

2008-2009

The Bulletin

BULLETIN OF TUFTS UNIVERSITY

<http://uss.tufts.edu/bulletin>

Academic Year
2008-2009



**SCHOOL OF ARTS
AND SCIENCES**
College of
Liberal Arts
Graduate School of
Arts and Sciences
**SCHOOL OF
ENGINEERING**

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The Bulletin

BULLETIN OF TUFTS UNIVERSITY | 2008-2009

School of Arts
and Sciences

COLLEGE OF LIBERAL ARTS

GRADUATE SCHOOL OF
ARTS AND SCIENCES

School of
Engineering

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<http://USS.tufts.edu/bulletin/>

PRESIDENTS OF TUFTS UNIVERSITY

Lawrence S. Bacow
President, 2001–present

John DiBiaggio
President, 1992–2001
Emeritus, 2001–present

Jean Mayer
President, 1976–1992
Chancellor, 1992–1993

Burton Crosby Hallowell
President, 1967–1976
Emeritus, 1977–present

Leonard Chapin Mead
Acting President, 1966–1967

Nils Yngve Wessell
Acting President, 1953
President, 1953–1966
Emeritus, 1967–present

Leonard Carmichael
President, 1938–1952

George Stewart Miller
Acting President, 1937–1938

John Albert Cousens
Acting President, 1919–1920
President, 1920–1937

Hermon Carey Bumpus
President, 1914–1919

William Leslie Hooper
Acting President, 1912–1914

Reverend Frederick William Hamilton
Acting President, 1905–1906
President, 1906

Reverend Elmer Hewitt Capen
President, 1875–1905

Reverend Alonzo Ames Miner
President, 1862–1875

John Potter Marshall
Acting President, 1861–1862

Reverend Hosea Ballou 2d
President, 1853–1861

About Tufts University

International, student-centered, Tufts University is dedicated to academic rigor and interdisciplinary research that addresses the most critical issues facing our world. Rooted in the best traditions of learning and scholarship, Tufts is committed to educating tomorrow's global leaders in all disciplines and fields through innovation in its teaching and research.

Since its founding in 1852 by members of the Universalist Church, Tufts has grown from a small liberal arts college into a nonsectarian university of approximately 8,500 students on four campuses. The trustees of Tufts College voted to make Tufts coeducational in 1892, and the first women were graduated in 1896. Although women applied to Tufts almost immediately after its founding in 1852, they were denied admission until the 1890s. With the founding of Jackson College for Women in 1910—named for Cornelia Maria Jackson, the benefactor who did the most to promote women's education at Tufts—women's education gained security at the institution.

At Tufts, creating excellence in education is forged through a philosophy that is forward-thinking, imaginative, and responsive to the fast-paced evolution of technology, politics, the sciences, our global society, and the arts.

Our Schools

The largest division of the university is the Faculty of Arts, Sciences, and Engineering. This division comprises the College of Liberal Arts, the School of Engineering, the Graduate School of Arts and Sciences, the College of Special Studies, and Summer Session. The university's graduate and professional schools are the Fletcher School of Law and Diplomacy, the School of Medicine, the School of Dental Medicine, the Cummings School of Veterinary Medicine, the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy, and the Sackler School of Graduate Biomedical Sciences.

The schools are located on Tufts' campuses in Medford/Somerville, Boston, and North Grafton, Massachusetts. Students may also study at the Tufts European Center, located in an eleventh-century monastery in Talloires, France.

Tufts is also affiliated with the School of the Museum of Fine Arts and New England Conservatory of Music, providing joint graduate and undergraduate programs and flexible cross-registration.

The Undergraduate Experience

Undergraduate study is on Tufts' Medford/Somerville campus, situated on a hill about five miles northwest of Boston. It is a tranquil New England setting within easy access by subway and bus to the cultural, social, and entertainment resources of Boston and Cambridge.

Tufts is a student-centered institution, where support for students' personal and academic development is embedded into the organization and ethos of the university. The Faculty of Arts, Sciences, and Engineering is committed to scholarship of the highest order and teaching of exacting quality, while equally dedicated to providing a friendly, open, and intellectually rich and stimulating environment. This environment is one of the reasons Tufts is one of the most highly competitive universities in the country.

Tufts has programs abroad in Britain, Chile, China, France, Germany, Ghana, Hong Kong, Japan, and Spain. More than 40 percent of undergraduates choose to spend their junior year abroad to add a strong international dimension to their education. This experience adds to the international flavor of the Tufts campus when they return for their senior year.

More than 98 percent of enrolling students expect to pursue graduate or professional studies, and annually Tufts students are the recipients of such prestigious academic awards as Fulbright, Rhodes, Marshall, and Mellon scholarships and fellowships.

School of Arts and Sciences

Mission Statement

Broadly recognized as one of the premier liberal arts colleges within a research university, the School of Arts and Sciences at Tufts University educates students for transformational leadership in communities around the world. Tufts' tradition of innovation dates to the school's founding in 1852. Today, a multi-disciplinary and experiential approach defines scholarship and teaching. Faculty and students use the curricular framework of the arts and sciences to address the great intellectual and social challenges of the 21st century.

The school has a distinctive style. Excellence in scholarship and teaching are the school's highest priorities; translating inquiry and research into action is a defining theme. The Faculty of Arts & Sciences, the largest of Tufts' seven schools, explores collaborative research opportunities across the university's professional schools and around the world. More than 5,000 students at the undergraduate and graduate levels represent the broad range of intellectual, creative and personal attributes. The creation of new knowledge in traditional and emerging disciplines, a dedication to globalism and active citizenship, a commitment to humanitarianism and diversity in its many forms, and a belief that intellectual discourse and discovery serve the common good are deeply held ideals.

College of Liberal Arts

Requirements for Degrees

For students entering the College of Liberal Arts, the degree of Bachelor of Arts or Bachelor of Science is awarded after four years (eight semesters) of full-time study and with successful completion of the equivalent of thirty-four full-credit semester courses. (Study in summer school at other institutions does not count as a semester under this policy.) A cumulative average of C- (1.67) or higher is required for graduation. No more than two of the thirty-four courses may consist of fieldwork or internship placements. Up to two semesters of full-time study after matriculation at Tufts may be spent at other approved four-year institutions or on approved foreign-study programs. (See Residence Requirement in the general information section for details.)

Three-fourths of all courses taken at Tufts with standard grading must be completed with a grade of C- or better. There is no rigid program of courses that must be taken by every student. Students are regarded as individuals and each student is encouraged to pursue a course of study appropriate to his or her training, experience, aptitudes, and plans for the future. Within a framework designed to ensure both breadth and depth in intellectual development, there is a broad range of choice. Students work with their advisers to select those courses best suited to their particular needs and interests.

Each student selects courses to fulfill the foundation and distribution requirements according to the following plan. All courses used to fulfill these requirements must be taken for a letter grade, not pass-fail.

Degree Audit Reporting System

DARS is a web based application that allows students to systematically assess their progress toward degree completion. A DARS audit will report detailed degree requirements, how coursework can be used to complete that degree, and completed and outstanding requirements. For more information visit

<http://degreearuit.studentservices.tufts.edu>.

Foundation Requirements

The faculty recognizes the following elements as basic to any program leading to a bachelor's degree in liberal arts, whatever a student's particular interests may be. First, an educated person in our society must be able to write coherent English, and must be able to apply that writing ability to the critical analysis of information and ideas in any field. Second, the study of another language and of foreign cultures is indispensable to a liberal education; such study provides a basis for locating oneself within a larger cultural and international context. Courses in college writing, foreign language and culture, and world civilizations constitute the foundation of a liberal arts education at Tufts.

The foundation requirements should be met early in a student's college career, so that these courses may serve as a foundation for later work. Where appropriate, a single course, examination, or other unit of work may be credited toward the fulfillment of both the foundation and the distribution requirements.

1. Writing

Two semesters of college writing are normally required for graduation in liberal arts. In general, students should complete this requirement in the first year. Most students do so by taking English 1 (Expository Writing) in the first semester and, in the second semester, English 2 (College Writing Seminar) or another approved writing course (such as Philosophy 1). A Philosophy 1 class (or other English 2 substitute) transferred from another college will not count for English 2 or 4. Students taking courses approved as English 2 substitutes may not count them as English 2 if taken before or at the same time as English 1. Students for whom English is a second language may take English 3 with consent of the instructor. *Courses taken toward fulfillment of this requirement must be taken for letter grades, except English 3, which is pass-fail.*

There are also other alternatives for satisfying the college writing requirement. In summary, the requirement may be satisfied in any of the following ways:

- Exemption from the entire requirement by attaining a score of five on the Advanced Placement Test in English Language and Composition or English Literature and Composition; an A on the British A-Level exams; or a score of seven on the Higher-Level International Baccalaureate.
- Exemption from the first half of the requirement by attaining one of the following: a score of four on the Advanced Placement Test in English Language and Composition or English Literature and Composition; a score of 760 or above on the SAT Writing exam, a score of five or six on the Higher-Level International Baccalaureate, six or seven at the Subsidiary Level; or a B on the British A-Level exams. Students so exempted from the first half of the requirement must complete English 2 or an equivalent course.
- Satisfactory completion of English 1 and one of the approved alternative courses (which may not be taken concurrently with English 1). These courses vary from year to year; students and their advisers should ascertain which alternatives are offered and approved in any given semester.
- Satisfactory completion of English 1 or 3 and

English 2 or 4, or an approved alternative course.

- Completion of English 1 with a grade of A or A- (resulting in exemption from the second half of the requirement). This exemption does not apply to writing courses equivalent to English 1 that were taken at another college.

2. Foreign Language/Culture Option

This foundation requirement has two parts. First, every student must satisfy a basic language requirement, demonstrating knowledge of a foreign language equivalent to three semesters of college courses. The second part of the requirement may be satisfied in several different ways. Students may take advanced courses in the same foreign language or they may undertake study of a second language. Students are offered the alternative of studying a foreign culture through courses taught in English.

