin, Professor Emeritus (2001).
John Fogarty, Professor Emeritus (2008).
Donald Geman, Professor Emeritus (2002).
David R. Hayes, Professor Emeritus (2002).
Joseph Horowitz, Professor Emeritus (2002).
James Humphreys, Professor Emeritus (2004).
Melvin Janowitz, Professor Emeritus (2000).
Aroldo G. Kaplan, Professor Emeritus (2002).
Ramesh M. Korwar, Professor Emeritus (2002).
Hsu-Tung Ku, Professor Emeritus (2001).
Mei-Chin Ku, Professor Emerita (2002).
Lorraine Lavallee, Professor Emerita (1993).
Teng-Sun Liu, Professor Emeritus (2002).
Larry N. Mann, Professor Emeritus (1998).
Jon Sicks, Professor Emeritus (2002).
Donald F. St. Mary, Professor Emeritus (2002).
Doris Stockton, Professor Emerita (2006).
Michael Sutherland, Professor Emeritus (2003).
Floyd Williams, Professor Emeritus (2005).

Mechanical and Industrial Engineering

Lawrence L. Ambs, Professor Emeritus (2003).
Thomas Blake, Professor Emeritus (2003).
Robert D. Davis, Associate Professor Emeritus (1990).
John Fogarty, Professor Emeritus (2008).
Laurence Murch, Associate Professor Emeritus (2002).
George E. Zinsmeister, Associate Professor Emeritus (1999).

Microbiology

Ercole Canale-Parola, Professor Emeritus (1994).
Linus Hale Jones, Assistant Research Professor Emeritus.
Malcolm A. McKenzie, Professor and Director Emeritus, Shade Tree Laboratory (1973).
Mark S. Mount, Professor Emeritus (2002).
Gail Schumann, Professor Emeritus (2003).
Terry A. Tattar, Professor Emeritus (2002).
Martin Wilder, Professor Emeritus.
Music and Dance
Wayne Abercrombie, Professor Emeritus (2007).
Horace Clarence Boyer, Professor Emeritus (1999).
Jon Humphrey, Professor Emeritus (2002).
Estela Olevsky, Professor Emerita (2002).
Marilyn Patton, Professor Emerita (1999).
David Sporny, Professor Emeritus (2008).
Paulina Stark, Professor Emerita (2004).

Nutrition
Peter L. Pellett, Professor Emeritus (1999).

Philosophy
Bruce Aune, Professor Emeritus (2001).
Ann Ferguson, Professor Emerita (2007).
Barbara Hall Partee, Professor Emerita (2004).

Physics
Frederick W. Byron, Jr., Professor Emeritus (2003).
Ross S. Hicks, Professor Emeritus (2003).
Michael N. Kreisler, Professor Emeritus (2007).
Robert V. Krotkov, Professor Emeritus (1997).

Plant Pathology

Plant and Soil Sciences
Alfred W. Boicourt, Professor Emeritus (1980).
Robert Devlin, Professor Emeritus of the Cranberry Experiment Station (1996).
Ernest Johnson, Professor Emeritus.
**Political Science**

Dean Alfange, Jr., Professor Emeritus (1999).


Glen Gordon, Professor Emeritus (2002).

Franklin W. Houn, Professor Emeritus (1990).


Katherine Fite, Professor Emerita (2007).


Harold Jarman, Professor Emeritus.

Alán Kamil, Professor Emeritus.


Harold Raush, Professor Emeritus (1986).


Bonnie R. Strickland, Professor Emerita (2002).


Howard Peters, Associate Professor Emeritus (1985).

Anne Stoddard, Associate Professor Emerita (2003).


Alvin E. Winder, Professor Emeritus (1992).

**Resource Economics**


Barry Field, Professor Emeritus (2008).

John Foster, Professor Emeritus (1990).


Donald Marion, Associate Professor Emeritus (1994).


**Sociology**

Albert Chevan, Professor Emeritus (1997).


Hilda H. Golden, Professor Emerita (1986).


Anthony Harris, Professor Emeritus (2002).

John P. Hewitt, Professor Emeritus (2002).


Christopher Hurn, Associate Professor Emeritus (2002).

Lewis M. Killian, Professor Emeritus (1986).


Surinder Mehta, Associate Professor Emeritus (2002).


Alice S. Rossi, Harriet Martineau Professor of Sociology and Professor Emerita (1991).


**Polymer Science and Engineering**

Richard J. Farris, Professor Emeritus (2002).


Otto Vogl, Professor Emeritus.

**Psychology**


Philosophy

Shlomo Barbour, Associate Professor Emeritus (2007).

George P. Cernada, Professor Emeritus (2002).


David W. Hosmer, Professor Emeritus (2002).


Philip C. Nasca, Professor Emeritus (2007).

Jesse S. Ortiz, Professor Emeritus (2004).
Curt Tausky, Professor Emeritus (2001).

Sport Management
Richard Bergquist, Professor Emeritus.
Betty Spears, Professor Emerita (1983).

Theater
Virginia Scott, Professor Emerita (2002).
Patricia C. Warner, Professor Emerita (2007).

Wildlife and Fisheries Conservation

Women’s Studies
Ann Ferguson, Professor Emerita (2007).
Janice Raymond, Professor Emerita (2002).
Associated Five College Graduate Faculty


Amherst College


Amrita Basu, Professor of Political Science and Women's and Gender Studies, B.A., Cornell, 1975; Ph.D., Columbia, 1984.


Howell D. Chickering, Jr., Professor of English, B.A., Dartmouth College, 1959; Ph.D., Indiana, 1965.


David A. Cox, Professor of Mathematics, B.A., Rice University, 1970; Ph.D., Princeton, 1975.

Peter D. Crowley, Professor of Geology, B.Sc., McGill University, 1979; Ph.D., Massachusetts Institute of Technology, 1985.


Richard D. Fink, Professor of Chemistry, A.B., Harvard, 1958; Ph.D., Massachusetts Institute of Technology, 1962.


Stephen A. George, Professor of Biology (Neuroscience), B.S., University of British Columbia, 1964; Ph.D., Johns Hopkins, 1970.


Tekla A. Harms, Professor of Geology, A.B., Bryn Mawr, 1977; M.Sc., Queen's University, 1982; Ph.D., Arizona, 1986.


Margaret R. Hunt, Professor of History and Women's and Gender Studies, A.B., Radcliffe, 1976; M.T.S., Harvard Divinity School, 1978; Ph.D., New York University, 1986.

Larry R. Hunter, Professor of Physics, B.A., Columbia, 1974; M.A., California at Berkeley, 1978; Ph.D., 1981.

Nassr Hussain, Assistant Professor of Law, Jurisprudence and Social Thought, B.A. Yale, 1988; M.S., California at Berkeley, 1990; Ph.D., 1995.


Ronald A. Lembo, Professor of Sociology, B.A., Massachusetts at Boston, 1974; M.A., California at Santa Barbara, 1980; Ph.D., California at Berkeley, 1989.


Rose R. Olver, Professor of Psychology and Women's and Gender Studies, B.A., Swarthmore, 1958; Ph.D., Radcliffe, 1962.


David I. Ratner, Professor of Biology, B.S., Yale, 1968; Ph.D., Harvard, 1975.


Ethan J. Temeles, Associate Professor of Biology, A.B., Cornell, 1978; M.Sc., Louisiana State, 1980; Ph.D., California at Davis, 1987.


Jonathan M. Vogel, Professor of Philosophy, B.A., Yale, 1976; Ph.D., 1986.


Arthur Guy Zajonc, Professor of Physics, B.Sc.E., Michigan, 1971; M.S., 1973; Ph.D., 1976.
Hampshire College


Carolee Bengsdorf, Professor of Politics, B.A., Cornell, 1966; Ph.D., Massachusetts Institute of Technology, 1985.


Raymond P. Coppinguer, Emeritus Professor of Biology, B.A., Boston, 1959; M.A., Massachusetts, 1964; Ph.D., 1968.


Mark Feinstein, Professor of Linguistics, B.A., Queens College, 1969; Ph.D., City University of New York, 1977.

Leonard B. Glick, Emeritus Professor of Anthropology, B.S., Maryland, 1949; M.D., 1953; Ph.D., Pennsylvania, 1963.

Alan H. Goodman, Professor of Biological Anthropology, B.S., Massachusetts, 1973; M.A., 1979; Ph.D., 1984.

Frank Holmquist, Professor of Politics, B.A., Lawrence, 1963; M.A., Ph.D., Indiana, 1975.


Maria de Lourdes Mattei, Associate Professor of Psychology, B.S., Puerto Rico, 1974; M.S., Massachusetts at Amherst, 1978; Ph.D., 1983.

Sandra Matthews, Associate Professor of Film/Photography, B.A., Radcliffe, 1973; M.F.A., SUNY at Buffalo, 1976.


Mitziko Sawada, Emeritus Visiting Associate Professor of History and Dean of Multicultural Affairs, B.A., Reed, 1951; M.A., New York University, 1978; Ph.D., 1985.


Neil Stilling, Professor of Psychology, B.A., Amherst, 1966; Ph.D., Stanford, 1971.


Frederick Weaver, Emeritus Professor of History and Economics, B.A., California, 1961; Ph.D., Cornell, 1968.