Foreign nationals whose native language is not English and who have received a substantial portion of their education in their native language are exempt from the foreign language requirement at Tufts. Determination of such exemption shall be made by the appropriate dean based on transcripts or other equivalent documentation.

PART I. Basic Language Requirement

Entering students are expected to demonstrate competence in a second language equivalent to three semesters of college courses. Secondary school transcripts are not accepted as evidence of language competence. Language competence may be determined on the basis of a placement examination taken at Tufts, SAT II Subject Test scores, or a college transcript. Entering students who do not demonstrate the required level of competence must take college language courses until that level is reached.

PART II. Continued Language Study/Culture Option

After the basic language requirement has been satisfied, the student has four options:

1) To continue study in the foreign language used to fulfill the basic language requirement until two courses have been completed at the third-year level; e.g., French 21-22 or French 31-32, German 21-22 or German 33-44. Because the fourth-semester college-level course (e.g., French 4, Spanish 4) is normally a prerequisite for courses at the advanced level, the option usually involves taking three

courses beyond the basic language requirement.

2) To complete courses through the third college-semester level (for example, Spanish 1 through 3) in a language different from the one used to satisfy the basic language requirement.

For students in the Class of 2009, American Sign Language may be used to fulfill this option.

3) To complete three credits dealing with a single culture or designated cultural area, either the same as or different from the language taken to fulfill Part I. The course must deal with a foreign culture. For purposes of this requirement, a foreign culture is defined as having non-English speaking origins. Anglo-American, English, Anglo-Irish, and Anglo-Australian cultures do not qualify, but Aboriginal Australian, Celtic, and African-American, Latino/a, and Asian American, for example, do to the degree that they are discrete from the Anglo-American tradition.

For students beginning with the Class of 2009 who elect to take this option, at least one course must focus on the region of origin. For instance, a student choosing the East Asian and Diasporas culture area must take at least one course rooted in East Asia, not the U.S.

Culture courses are regularly updated on the bulletin Web site. Students wishing to submit courses that are not on this list (or its updated semester supplement) must petition the Academic Review Board; forms are available in Dowling Hall. Please go to <http://studentservices.tufts.edu/registration.htm> to view the courses approved.

4) Foreign language courses beyond the third college-semester level may be counted as part of the culture option, e.g., Spanish 4, French 4, or courses at higher levels. For example, a student who has completed four semesters of foreign language study may choose to complete the foundation requirement by taking two culture courses in the same culture area as that of the language studied.

Travel or residence in another country, while admittedly educational, may not be applied toward fulfillment of the culture option. Courses accepted for transfer from other colleges or universities may be used upon approval of the Academic Review Board. Policies governing the

acceptance of courses in satisfaction of the language requirement and culture option are established by the Academic Review Board.

3. World Civilizations

The world civilizations requirement focuses on an in-depth study of a non-Western civilization or civilizations, or the interaction of non-Western and Western civilizations with equal attention given to both. The definition of the non-Western world is considered to include Africa, Asia, the Caribbean, Latin America, and selected indigenous cultures of Oceania and North America.

The course taken in fulfillment of the world civilizations requirement may be used to fulfill the culture option or that distribution requirement for which the course would normally be appropriate, but not both.

For an updated list of courses that have been approved by the Academic Review Board, visit <http://studentservices.tufts.edu/registration.htm>. For approval of courses that do not appear on this list, a petition form is available in Dowling Hall.

4. Quantitative Reasoning

The quantitative reasoning requirement is designed to impact basic mathematical skills that students will need throughout their studies. Students with a mathematics SAT score below 560 or a mathematics ACT score below 23 must take Mathematics 4 in the fall semester of their first year, or must pass the placement examination offered by the mathematics department during orientation. For these students, Mathematics 4 will fulfill one credit of the two-credit mathematical sciences distribution requirements. All other students are exempt from the Quantitative Reasoning requirement.

Please note: students with exactly 560 on the mathematics SAT or 23 on the mathematics ACT may seek permission from the mathematics department to count mathematics 4 towards the mathematical sciences distribution requirement.

Distribution Requirements

The faculty holds that a student enrolled in any program leading to a liberal arts degree must demonstrate a reasonable acquaintance with each of the following five areas of inquiry: the humanities, the arts, the social sciences, the natural sciences, and the mathematical sciences.

- A student must take the equivalent of two course credits in each area.
- No more than two of the ten credits may be from the same department or program.
- A student may use approved pre-matriculation credit (e.g. AP or IB) to fulfill distribution requirements.
- No single course may be used in more than one distribution area. For example, a history course may be counted as either humanities or a social science requirement, but not both.
- Courses used in the foundation requirement or as part of the concentration (major), may also be used to fulfill distribution requirements (with some exceptions noted below).
- No more than two of the ten distribution requirements may be from a single department or program.

Special restrictions apply to Experimental College courses:

- Approval of the Academic Review Board must be obtained in all cases.
- Only one Experimental College credit may be used as a distribution requirement.
- Those courses graded pass-fail may not be used to satisfy any distribution requirement.

Please go to <http://studentservices.tufts.edu/registration.htm> to view the courses that have been approved by the Academic Review Board.

Summary Sheet of Requirements

Foundation Requirements

1. WRITING

- 1) _____
- 2) _____

2. FOREIGN LANGUAGE/CULTURE OPTION

Part I: Competence equivalent to three semesters of college language courses

- 1) _____
- 2) _____
- 3) _____

Part II: Three semesters of language, or culture option. (Fulfill a, b, or c.)

- 4) _____
- 5) _____
- 6) _____

- a. Continue in the first language for three more semesters
- b. Three semesters in a *second* language (including ASL)
- c. Culture option—there are two ways to fulfill the culture option:
 1. Continue through the fourth or fifth semester of the language used to fulfill Part I, and take one or two courses in the same culture area as that language.
 2. Take three credits related to a single culture either the same as or different from the language taken to fulfill Part I. One course must focus on the region of origin. See the online list of approved culture courses.

3. WORLD CIVILIZATIONS

- 1) _____

This course may also be used toward a culture OR a distribution requirement, but not both.

4. QUANTITATIVE REASONING

- 1) _____

For students with a math SAT score below 560 or a math ACT score below 23.

Distribution Requirements**1. HUMANITIES**

- 1) _____
- 2) _____

2. ARTS

- 1) _____
- 2) _____

3. SOCIAL SCIENCES

- 1) _____
- 2) _____

4. NATURAL SCIENCES

- 1) _____
- 2) _____

5. MATHEMATICAL SCIENCES

- 1) _____
- 2) _____

Concentration Requirement

The object of the concentration (or major) requirement is to provide the student with an integrated and thorough program of study in a well-developed field of learning. Most students satisfy the concentration requirement within established academic departments and programs, selected from among those listed below. An alternative program, called Plan of Study, is available to students with unique academic interests not clearly encompassed by the established fields of concentration. All courses used toward fulfillment of the concentration requirement must be taken for letter grades.

Department or Program Major

Students are expected to choose their major and to have a faculty adviser in the major field during the second semester of the sophomore year. With the assistance of the faculty adviser, the student plans a concentration program of ten or more courses as specified by the major department. In some cases, the student must complete prerequisite courses in addition to those that actually constitute the concentration program.

For students with multiple concentrations, no more than half the courses used to fulfill the requirements for one concentration may be used to satisfy the requirements for a second or subsequent one. However, for courses taught in a foreign language beyond the third-year level of instruction, this overlap can be extended: up to 80 percent of

the courses used to fulfill the requirements for one concentration may be used to satisfy the requirements for a second or subsequent one. Departments and programs may further restrict the amount of overlap between concentrations. Students who wish to complete two sets of concentration requirements are urged to continue to design such programs with minimal course overlap.

Plan of Study Major

Plan of Study offers a student the opportunity to create an individual concentration area corresponding to a unique set of interests, yet meeting the spirit of the concentration requirement. The Plan of Study major involves a selection of courses from the humanities, arts, social sciences, natural sciences, mathematics (quantitative), and engineering areas, with at least two of these six being represented, appropriate to an interdisciplinary area such as Latin American studies or film studies.

The Plan of Study major consists of an integrated program of at least ten credits, including a two-semester thesis credit (All College 91-92) or a substantial project comparable in scope to a thesis, including a written component. In this course, the student integrates material learned in the several selected disciplines into a final project, culminating in a substantial thesis. Students in Plan of Study are eligible for thesis honors. In order to complete a Plan of Study, the student must have a high degree of initiative and self-discipline. Also, no more than two credits used to fulfill another major may be used toward the Plan of Study and students may not triple major if one major is the Plan of Study.

A student who wishes to select the Plan of Study major must submit an application summarizing the planned program no later than four weeks before the end of the sophomore year (usually by April 1). Each applicant selects an advisory committee of three faculty members who support the application, including representatives from three departments in at least two of the six areas listed above. (At least two of the committee members must be full-time members of the Arts and Sciences faculty, with the rank of lecturer or above; at least one of the committee members must be a tenure-track member of the Arts and Sciences faculty.)

In consultation with the advisory committee, the student develops plans for his or her program, which are then submitted as part of the application

to the chair of the Arts and Sciences Committee on Curricula. The student is expected to work closely with the advisory committee throughout his or her tenure as a Plan of Study major. Close consultation with the principal adviser is especially important while the student is working on the final project.

For more information, visit <http://studentservices.tufts.edu/sspdf/planofstudyguide.pdf>.

Departmental, Interdepartmental, and Program Concentrations:

- | | |
|------------------------------|--|
| American Studies | German |
| Anthropology | German Studies |
| Applied Physics | Greek |
| Archaeology | Greek and Latin Studies |
| Architectural Studies | History |
| Art History | International Letters and Visual Studies |
| Asian Studies | International Relations |
| Astrophysics | Italian Studies |
| Biochemistry | Japanese |
| Biology | Judaic Studies |
| Biomedical Engineering | Latin |
| Biopsychology | Mathematics |
| Biotechnology | Middle Eastern Studies |
| Chemical Physics | Music |
| Chemistry | Peace and Justice Studies |
| Child Development | Philosophy |
| Chinese | Physics |
| Classics | Political Science |
| Cognitive and Brain Sciences | Psychology |
| Community Health | Psychology/Clinical |
| Computer Science | Quantitative Economics |
| Drama | Religion |
| Economics | Russian |
| Engineering Psychology | Russian and East European Studies |
| English | Sociology |
| Environmental Studies | Spanish |
| French | Women's Studies |
| Geological Sciences | |
| Geology | |

The degree of Bachelor of Arts or Bachelor of Science is conferred on all students who complete this program. Students whose major concentration is applied physics, astrophysics, biochemistry, biology, biomedical engineering, biopsychology, biotechnology, chemical physics, chemistry, cognitive and brain sciences, computer science, engineering psychology, environmental studies, geological sciences, geology, mathematics, and physics will receive a Bachelor of Science degree. Those majoring in psychology, psychology/clinical, and quantitative eco-

nomics may choose to receive the degree of Bachelor of Science or Bachelor of Arts at the time they complete their degree sheet. Students in all other majors will receive a Bachelor of Arts degree. Students whose multiple majors make them eligible for either a Bachelor of Arts degree or a Bachelor of Science degree may choose between the two when completing their degree sheet.

Additional Graduation Requirements

Other courses to complete the thirty-four credits required for graduation may be selected without restriction. However, students should be guided in their choice by the purpose of promoting breadth as well as depth in intellectual development. In planning their programs of study, students should keep in mind that a good general education in the humanities, the arts, the sciences, mathematics, and the social sciences is a distinguishing characteristic of members of all the established professions. Faculty advisers are ready at all times to aid and counsel in making decisions.

Seniors must file a degree sheet the semester prior to their expected date of graduation. (Consult Undergraduate Education in Dowling Hall.)

Undergraduate Minor Programs

A student may have any number of majors and minors, provided there is only one disciplinary (departmental) minor. Two course credits used toward the departmental minor may be used toward a foundation, distribution, or concentration requirement. Two courses used toward the inter-disciplinary minor may be used toward a distribution or concentration requirement, but not toward a foundation requirement.

Disciplinary (or Departmental)

A minor is a coherent group of four to six course credits that may be a limited version of a field of concentration or a group of courses having closely related subject matter. Minors are optional and in no way replace the field of concentration. The object of a minor program is to present students with the basic concepts in a single scholarly discipline, including an introduction to appropriate methodologies and ways of thinking around the subject.

Students may have only one disciplinary (departmental) minor, regardless of the number of

majors. Two course credits used toward the departmental minor may be used toward a foundation, distribution, or concentration requirement. Students may not complete both a minor and a concentration (major) in the same discipline. All courses used in fulfillment of a disciplinary minor must be taken for a grade. Not all departments have minors, so students should consult department web sites for additional information.

Interdisciplinary

The interdisciplinary minor program involves a designated group of five credits from at least three departments or programs of the university, bringing to bear the knowledge and perspectives of various disciplines on a single subject. Students may select a minor from among the programs approved by the Subcommittee on Academic Minors of the Committee on Curricula. These minor programs are listed below.

Students may have more than one interdisciplinary minor, regardless of the number of majors they have, and may have an inter-disciplinary minor in addition to a departmental minor. Two courses used toward the inter-disciplinary minor may be used toward a distribution or concentration requirement, but not toward a foundation requirement.

In addition to the five credits, a student is required to complete an appropriate project, such as a thesis, an oral presentation, or a performance, which integrates the knowledge and methodologies of the disciplines involved. The integrative project will be given one-half or one course credit under a CIS (Center for Interdisciplinary Studies) 95-96 designation and will receive a letter grade. The topic of the project must receive initial approval from an instructor of one of the courses taken by the student for the specific minor program. This instructor will also agree to direct the student's work on the project. The project will be evaluated by at least one other faculty member whose courses are part of the particular minor program, and who will then consult the project director regarding the grade to be assigned. The student is responsible for selecting the faculty members who will participate in this aspect of the program.

In a further effort to synthesize knowledge acquired in the program, the faculty members involved in each minor will arrange two meetings for all students who will be working on their proj-

ect in that particular academic year. The first meeting, scheduled for the fall semester, will give to the students the opportunity to consult the faculty regarding project topics, resources, and methodology. The second meeting, held at the end of the spring semester, will provide a forum at which the participants in the minor will discuss their work with others interested in the same general area and share the views and insights gained by participation in the particular minor program.

Students may submit a Declaration of Minor form to the Center for Interdisciplinary Studies only after they have declared a major concentration. At the completion of their minor program, students must submit a Minor Certification form, bearing the signatures of the faculty coordinator of the minor and of the two or more faculty members involved in the evaluation of their project, the title of the project, and a list of the five courses taken.

The approved interdisciplinary minor programs are:

Africa in the New World
 Asian Studies
 Engineering Science Studies
 Ethnic Groups in America
 Film Studies
 Latin American Studies
 Latino Studies
 Leadership Studies
 Mass Communications and Media Studies
 Medieval Studies
 Multimedia Arts
 Urban Studies
 Women's Studies

See the alphabetical listings in this bulletin for a description of these programs and the name of the faculty coordinator, who in each case can provide more information and an updated list of approved courses.

Degrees with Honors

Honorable mention (*cum laude*) is conferred at commencement on students who achieved a record of five credits of A or A- and a cumulative average of 3.50.

High distinction (*magna cum laude*) may be conferred at commencement on students who achieved a record of six credits of A or A- in satisfying their concentration requirements, including related fields, and whose cumulative average for all

courses is 3.65 or better. Students must be recommended in writing by their departmental chairperson or advisory committee.

Highest distinction (*summa cum laude*) may be conferred at commencement on students who achieved a record of six credits of A or A- in satisfying their concentration requirements, and whose cumulative average for all courses is 3.80 or better. Such candidates must also have earned A or A- grades in four of the five areas of the distribution requirement. All of these A or A- grades must be received in courses offered by a department or interdisciplinary program at Tufts. Please note that Advanced Placement scores are not interpreted as grades.

It is important to emphasize that the numerical criteria for *magna cum laude* and *summa cum laude* determine only eligibility for consideration; actual award of these honors is contingent on departmental recommendation. A description of additional departmental criteria (such as independent research) for honors recommendations is available from each academic department. In addition, for students recommended for *summa cum laude*, the department must supply a letter supporting the recommendation. Finally, *summa cum laude* is awarded only by special vote of the entire faculty, recognizing extraordinary achievement in the breadth, as well as the depth, of the student's intellectual development. Students whose permanent record includes a serious disciplinary infraction will not normally be eligible for *summa cum laude* honors. Exceptions to this policy can be made only after disclosure by the Dean of Student Affairs of the details of the infraction and subsequent vote by the faculty.

Grades in courses taken at institutions other than Tufts shall not be considered as criteria for honors. Exceptions to this rule are courses taken through cross-registration, the Swarthmore Exchange Program, the Mystic Seaport Program, or Tufts programs abroad.

See also Thesis Honors Program.

Phi Beta Kappa

Founded at the College of William and Mary in Virginia on December 3, 1776, Phi Beta Kappa is the highest national academic honor for students in the liberal arts. There are chapters of Phi Beta Kappa at 242 colleges and universities. Delta Chapter of Massachusetts at Tufts University was

established on September 7, 1892, and women became eligible from the time of their acceptance at Tufts. Although second-semester juniors and all seniors will be considered without any action on their part, students can be recommended for election to Phi Beta Kappa by their major departments or by individual professors. Election is determined by the student's cumulative average together with his or her program: the courses selected in the field(s) of concentration and in fulfilling the foundation and distribution requirements, the general nature and difficulty of the program, its breadth and depth, the student's progress in the program, and the use of the pass-fail option. In recent years, 5 to 6 percent of the graduating seniors have been elected to Phi Beta Kappa.

Thesis Honors Program

The Thesis Honors Program allows students to pursue a program of independent study usually leading to a senior thesis and a qualifying examination. (In some fields, the thesis may take the form of a creative project or research experience.) The principal purpose of the program is to give special impetus to the development of self-reliance, individual initiative, habits of critical analysis, and correlation of knowledge. Intensive specialization in a field of knowledge may be considered an appropriate corollary in some cases, depending on the student's individual approach and the particular area of investigation. Students pursuing the Plan of Study major or a CIS thesis are eligible for thesis honors.

Since this is an honors program, admission is normally restricted to students whose names have appeared on the Dean's List at least two times before their senior year. Students may take on an honors thesis with one semester on the Dean's List if they have transferred to Tufts or have received special permission from their department. Application should be made no later than the end of the junior year. The student is responsible for finding an advisory committee. While three members are recommended, the committee may have two members, one of whom may be outside the student's major department. Admission to the program requires formation of an advisory committee, consent of the student's adviser, and approval either of the chair of the student's major department, or in the case of a CIS thesis, the CIS Board. The membership of the advisory committee and the title of the thesis must be

registered with the Academic Resource Center.

The advisory committee will be chaired by a member of the student's major department or by the sponsor of the thesis in the case of a Plan of Study. The committee will direct the student's reading and research or other creative work, and will guide the student in preparing for a qualifying examination in the area of investigation. All such programs will include a thesis course, which normally will count as two one-semester credits. Students who would like to be recommended for degrees with honors by departments or programs that require a thesis should be aware that a thesis within their own department or program is required and a CIS thesis will not usually count as a substitute.