Barbara Yngvesson, Professor of Anthropology, B.A., Barnard, 1962; Ph.D., California at Berkeley, 1970.

Mount Holyoke College

Sarah J. Bacon, Associate Professor of Biology, A.B., Mount Holyoke, 1987; Ph.D., Chicago, 1996.

Debbora Battaglia, Professor of Anthropology, B.A., California at Santa Barbara, 1972; M.Lit., Cambridge University, England, 1975; Ph.D., 1981.

G. Lee Bowie, Professor of Philosophy, A.B., Yale, 1965; Ph.D., Stanford, 1971.


Carolyn Penney Collette, Professor of English Language and Literature on the Alumnae Foundation, A.B., Mount Holyoke College, 1967; M.A., Massachusetts, 1968; Ph.D., 1971.


Sean M. Decatur, Marilyn Dawson Sarles, M.D., Professor of Life Sciences and Professor of Chemistry, B.A., Swarthmore, 1990; Ph.D., Stanford, 1995.


Andrew Lass, Professor of Anthropology, A.M., Charles University, Prague, Czech Republic, 1993; Ph.D., Massachusetts, 1982.


Mark Allan Schulte McMenamin, Professor of Geology, B.S., Stanford, 1979; Ph.D., California at Santa Barbara, 1984.


Lynda Morgan, Associate Professor of History, B.S., Western Carolina, 1975; M.A., 1978; Ph.D., Virginia, 1986.


Howard Nicholson, Kennedy-Schelkunoff Professor of Physics, A.B., Hamilton, 1966; B.S., Massachusetts Institute of Technology, 1966; Ph.D., California Institute of Technology, 1971.


Alan Werner, Professor of Geology, B.S., Grand Valley State University, Michigan, 1979; M.S., Southern Illinois, 1982; Ph.D., Colorado, 1988.


Craig T. Woodard, Professor of Biological Sciences, B.S., Bates, 1986; M.S., Yale, 1988; M. Phil., 1988; Ph.D., 1992.

Smith College


Margaret Anderson, Professor of Biological Sciences, B.A., Augustana College, 1963; Ph.D., Stanford, 1967.


Giovanna Bellesia, Professor in Italian Language and Literature, Ph.D., North Carolina at Chapel Hill, 1985.


John B. Brady, Mary Elizabeth Moses Professor of Geology, A.B., Harvard, 1970; M.S., California at Los Angeles, 1972; Ph.D., Harvard, 1975.


James J. Callahan, Professor of Mathematics, B.A., Marist College, 1962; Ph.D., New York University, 1967.


Richard Fantasia, Professor of Sociology, B.S., Upsala College, 1975; M.S., SUNY at Buffalo, 1978; Ph.D., Massachusetts, 1982.


Paula J. Giddings, Professor of Afro-American Studies, B.A., Howard, 1969.


Daniel Horowitz, Mary Huggins Gamble Professor of American Studies and Associate Member of History, B.A., Yale, 1960; Ph.D., Harvard, 1967.


Reyes Lazaro, Associate Professor of Spanish and Portuguese, B.A., Universidad de Deusto, 1977; M.A., Massachusetts, 1984; Ph.D., 1994.

Thomas S. Litwin, Adjunct Professor of Biological Sciences, B.A., Hartwick College, 1974; Ph.D., Cornell.

James D. Lowenthal, Associate Professor of Astronomy, B.S., Yale, 1986; Ph.D., Arizona, 1991.

Robert B. Merritt, Professor of Biological Sciences, B.A., Kansas, 1964; Ph.D., 1970.

Gwendolyn Mink, Charles N. Clark Professor of Women’s Studies, B.A., California at Berkeley, 1974; Ph.D., Cornell, 1982.


Paulette Peckol, Louise C. Harrington Professor of Biological Sciences, B.A., Wittenberg University, 1975; Ph.D., Duke, 1980.

Philip D. Reid, **Louise C. Harrington Professor Emeritus of Biological Sciences**, B.S., Eastern Michigan, 1962; M.A., Missouri, 1964; Ph.D., Massachusetts, 1970.


Peter I. Rose, **Sophia Smith Professor Emeritus of Sociology and Anthropology**, A.B., Syracuse, 1954; M.A., Cornell, 1957; Ph.D., 1959.


Stylianos P. Scordilis, **Professor of Biological Sciences**, B.A., Princeton, 1969; Ph.D., State University of New York, 1975.


Elizabeth V. Spelman, **Barbara Richmond 1940 Professor in the Humanities, Professor of Philosophy**, B.A., Wellesley, 1966; Ph.D., Johns Hopkins, 1974.

Ileana Streinu, **Professor of Computer Science**, B.S., Bucharest, Romania, 1977; M.S., 1977; Ph.D., Rutgers, 1994.