The thesis may be of a creative, critical, or historical nature, or may embody critical analysis of the results of experiments carried out by the student under supervision. Its subject and scope will be agreed upon in advance by the student and sponsor and approved by the committee. The completed thesis will be presented for consideration no later than two weeks before the last day of classes of the student's final semester.

Each candidate for a degree with thesis honors is required to undergo examination on the thesis and on the principal area of investigation (or major concentration). The specific character of the examination is determined by each department or advisory committee and may be oral or written or both. After the defense, a final copy of the thesis, in electronic form, should be submitted to the Tisch Library archive.

The department or advisory committee is empowered to determine the level of thesis honors to be awarded, basing its recommendation on an evaluation of the thesis. Degrees are designated bachelor of arts or bachelor of science, with highest thesis honors, with high thesis honors, or with thesis honors. (Thesis honors will be indicated on the student's transcript, but not on the diploma.) Students who, in the judgment of the department or advisory committee, have not attained the standards required for a thesis honors designation, but whose work is worthy of a degree, are recommended for the bachelor of arts or bachelor of science degree subject to the general regulations. Students who, in the judgment of the department or advisory committee, have attained the standards required for a thesis honors designation may also receive the

degree *summa cum laude*, *magna cum laude*, or *cum laude*, in accordance with the procedures governing degrees with distinction.

After the defense, a final copy of the thesis should be submitted to Digital Collections and Archives (DCA). Beginning in academic year 2008-2009, the DCA will accept thesis submission electronically as an alternative to submitting a bound paper copy. Please contact the DCA for more information on how to submit your thesis. For answers to frequently asked questions and a style sheet, visit the Web site:

<http://ase.tufts.edu/wts/seniorThesis.asp>.

Cross Registration

Up to twenty undergraduates Tufts students may enroll in each of the following institutions during the fall and spring semesters: Boston College, Brandeis University, and Boston University. Qualifying students must be enrolled full time and be in good academic standing in their home institution. There is no exchange of fees, and both course credits and grades are recorded at the home institution. Tufts students who wish to cross-register into another Tufts school during the summer months are permitted to do so provided they qualify for the course and submit all forms correctly and on time. One cross registered course at the above institutions may be taken per semester. Tufts students are limited to a total of two courses taken in departments for which there is no Tufts equivalent (e.g., business). Tufts students are subject to the requirements of the course taken at the host institution, including attendance.

Any student from the above institutions wishing to take a course at Tufts University is subject to the same rules as the resident Tufts University students. One course per fall and spring semester for up to twenty enrollments per institution may be taken at the Tufts University Medford, Boston and Grafton campuses. This does not include classes being held at the School for the Museum of Fine Arts.

For Questions and forms contact Student Services at 617-627-2000 or email to studentservices@tufts.edu.

Domestic Exchange and Off-Campus Programs

Juniors in good standing and exceptional sophomores may participate. For the Swarthmore exchange program, students pay all charges to their home institution; there is no exchange of fees. The course credits and grades earned in the exchange programs by Tufts students are recorded on the Tufts transcript.

Sophomores and juniors are also eligible to participate in a one-semester program in American Maritime Studies, accredited by Williams College and held at Mystic Seaport, Connecticut. Both credits and grades are recorded. Also, qualified students may participate in courses offered by the Massachusetts Bay Marine Studies Consortium. For more information on these programs, contact Undergraduate Education.

Graduate School of Arts and Sciences

The Graduate School of Arts and Sciences is the academic unit responsible for all postbaccalaureate degree programs offered through the School of Arts and Sciences. The advanced degrees offered are the master of arts, master of science, master of fine arts, master of arts in teaching, master of public policy, certificate of advanced graduate study, doctor of occupational therapy, and doctor of philosophy.

Through its doctoral programs, the Graduate School of Arts and Sciences aims to advance knowledge and to develop intellectual leaders in selected areas of the natural sciences, social sciences, and the humanities. In order to encourage the close association of doctoral candidates and faculty, the number of programs offered is relatively small and the number of students admitted to each is limited. Through its wider variety of master's level programs, the school provides students with a focused education and specific skills to further their professional careers. The programs leading to these degrees are described in this bulletin. Inquiries should be addressed to the Office of Graduate Studies, Ballou Hall, first floor, Tufts University, Medford, Massachusetts 02155.

The Office of Graduate Studies also administers the Graduate Career Advancement Program, and the nonacademic aspects of graduate programs in arts, sciences, and engineering, such as admissions, registration, and degree certification as described in the following pages.

Admission

Booklets providing program descriptions and application forms are available from the graduate office. This information is also online at <http://gradstudy.tufts.edu/Admissions>. The application must be accompanied by a nonrefundable application fee. The fee is waived if the applicant is a current Tufts undergraduate, graduate, or certificate student. Departments can also supply information about their graduate programs.

The deadlines for admission vary by program. The application deadline for fall admission for international students is December 30; applications for spring admission must be completed by September 15. In addition, the graduate office must

receive notification by April 15 of students' intention to accept Tufts' admission offer for fall matriculation and by December 1 for spring matriculation.

Registration

All graduate students must be registered, or on an approved leave of absence, each academic year term. If all required courses—including any thesis courses—have been completed, master's candidates must register for courses 401 (part time) or 402 (full time) in their departments and doctoral candidates must register for courses 501 (part time) or 502 (full time) in their departments.

A full-time student may arrange with an instructor to audit a course, but this course will not appear on the student's academic record. A course for which a student has been formally registered remains on the record unless a formal petition to remove it has been approved by the dean within the first four weeks of the term.

Prior to their initial registration, all graduate students must complete a health examination report, available from the Health Service. Registration will not be allowed for those with missing or incomplete health questionnaires and examination forms.

Cross Registration— Graduate School Consortium

Full-time students in the Graduate School of Arts and Sciences and graduate students in the School of Engineering may enroll in any semester for one graduate course in the Graduate School of Arts and Sciences at Boston College, Boston University, or Brandeis University. The catalogs and schedules of the host institutions are available at the registrar's office of each university. Students who wish to cross-register should consult the instructor in the particular course and should expect to satisfy the prerequisites and requirements normally required for admission to that course. Cross-registration is not permitted in any summer school. Courses satisfactorily completed (B- or better) at one of the three consortium schools automatically appear on the student's Tufts transcript and may be counted toward degree requirements.

A student at Tufts University who wishes to enroll in a graduate course at one of the host institutions should obtain a registration permit from the student services center in Dowling Hall and

present it to the graduate registrar of the host institution. The host institution reserves the right to terminate the student's participation at that institution at any time. A full-time graduate student at Tufts University may also enroll for two graduate courses during any semester at the Fletcher School of Law and Diplomacy or the Friedman School of Nutrition Science and Policy. Cross-registration forms are available at Student Services in Dowling Hall.

Tufts is also a member of the Graduate Consortium in Women's Studies (GCWS) at MIT. For information about course offerings and application materials go to <http://mit.edu/gcws>.

Graduate Career Advancement Program

The Office of Graduate Studies administers the Graduate Career Advancement Program (GCAP) that allows someone with a baccalaureate degree to take courses for credit or audit during the academic year without being matriculated into a degree program. In addition to taking courses for personal enrichment, GCAP students enroll to become familiar with a graduate or professional degree program, to strengthen their academic record, or to advance their careers. Admission to any course is at the discretion of the instructor and is subject to the availability of space. For students who later matriculate as graduate students at Tufts, a maximum of two relevant courses are transferable to a master's degree.

Certificate Programs

For those interested in earning professional credentials in a concentrated format, graduate-level certificate programs are available in bioengineering, biotechnology and biotechnology engineering, community environmental studies, computer science, environmental management, epidemiology, human-computer interaction, management of community organizations, manufacturing engineering, microwave and wireless engineering, museum studies, program evaluation, and advanced professional study in occupational therapy, including concentrations in hand and upper extremity rehabilitation and school-based practice. The postbaccalaureate minor program in computer science is available for students with a bachelor's degree and one college-level computer programming course. Tufts certificate students may transfer up to four relevant courses to a master's degree.

For more information, contact the Office of Graduate Studies, Ballou Hall (first floor), Medford, Massachusetts 02155, 617-627-3395, or visit <http://gradstudy.tufts.edu>.

Reserving Graduate-Level Courses while an Undergraduate

Tufts undergraduate students may reserve graduate-level courses taken prior to completion of their baccalaureate degree that are not needed for completion of those degree requirements. Through arrangement with the registrar, these courses are designated on the transcript and may be applied toward a master's degree at Tufts or elsewhere.

Combined Bachelor's/Master's Degrees Program

This program, which is offered on a limited department-by-department basis, is conducted jointly by the undergraduate colleges and the graduate school. Exceptional students may undertake studies combining undergraduate and graduate courses, and are simultaneously enrolled in bachelor's and master's degree programs. However, courses counted toward the completion of one degree may not be used for the other. Combined-degrees students must pay four years of undergraduate tuition and the entire tuition for the master's degree.

Transfer of Credit

After matriculating in the Graduate School of Arts and Sciences or the School of Engineering, eligible students may apply for transfer credit for graduate-level courses taken at Tufts or at other institutions. A maximum of two graduate-level courses (one for M.F.A. candidates) taken either as a nondegree student at Tufts or at another institution may be transferred and used to fulfill requirements for a master's degree subject to the following conditions. Credits transferred must carry the grade of B- or better; have been taken following completion of the baccalaureate degree; and not have been counted toward another degree. Tufts certificate students may request to transfer two additional courses from the College of Special Studies. In all cases, courses to be transferred must be approved by the department and the Graduate School of Arts and Sciences or the School of Engineering. Transfer of credit request forms are available online at <http://gradstudy.tufts.edu/forms>.

Master's Degree

Residence and Course Requirements

The minimum residence requirement for the master's degree is two terms of graduate study. The degree requires a program of advanced study of at least eight courses or the equivalent. The specific requirements of the various departments are given in this bulletin. Additional courses beyond the first eight are required in many programs. Courses counted for credit for one degree may not be used for another. A student seeking two separate master's degrees must meet the stated requirements for each degree. Tuition will be charged for both degrees.

Thesis

In some departments, a thesis is required for the master's degree; in others, the thesis is optional or is not required. A thesis should show the student's competence in independent investigation and should demonstrate critical power as well as ability in expression.

Foreign Language

Some departments require demonstration of proficiency in an approved foreign language. The schedule for proficiency exams is available from the graduate office.

Comprehensive Examination

Candidates for a master's degree may be required to pass a comprehensive examination conducted by a committee of the graduate faculty. The character of the examination is determined by each department, and may be either oral or written or both.

Recommendation for the Degree

Candidates for the master's degree must complete a recommendation-for-degree (degree sheet) and the graduate exit survey. Degree sheets and the exit survey are available online at

<http://gradstudy.tufts.edu>. The candidate cannot be recommended to the faculty for a degree unless the degree sheet is completed, endorsed by the department, and submitted to the graduate office near the beginning of the semester in which the degree is to be granted. Deadlines are listed in the Graduate Student Handbook.

Time Limit

All credits to be counted toward a master's degree

must be earned within five calendar years just prior to the granting of the degree. Candidates for the M.F.A. must complete all degree requirements in three years. Petitions for extension of time require the approval of the Graduate School of Arts and Sciences or the School of Engineering.

Combined-Degrees Programs

The Graduate School of Arts and Sciences and the Fletcher School of Law and Diplomacy administer a combined-degrees (M.A./M.A.L.D.) program in international environmental policy. Students must be accepted simultaneously by both the Fletcher School of Law and Diplomacy and the Department of Urban and Environmental Policy and Planning within the Graduate School of Arts and Sciences and must complete the two degrees within five years. The program consists of twenty-three course credits taken over three years, resulting in a jointly advised thesis.

The Graduate School of Arts and Sciences and the Friedman School of Nutrition Science and Policy administer a combined-degrees (M.A./M.S.) program for students interested in urban and environmental policy and agriculture, food, and environment. Students must be accepted simultaneously by both the Friedman School of Nutrition Science and Policy and the Department of Urban and Environmental Policy and Planning within the Graduate School of Arts and Sciences, and must complete the two degrees within five years. The program consists of twenty-three course credits that include a two-credit thesis.

The Graduate School of Arts and Sciences and the School of Engineering administer a combined-degrees (M.A./M.S.) program in urban and environmental policy and planning and civil and environmental engineering. The program requires five semesters of full-time study and consists of nineteen course credits that include a two-credit thesis.

Doctor of Philosophy Degree

The doctor of philosophy degree is conferred by the university only to advanced students who demonstrate exceptional achievement in original scholarship. This degree prepares students to become scholars, to make original contributions to their field, and to communicate and disseminate this information to others. Doctoral candidates will

develop their ability to evaluate critically and synthesize information from many sources and apply it to specific problems. Students must practice their work ethically, as appropriate to that field. During the dissertation, the student is apprenticed to a faculty adviser who is an expert in the field of inquiry.

Opportunity for doctoral study and research is selective, and admissions are contingent on the recommendation of the department concerned. A student planning to follow such a program should, if possible, arrange an interview with the chair or graduate adviser of the department in which he or she wishes to study.

When a student enrolls in a doctoral program with a master's degree in the relevant subject area from an accredited college or university, the number and identity of the courses and other requirements needed to satisfy the predoctoral dissertation obligations are negotiable with the department. A letter detailing the results of these negotiations must be on file with the graduate office.

Tufts will not award the doctoral degree to students whose dissertation research or writing was performed at another institution, unless they were under the direct supervision of a Tufts-based faculty member. (See residence requirement restrictions below.)

Credit for work at another institution taken concurrently with studies in the graduate school, including courses taken elsewhere during the summer, must receive approval from the student's department prior to registration for such courses. The Graduate School of Arts and Sciences and the School of Engineering approve all final transfers of credit. Students who formally cross-register in regular semesters with Boston College, Boston University, and/or Brandeis University through the consortium do not need prior approval. Also, the number of courses taken through the consortium is not subject to the limits on transferred credits as stated above.

Residence Requirement

The minimum requirement is three academic years of study and research completed with distinction, of which at least one year of full-time study must be spent in residence at Tufts. All work must be completed within seven years. Employees of Tufts University are not eligible for doctoral-level tuition remission and would normally be unable to satisfy the full-time study requirement. Petitions for extension of time require approval of the Graduate

School of Arts and Sciences and the School of Engineering. Graduate-level courses taken elsewhere prior to matriculation may be counted to a maximum of one year of credit toward the residence requirements. One year of the residence requirement is automatically satisfied by a master's degree obtained from an accredited college or university.

Foreign Language

Many departments require demonstration of proficiency in one or two approved foreign languages. Consult departmental program descriptions for specific requirements. The schedule for proficiency exams is available from the graduate office.

Qualifying Examinations

A student who has completed the major part of his or her systematic study and has met the language requirement (if any) will, subject to the approval of the department or committee supervising the program, take a qualifying examination. This examination, which may be written, oral, or both, is described in the statement of each department's program in this bulletin.

Dissertation

A major portion of work toward a doctoral degree consists of the preparation of a dissertation chosen with the approval of the department concerned and written under its supervision. The dissertation must demonstrate high attainment in a special branch of knowledge, the original development of an appropriate subject, and independent research. The dissertation must be accepted by a faculty committee. The examining committee for doctoral candidates in Arts and Sciences should be composed of four members – three from the department with which the student has conducted his/her research (or relevant disciplines at Tufts) and one from outside the university. The School of Engineering doctoral examining committees consist of a minimum of four members with one member from a different Tufts department and one member from outside the university. Dissertations are deposited in the Library of Congress through the University Microfilms, Inc. system.

Recommendation for the Degree

Candidates for the doctoral degree must complete a recommendation-for-degree form (degree sheet) and the graduate exit survey. Degree sheets and exit surveys are available online at <http://gradstudy.tufts.edu/GraduationInformation>. The candidate cannot be recommended to the faculty for

a degree unless the degree sheet is completed, endorsed by the department, and submitted to the graduate office at the beginning of the semester in which the degree is to be granted.

Interdisciplinary Doctorate

The Interdisciplinary Doctorate (ID) was established to accommodate students interested in pursuing doctoral-level studies in areas that cannot be accommodated in the other doctoral programs within the Graduate School of Arts and Sciences and the School of Engineering. The admissions committee considers applications from those who are familiar with the Tufts graduate-level offerings and with its faculty, and whose research area is truly interdisciplinary and carefully matched to the university's human, intellectual, and physical resources. The application process places the burden of acquiring this information on the applicant. A standing committee of the graduate school, the Interdisciplinary Doctorate Overseers Committee (IDOC), serves as the admissions committee and will monitor the progress of all students matriculated into the program.

Admission to ID is highly selective. Students must demonstrate the ability to do independent research/scholarship. Creative works of art, musical composition and performance, and performance direction, though laudable, are not acceptable as the sole criteria for admission into a scholarly doctoral program of study.

In addition to the standard application material, ID applicants must submit a proposal for interdisciplinary doctorate study, as well as documents pertaining to the student's advisory committee. These will all be examined by IDOC at one of its twice yearly admissions meetings, and possible followup with the candidate and his/her advisory committee may be required.

For complete information about the admissions and program requirements for the Interdisciplinary Doctorate, call the Office of Graduate Studies, at 617-627-3395 and ask for the guidelines for applicants. The guidelines are also available on the Web at <http://gradstudy.tufts.edu>.

Leave of Absence

A leave of absence, which stops the clock toward time to degree completion, is usually allowed for reasons of ill health or other personal contingencies. To be granted a leave of absence, a student must

complete a leave of absence request form and submit it to the graduate office. The student's adviser must provide written support for the request. Leave of absence request forms are available online at <http://gradstudy.tufts.edu>. A leave of absence will not be granted for more than one year. See the Graduate Student Handbook for details.

Extension of Degree Time

Master's students are expected to complete their degree within five years, M.F.A. students within three years, and doctoral students within seven years from matriculation. A student should consider applying for an extension of time when he/she is actively working on program requirements and needs more time to complete them, but is confident that the work will be completed within the additional year if it is approved. Students should not request an extension of time if substantial progress cannot be made within the additional year provided.

To request an extension of time to complete the degree requirements, a student must complete a Request for Extension of Time form, which is available online at <http://gradstudy.tufts.edu/Forms> and submit it to his/her department for approval. See the Graduate Student Handbook for details.

Grades

Grades of scholarship are expressed by one of the following letters:

- A Superior work
- B Meritorious work
- C Not acceptable for graduate credit
- D Not acceptable for graduate credit
- F Failure
- P Not acceptable for graduate credit
- S, U Grades of S (Satisfactory) and U (Unsatisfactory) may be given by the instructor in special topics courses, courses in supervised teaching, research courses, certain graduate colloquia, and thesis and dissertation courses.

The following symbols are also used:

- I Incomplete: an indication that more time will be allowed to complete the work, specifically within six weeks of the first day of classes in

the subsequent semester (fall or spring only; summer terms excluded).

- W** Withdrawn: an indication that a student has been permitted to withdraw from a course after the fifth week of a semester, but no later than the last day of classes.
- Y** Work not scheduled for evaluation during the current term

Policy on Incompletes

An incomplete may be awarded only if the student has done substantial work in the course, the instructor judges the reasons for granting incomplete status to be valid, and the instructor determines that the work can be completed in the time specified on the incomplete form. The instructor is responsible for specifying on the incomplete form the reason for the incomplete grade and the conditions that must be satisfied for the awarding of a grade. A copy of this form must be submitted to the registrar at the time final grades are reported. It is the responsibility of the student to request an incomplete before the date of the required work.