Stephen G. Tilley, **Myra A. Sampson Professor of Biological Sciences**, B.S., Ohio State, 1965; M.S., Michigan, 1967; Ph.D., 1970.

Hans R. Vaget, **Helen and Laura Shedd Professor Emeritus of German and Professor Emeritus of Comparative Literature**, M.A., University of Tübingen, 1964; Ph.D., Columbia, 1969.

Doreen A. Weinberger, **Associate Professor of Physics**, B.A., Mount Holyoke, 1975; M.S., Massachusetts Institute of Technology, 1978; Ph.D., Arizona, 1984.


Christine A. White-Ziegler, **Associate Professor of Biological Sciences**, B.A., Virginia, 1986; Ph.D., Utah, 1993.

Nancy E. Whittier, **Professor of Sociology**, B.A., Ohio State, 1986; M.A., 1988; Ph.D., 1992.

Steven A. Williams, **Gates Professor of Biological Sciences**, B.A., California at Davis, 1974; M.S., Ph.D.


Associated Five Campus Graduate Faculty

University of Massachusetts Boston


University of Massachusetts Dartmouth

Mark A. Altabet, Associate Professor of Chemistry and Biochemistry, B.S., New York at Stony Brook; 1979; Ph.D., Harvard, 1984.

James J. Bisagni, Associate Professor of Physics, B.S., New York at Stony Brook, 1972; M.S., Rhode Island, 1976; Ph.D., 1991.

Donald W. Boerth, Professor of Chemistry, B.S., North Dakota State, 1969; Ph.D., Minnesota, 1975.


Avijit Gangopadhyay, Assistant Professor of Physics, B.Tech., Indian Institute of Technology, 1979; M.Tech., 1981; Ph.D., Rhode Island, 1990.

James A. Golen, Associate Professor of Chemistry, B.A., Southeastern Massachusetts, 1965; Ph.D., Massachusetts, 1970.

Nancy J. O’Connor, Assistant Professor of Biology, B.S., Massachusetts at Dartmouth, 1980; M.S., Delaware, 1982; Ph.D., North Carolina State, 1982.

Emmanuel C. A. Ojadi, Assistant Professor of Chemistry, B.Sc., University of Ife, 1979; M.A., Brandeis, 1982; Ph.D., 1986.


Brian J. Rothschild, Professor of Biology, B.S., Rutgers, 1957; M.S., Maine, 1959; Ph.D., Cornell, 1962.

Bal Ram Singh, Assistant Professor of Chemistry, B.Sc., Kamla Nehru Institute of Science and Technology, 1977; M.Sc., Jawaharlal Nehru University, 1979; M.Phil., 1982; Ph.D., Texas Tech University, 1987.

J. Donald Smith, Professor of Chemistry, A.B., Columbia, 1965; Ph.D., Chicago, 1969.


University of Massachusetts Lowell

Robert Forrant, Assistant Professor of Regional Economic and Social Development, M.A., Northeastern, 1972; Ph.D., Massachusetts, 1994.

Jacob Wan-Tat Lam, Professor of Health and Clinical Sciences, B.S., Illinois, 1963; M.A., Tennessee, 1965; Ph.D., Massachusetts at Amherst, 1970.

William Lazonick, Professor of Regional Economic and Social Development, M.S., London School of Economics, 1969; Ph.D., Harvard, 1975.

Robert J. Nicolosi, Professor of Clinical Laboratory Sciences, B.S., St. Anselms; M.S., New Hampshire; Ph.D.

Norma C. Powell, Associate Professor of Accounting, B.S., Houston, 1976; M.S., 1978; Ph.D., Texas A & M, 1982.

University of Massachusetts Worcester

Mary K. Alexander, Professor of Nursing, B.S., Vermont, 1971; M.S., Massachusetts, 1974; Ed.D., 1985.


Robert J. Goldberg, Associate Professor of Medicine and Epidemiology, B.S., Massachusetts, 1972; M.S., Tufts, 1973; Ph.D., Johns Hopkins, 1978.


Roger S. Luckmann, Assistant Professor of Family and Community Medicine, B.A., Yale, 1971; M.D., Boston University, 1976; M.P.H., California at Berkeley, 1986.

Ira S. Ockene, Professor of Cardiovascular Medicine, B.S., City College of New York, 1962; M.D., Albert Einstein College of Medicine, 1966.

Judith K. Ockene, Professor of Medicine, B.S., City College of New York, 1964; M.A., 1966; Ph.D., Boston College, 1979.

Pauline Q. Sheehan, Assistant Professor of Pediatrics and Adolescent Medicine, M.D., University of Chile, 1976.

Campus Map