If an incomplete is granted, all work in the course must be completed on or before the date six weeks after the first day of classes in the subsequent semester (fall or spring only; summer terms excluded). If the student has completed the work within the stated time, it will be evaluated without prejudice. Completed work must be submitted in person or by registered mail to the instructor. Upon the student's completion of work in the course, the instructor must submit a final grade to the registrar within eight weeks after the first day of classes of the subsequent semester. If a course is not completed by the designated time, the student will receive the default grade specified on the incomplete form. Under exceptional circumstances, a student may request an extension of the six-week deadline. Such an extension may be granted at the discretion of the instructor. Any such agreement between the student and faculty member must be submitted in writing to the dean for transmission to the registrar.

Academic Standing

To remain eligible to continue in a degree program and/or to receive various types of financial assistance including federal aid, a graduate student must maintain good academic standing and be making adequate progress toward the degree. The

following are the minimum requirements; departments have the right to impose additional criteria for good academic standing.

- 1) It is expected that a student will complete all courses taken for credit with the grade of B- or better (see Grades). Courses for which a student receives a grade of less than B- may be retaken only once. The original grade earned remains in the student's record. If a student receives any two grades less than B-, the department will recommend to the graduate dean that the student be administratively withdrawn.
- 2) Courses for degree credit may not be taken or transferred as Pass/Fail
- 3) All comprehensive and/or qualifying examinations and language examinations must be passed within the time limits established by the various departments.
- 4) Deadlines established by departments for submission of thesis outlines and dissertation proposals, for the completion of internships or other field experience, and for regular, systematic evaluations of research progress must be met.
- 5) It is expected that incomplete grades will be completed in the specified six-week time frame (unless an extension of this deadline has been given in writing to the registrar). Excessive numbers of incompletes or incompletes existing for more than one year may be grounds for dismissal.
- 6) The completion of all degree requirements must take place within the time limits established for the various programs by the graduate schools.

Failure to meet the grade requirements or deviation from any of the last three items above constitutes evidence that the student is making inadequate degree progress, is no longer in good academic standing - and that he/she will be administratively withdrawn, unless an exception is granted by the graduate school based on the recommendation from the appropriate department or departmental committee. Only the deans of the Graduate School of Arts and Sciences and the School of Engineering may administratively withdraw an enrolled graduate student.

Office of the Dean of Student Affairs

Graduate students' primary academic relationships are with their department. However, the personnel of the Office of the Dean of Student Affairs in Dowling Hall are available for concerns outside aca-

demic life. Graduate students should refer to the student handbook (the Pachyderm) to become familiar with university rules. Breaches of rules will be referred to the Office of the Dean of Student Affairs for investigation and, when appropriate, disciplinary action. Students writing theses or dissertations should be particularly sensitive to standards of acceptable research and presentation.

Expenses

Tuition

For graduate students in the Graduate School of Arts and Sciences and the School of Engineering varies by program. For an arts and sciences master's degree requiring eight to twelve courses, one full year's tuition is charged. For programs requiring additional course work, tuition is charged for two years. For an arts and sciences doctoral degree, full tuition is charged for three years unless the student enters the degree program with an appropriate master's degree, in which case tuition is charged for two years. Engineering master's programs require full tuition payment for three semesters unless a student has registered for all ten credits required for the degree and completed all required courses (excluding thesis or project) in fewer than three semesters. For an engineering doctoral degree, full tuition is charged for nine semesters unless the student enters the program with an appropriate master's degree, in which case tuition is charged for six semesters. Part-time graduate students in both schools are charged for each course/credit taken until their degree is completed. Current tuition rates for each school are available on the web at <http://gradstudy.tufts.edu>.

The Trustees of Tufts University reserve the right to change the tuition or to establish additional fees or charges for special features or services whenever in their opinion such action is deemed advisable.

Student Activity Fee

All graduate students pay an annual \$40 student activity fee. The monies are used by the Graduate Student Council to support the interests of graduate students.

Penalty Fees

A penalty fee is charged for late registration and for late payment of any university charge. Any loss or

damage to university property for which the student is responsible, including breakage of equipment in a laboratory, is charged to the student.

Living Accommodations

The university provides a limited number of residential facilities for use by first-year graduate students. Contact the Office of Residential Life office at 617-627-3248 for applications. Accommodations are available to incoming, full-time students for a maximum of one year. Most students live in apartments in the surrounding community, many of which are within walking distance of the campus.

Information about off-campus housing is available through the Off-Campus Housing Office; call 617-627-5319 or visit <http://ase.tufts.edu/och>.

Dining Facilities

Students and faculty meet casually in the Campus Center and Trios, where meals are served on a cash basis, cafeteria style. Graduate students may take advantage of the meal plans on the Medford/Somerville campus.

Financial Assistance

To help students whose records indicate scholarly promise, the university makes available a variety of awards and work opportunities. Tuition scholarships and fellowships are normally granted for one academic year; therefore, a registered student who holds a scholarship or fellowship must apply annually to the department for a renewal. All awards are granted and accepted with the understanding that they may be revoked or reduced at any time for inadequate progress toward the degree as defined by departmental standards. Ordinarily, no student may hold a fellowship, scholarship, or teaching assistantship for more than two years of study for a master's degree, or for more than four years of study for the doctoral degree. Priority in making awards is given to full-time students.

Scholarships

A tuition scholarship is an award, on grounds of scholarly ability and need, of financial credit that may be used exclusively for remission of tuition during the academic year. A limited number of full scholarships and a larger number of partial scholarships are available. Scholarship students are responsible for payment of tuition charges above

those covered by their particular scholarship as well as all fees.

Fellowships

A fellowship is an academic award of honor to outstanding students to help them in furthering advanced study and research. No services are required of students for fellowship or scholarship awards.

Teaching Assistants

Teaching assistants are resident graduate students who participate part time in the instructional programs of the university and receive a stipend. The university has established these awards to enable graduate students to gain teaching experience. Teaching assistants are also eligible for scholarships and fellowships. Teaching assistants normally have instructional responsibility in the recitation or laboratory sections of courses to which they are assigned, or their work involves grading papers and examinations. International students are not usually eligible for appointment as teaching assistants in their first year of graduate work unless they have demonstrated proficiency in spoken English or they have received training at another American university.

Appointments to these positions are based on the recommendation of a student's department chair or appropriate departmental graduate committee and are made for periods of one academic year or one semester, but are renewable.

The university reserves the right to terminate an appointment at any time for due cause. Inadequate degree progress as defined by departmental or program standards may constitute cause. Also, academic dishonesty may constitute cause, as may incomplete or false information on the application forms to the graduate school. In all instances of dismissal, the student will be notified in writing of the reasons for the termination and may appeal the decision to the dean.

Stipend levels vary by department. All stipends are taxable by the U.S. Internal Revenue Service. Prorated fractions of these stipends are made based on the actual time commitments of a given assistantship.

Graduate Institute for Teaching

The Graduate Institute For Teaching (GIFT)

offers a program for graduate students who are interested in becoming college-level faculty. GIFT students attend specialized workshops on pedagogy during the summer and have the opportunity to co-teach a fall semester course under the direction of a faculty mentor. Students receive a stipend for teaching. For more information, go to <http://gradstudy.tufts.edu>.

Research Assistants

Research assistants are graduate students who actively participate in the ongoing research program of a faculty mentor. Stipends are sometimes available during the summers as well as during the academic year. Stipend levels follow those of teaching assistants. Research assistantships are normally awarded through the department chair or research program director.

Resident Proctors

A limited number of positions are available for both married and unmarried graduate students as proctors in university residence halls. Remuneration includes rent-free accommodations and a stipend. Applications are available at the Office of Residential Life. Appointments involve a commitment for a full academic year.

Financial Aid

Information on other types of financial assistance, including various loan programs, is available from Student Financial Services at <http://uss.tufts.edu/finaid/gradaid>. Students seeking part-time work on campus should contact Student Employment, Dowling Hall.

College of Special Studies

The College of Special Studies offers a variety of academic programs. One is the degree program offered in conjunction with the School of the Museum of Fine Arts. The other programs of the college, offered through the Office of Graduate Studies, are intended to provide quality education on a nondegree basis, primarily but not exclusively to nontraditional students.

School of the Museum of Fine Arts

In accordance with Tufts University's affiliation with the School of the Museum of Fine Arts, a student may apply as a candidate for the bachelor

of fine arts degree. After acceptance into the B.F.A. program, students take their studio art courses at the Museum School (in Boston) and the majority of their liberal arts courses at Tufts University. Courses in many fields of art are available, such as printmaking, photography, painting, drawing, sculpture, ceramics, metalsmithing, video and multimedia, film, performance, sound, text and image arts, and stained glass. Requirements for the bachelor of fine arts degree include ninety credits in studio art and eighteen academic courses, including five semesters of art history.

Students interested in obtaining licensure as teachers of visual art may complete the bachelor of fine arts in art education. This program requires eighty-four studio credits and nineteen academic courses. (See Teacher Licensure Programs.)

For more information, students may write to the School of the Museum of Fine Arts, 230 The Fenway, Boston, Massachusetts 02115.

Office of Graduate Studies

This office administers the Graduate Career Advancement Program, which allows holders of baccalaureate degrees to enroll in courses at Tufts to prepare for further study or simply to expand their knowledge of particular fields or disciplines. In addition to the Graduate Career Advancement Program, the office sponsors a number of advanced professional certificate programs. Each program consists of a coherent set of credit-bearing courses in an emerging or rapidly evolving field. The certificate can serve as a credential for professional advancement or as an intermediate step toward a master's degree.

For more information, visit <http://gradstudy.tufts.edu>, or contact the Office of Graduate Studies in Ballou Hall at 617-627-3395.

School of Engineering

Mission Statement

The Tufts University School of Engineering is uniquely positioned to educate the technological leaders of tomorrow. We offer the best of a liberal arts college atmosphere coupled with the intellectual and technological resources of a world-class research university. Our goals are to educate engineers committed to the innovative and ethical application of technology in the solution of societal problems, and to be a leader among peer institutions in targeted areas of interdisciplinary research and education that impact the well-being and sustainability of society.

Grounded in our commitment to engineering education innovation and interdisciplinary research, we offer our students a rich educational experience that combines intellectual rigor and disciplinary breadth in an intimate, student-centered environment. The many women among our engineering student body and faculty attest to Tufts Engineering's welcoming climate for traditionally underrepresented groups and offer a unique perspective to our students. We value our close collaborations with the School of Arts and Sciences and the University's extraordinary collection of excellent Professional Schools that create a wealth of educational and research opportunities.

School of Engineering Information

Undergraduate Programs

The School of Engineering offers courses leading to the bachelor of science in five departments of engineering (biomedical, chemical and biological, civil and environmental, electrical and computer, and mechanical), as well as in the computer science department. Also, the computer science department offers a program leading to the bachelor of science through the School of Engineering. Students may also enroll in special programs in the School of Engineering in preparation for careers in architecture, medicine, dentistry, veterinary medicine, law, public health, human factors, urban planning, and biomedical engineering. The school offers twelve bachelor of science degrees: bachelor of science in biomedical engineering, chemical engineering, civil engineering, computer engineering, computer

science, electrical engineering, environmental engineering, and mechanical engineering, bachelor of science in engineering science, bachelor of science in engineering, bachelor of science in engineering physics, and bachelor of science.

The programs of study leading to these degrees differ in structure and the manner in which they are administered. Departments administer professional degrees in programs accredited by the Engineering Accreditation Commission (EAC) or the Computing Accreditation Commission (CAC) of the Accreditation Board for Engineering and Technology (ABET) for students who wish to be recognized as practicing professionals, especially those who wish to become registered professional engineers. Whereas the professional degree programs are the most structured, the bachelor of science degree program is the most flexible. Through consultation with an individual faculty member in the School of Engineering, students may pursue an individualized program of study leading to the bachelor of science degree. The bachelor of science in engineering is administered by engineering departments and allows for some departure from the curriculum for the professional degree. The School of Engineering, in cooperation with the Department of Physics, offers a bachelor of science in engineering physics. This program combines a mastery of the fundamental principles of physics with the professional aspects of engineering.

UNDERGRADUATE DEGREES — TUFTS UNIVERSITY SCHOOL OF ENGINEERING

DEPARTMENT	UNDERGRADUATE DEGREE	DEGREE ABBREV	MAJOR	MAJOR ABBREV	PROGRAM
BIOMEDICAL ENGINEERING	Bachelor of Science in Biomedical Engineering	BSBME	Biomedical Engineering	BME	—
	Bachelor of Science in Chemical Engineering*	BSCHE	Chemical Engineering	CHE	—
	Bachelor of Science in Engineering	BSE	Engineering	ENGR	—
CIVIL & ENVIRONMENTAL ENGINEERING	Bachelor of Science in Civil Engineering*	BSCE	Civil Engineering	CE	—
	Bachelor of Science in Environmental Engineering*	BSEVE	Environmental Engineering	ENVE	—
	Bachelor of Science in Engineering	BSE	Engineering	ENGR	— Env. Health Arch. Studies
COMPUTER SCIENCE	Bachelor of Science in Computer Science*	BSCS	Computer Science	COMP	—
ELECTRICAL & COMPUTER ENGINEERING	Bachelor of Science in Electrical Engineering*	BSEE	Electrical Engineering	EE	—
	Bachelor of Science in Computer Engineering*	BSCPE	Computer Engineering	COEN	—
	Bachelor of Science in Engineering	BSE	Engineering	ENGR	—
	Bachelor of Science in Mechanical Engineering*	BSME	Mechanical Engineering	ME	—
MECHANICAL ENGINEERING	Bachelor of Science in Engineering	BSE	Engineering	ENGR	Manuf. Engr.
	Bachelor of Science (in Engineering Psychology)	BS	Engineering Psychology	EPSY	—
	Bachelor of Science in Engineering Science	BSES	Engineering Science	ES	—
OTHER DEGREES	Bachelor of Science in Engineering Physics	BSEP	Engineering Physics	ENPH	—
	Bachelor of Science	BS	No Major	NOMA	—

*ABET Accredited Program

Professional Degree Requirements

Bachelor of Science in Chemical Engineering
(B.S.C.H.E.)

Bachelor of Science in Civil Engineering (B.S.C.E.)

Bachelor of Science in Computer Engineering
(B.S.C.P.E.)

Bachelor of Science in Electrical Engineering
(B.S.E.E.)

Bachelor of Science in Environmental Engineering
(B.S.E.V.E.)

Bachelor of Science in Mechanical Engineering
(B.S.M.E.)

The programs leading to these degrees are accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Computer Science
(B.S.C.S.)

The Department of Computer Science administers the program leading to Bachelor of Science in Computer Science (in the School of Engineering) accredited by the Computing Accreditation Commission (CAC) of the Accreditation Board for Engineering and Technology (ABET). This program combines mastery of computer science with the breadth and practicality of an engineering education. It is for students who desire a knowledge of computer science, computer systems, and computer applications without the hardware courses required for the computer engineering.

The requirements for these professional degrees in engineering are thirty-eight credits to be distributed as detailed below.

Introductory Course Requirement

The introductory courses consist of eleven credits:

- a. Mathematics 11, 12, 13, 38 (or 22 for computer science majors). Mathematics 17 and 18 may be substituted for Mathematics 11, 12, and 13.
- b. Physics 11 with lab
- c. Chemistry 1 or 11 or 16
- d. Intro CAD (half-credit)
- e. Intro to Computers (one credit)
- f. One elective half-credit courses in introductory engineering
- g. English 1 or 3

The above 9 credits may not be taken pass-fail, except for English 3.

h. Physics 12 or a second course in chemistry

It is strongly recommended, but not required, that Physics 12 be taken with the lab. Individual departments may require that Physics 12 be taken with the lab; please check the requirements of your major department

- i. One approved science elective credit chosen from astronomy, physics, chemistry, biology, or geology. Please see <http://go.tufts.edu/EngineeringAdvising> for more information.

Foundation Requirement

There are eight credits required by the student's department of concentration and selected from among the following: biology, chemistry, computer science, engineering science, geology, mathematics, and physics/astronomy.

Concentration Requirement

The twelve credits that constitute the concentration requirement for a particular degree are determined by the department offering the degree.

Humanities, Social Sciences, and Arts Requirement

Courses selected must include a minimum of one credit each in the areas of humanities and social sciences. In addition, at least two courses must be taken in the same department. Ex-college courses are excluded, including those approved for distribution credit by the College of Liberal Arts. The student has the option to satisfy these requirements through a special minor in foreign language and culture in the areas of Chinese, French, German, Hebrew, Italian, Japanese, Russian, or Spanish. Contact the Department of German, Russian, and Asian Languages and Literatures, or the Department of Romance Languages for details. See <http://go.tufts.edu/EngineeringAdvising> for more information on accepted courses in Humanities, Social Sciences, and Arts.

Free Elective Requirement

There are two free elective credits to complete the thirty-eight credits required for these degrees. The courses selected to fulfill the two free elective credits may be chosen without any restriction.

First-Year Program

The first year for students in the professional degree programs normally consists of courses in mathemat-

ics, science, English 1, humanities and/or arts, and social sciences. Mathematics 11 and 12; two courses from Physics 11, 12, Chemistry 1, 2; Introductory Engineering courses are customarily completed during the first year.

Bachelor of Science (B.S.)

The program leading to the bachelor of science degree consists of thirty-six credits. A minimum of eighteen of these credits must be in engineering and in those departments that provide foundation courses in the accredited programs. This group must include Mathematics 11 and 12 and eight credits in engineering or engineering science. A minimum of six of the remaining credits must be in the humanities and/or arts, and social sciences. Students in the program choose their adviser from the faculty of the School of Engineering. Each student, through his or her adviser, must submit for approval a proposed program of study to a committee consisting of the deans and the chairs of the various engineering departments. No major is associated with this degree.

The program leading to this degree is not accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Engineering (BSE)

All engineering departments offer additional programs that emphasize the basic sciences or a more theoretical approach than their regular programs, or that in other respects depart from the traditional concentration requirements in that discipline. These departments designate these programs with the degree title of bachelor of science in engineering, without department designation. The curricula differ from the professional degree programs in the selection of the departmentally required concentration courses and the department foundation courses.

Programs leading to this degree are not accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Engineering Science (B.S.E.S.)

In general, the School of Engineering requires undergraduate students to specialize within the framework of the various departments. A student

may, however, seek a more diversified program in engineering and science leading to the bachelor of science degree in engineering science. This degree program allows the student who is interested in the application of science and mathematics to engineering to develop an individualized program of study. The engineering science curriculum is designed to meet the need for basic studies in engineering with a broad foundation in science. It includes the introductory courses and selected foundation courses. It differs from the professional degree programs in that the department concentration courses can be varied to provide flexible programs in science and engineering. Of the credits beyond the introductory, the foundation, the free electives, the humanities and/or arts, and social sciences requirements, approximately one-third must be taken in a single field of physical or biological science, one-third in engineering subjects, with the remaining one-third available to meet the particular professional objective of the student. Students who wish to pursue a program of this nature should consult with an individual faculty member in the School of Engineering and submit a written curriculum program for approval to the academic dean before the end of the sophomore year.

The program leading to this degree is not accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Engineering Physics (B.S.E.P.)

The School of Engineering, in cooperation with the Department of Physics, offers a combined program of study leading to a bachelor of science in engineering physics. The program combines an emphasis on the mastery of the fundamental principles of physics and basic mathematical techniques with the disciplined practicality of professional engineering. Students enrolled in this program are members of the School of Engineering but will have academic advisers in both engineering and physics. While a student may enter the engineering physics program at any time, it is expected that he or she will have taken the introductory courses in basic science and mathematics common to all Tufts engineering programs. Early participation in faculty research projects is encouraged. At present, areas of particular interest include astrophysics, biophysics, elementary particle physics, magnetism and superconductivity,

polymer physics, surface physics, and optics.

The program leading to this degree is not accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Biomedical Engineering (B.S.B.M.E.)

The Department of Biomedical Engineering offers a bachelor of science in biomedical engineering for engineering students that combines intensive training in research methods, techniques, and practical skills with a solid science and engineering curriculum that provides breadth and depth in the field.

The program leading to this degree is not accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Engineering Double Majors

Students pursuing a major within the School of Engineering may undertake a second major with the consent of the respective department in the College of Liberal Arts or the School of Engineering. To do so, the student must notify the department of the second major at least one semester before graduation. No more than half the courses used to fulfill the requirements for one concentration may be used to satisfy the requirements for a second or subsequent one. Students may not complete the second or subsequent concentration in the same discipline.

Students following the bachelor of science in engineering and the bachelor of science in engineering science are considered to have engineering and engineering science, respectively, as majors and may participate in double-major programs.

Undergraduate Minor Programs

In addition to completing the courses for the concentration requirement, an undergraduate may elect to enroll in a minor program in a different, although possibly related field. All courses used in fulfillment of the minor program must be taken for a grade. No more than two courses used to fulfill a foundation or concentration requirement may be counted toward fulfillment of the minor. Students may not complete both a minor and a concentration in the same discipline.

Minor programs offered in the School of Engineering are:

Architectural Engineering

(for liberal arts students) Department of Civil and Environmental Engineering

Biomedical Engineering

Department of Biomedical Engineering

Biotechnology Engineering

Department of Chemical and Biological Engineering

Computer Science

Department of Computer Science

Engineering Management

administered by the Gordon Institute

Entrepreneurial Leadership

administered by the Gordon Institute

Geoengineering

(for liberal arts students) Department of Civil and Environmental Engineering

Multimedia Arts

(for liberal arts and engineering students) Department of Electrical and Computer Engineering

Musical Instrument Engineering

(for liberal arts and engineering students) Department of Mechanical Engineering

For more information, see departmental listings in this bulletin.

Pass-Fail Option

The spirit of the pass-fail option is to encourage academic exploration. Certain introductory courses must be taken for a grade (see Introductory Course Requirement). Not more than eight pass-fail credits may be counted toward the credits required for graduation. For the accredited programs, no foundation or departmental concentration course may be taken pass-fail. Normally, no more than one course per semester may be taken pass-fail. No distinction is made between regular courses that students elect under the pass-fail grading and those courses in which grading is pass-fail. All decisions regarding the pass-fail option must be made within the first four weeks of any term. After four weeks, the only choices are to complete a course under the existing

grading system or to withdraw for the remainder of the term. Please see <http://go.tufts.edu/EngineeringAdvising> for more information.

Grade Requirements

For graduation, grades of C- or better are required in two-thirds of the courses submitted for the degree. For students who transfer to Tufts, grades of C- or better must be earned in more than two-thirds of the courses taken at Tufts. It is expected that grades of C- or better will be earned in at least 75 percent of the courses taken in the department of concentration.

Degrees with Honors

Honorable mention (*cum laude*) is conferred at commencement on deserving students who earned an academic average of 3.20 or higher.

High distinction (*magna cum laude*) is conferred at commencement on deserving students who had an academic average of 3.50 or higher.

Highest distinction (*summa cum laude*) is conferred at commencement as follows:

- Each ABET-accredited program may nominate the two students with highest cumulative average of 3.75 or higher.
- Non-ABET-accredited programs, taken together, may nominate the two students with highest cumulative average of 3.75 or higher.

These nominations are approved by a special vote of the faculty. With the consent of the faculty, students who graduate at a time other than May will be granted the honor *summa cum laude* if they have a cumulative average equal to or greater than the average of students who received the award in their disciplines at the previous May ceremony.

The above criteria may be replaced by special evaluation of the Tufts academic record if substantial transfer credit is submitted in fulfillment of the degree requirements, or if the degree program is of unusual duration. Students whose permanent record includes a serious disciplinary infraction will not normally be eligible for degrees with honors. Exceptions to this policy can be made only after disclosure by the dean of student affairs of the details of the infraction and subsequent vote by the faculty.

Tau Beta Pi

Tau Beta Pi, the national engineering honor society, founded in 1885, affords engineering students the same recognition for high scholastic achievement and exemplary character as is provided for liberal arts students in Phi Beta Kappa. The Tufts chapter is designated as Delta Chapter of Massachusetts.

Thesis Honors Program

The Thesis Honors Program allows students to pursue a program of independent study usually leading to a senior thesis and a qualifying examination. The principal purpose of the program is to give special impetus to the development of self-reliance, individual initiative, habits of critical analysis, and correlation of knowledge. Students pursuing a CIS thesis are eligible for thesis honors.

Because this is an honors program, admission is normally restricted to students whose names have appeared on the Dean's List at least two times before their senior year. Students may take on an honors thesis with one semester on the Dean's List if they have transferred to Tufts or have received special permission from their department. The application process should be completed during the junior year, including the summer of the senior year. The student is responsible for finding an advisory committee (one principal adviser who is a full-time faculty member in the School of Engineering, and at least one other full time faculty member from the faculty of Arts, Sciences, and Engineering, or industry expert). Admission to the program requires formation of an advisory committee, consent of the student's adviser, and approval of either the student's major department, or in the case of a CIS thesis the CIS Board. The membership of the advisory committee and the title of the thesis must be registered with the Academic Resource Center.

The advisory committee will be chaired by a full-time faculty member in the School of Engineering. Exceptions to this rule may be made at the discretion of the department chair for the student's major. The committee will direct the student's reading and research or other technical work, and will guide the student in preparing for a qualifying examination in the area of investigation. All such programs will include two one-semester course credits (with at least one credit toward the concentration elective). The thesis should be of quality comparable to a paper publishable in a

peer-reviewed journal. Its subject and scope will be agreed on in advance by the student and sponsor and approved by the committee. The completed thesis will be presented for consideration no later than two weeks before the last day of classes of the student's final semester.

Each candidate for a degree with thesis honors is required to undergo examination on the thesis and on the principal area of investigation. The specific character of the examination is determined by each advisory committee and may be oral or written or both. After the defense, a final copy of the thesis, in electronic form, should be submitted to the Tisch Library archive.

The advisory committee is empowered to determine the level of thesis honors to be awarded, basing its recommendation on an evaluation of the thesis. Degrees are designated bachelor of science, with highest thesis honors, with high thesis honors, or with thesis honors. (Thesis honors will be indicated on the student's transcript, but not on the diploma.) Students who, in the judgment of the advisory committee, have not attained the standards required for a thesis honors designation, but whose work is worthy of a degree, are recommended for the bachelor of science degree subject to the general regulations. Students who, in the judgment of the advisory committee, have attained the standards required for a thesis honors designation may also receive the degree *summa cum laude*, *magna cum laude*, or *cum laude*, in accordance with the procedures governing degrees with distinction.

After the defense, a final copy of the thesis should be submitted to Digital Collections and Archives (DCA). Beginning in academic year 2008-2009, the DCA will accept thesis submission electronically as an alternative to submitting a bound paper copy. Please contact the DCA for more information on how to submit your thesis. For answers to frequently asked questions and a style sheet, visit the Web site:

<http://ase.tufts.edu/wts/seniorThesis.asp>.

Internship Programs

Internships provide students with the opportunity to apply their education and skills directly toward a field-based situation, usually at an off-site organization. Most often, internships are paid positions that are performed on a full-time basis over the summer months, or for approximately ten to fifteen hours a week during the semester. The Office of Engineer-

ing Internships and Employer Outreach, located in Dowling Hall, helps qualified engineering students identify potential internship opportunities.

Internships are typically performed without an academic component, in which case students focus directly on the practical experience and tasks at hand. However, in some departments, students also have the option of performing an internship for academic credit. Students who wish to receive academic credit for an internship must have a faculty sponsor on campus as well as professional-level supervision at the workplace. Students must register for the relevant course within the department, and an internship agreement must be completed at the time of registration. All agreements must be signed no later than the add-drop deadline for the semester. At the end of the internship, students are expected to complete a written project, which demonstrates what has been learned during the internship experience. A minimum of 150 hours of work for the semester is required.

Graduate Programs

The School of Engineering is the academic unit of Tufts University responsible for postbaccalaureate degrees in engineering and computer science. The nonacademic aspects of graduate engineering programs, such as admissions, registration, special student program, transfer credit and degree certification, are administered along with the nonengineering programs by the Graduate School of Arts and Sciences. Several combined undergraduate-graduate degree programs are offered by the school, including tracks in the traditional engineering disciplines, engineering management in collaboration with the Gordon Institute, biomedical engineering/medicine in collaboration with Tufts' health science schools, and international engineering in collaboration with the Fletcher School of Law and Diplomacy.

Through its six academic departments and the Gordon Institute, the School of Engineering offers the master of science degree (a thesis is required in some programs), the master of engineering degree that is especially well suited for part-time, practicing engineers, and the doctor of philosophy degree in selected areas of research excellence. Students may enroll full time or part time in any program subject to the residence requirements described in the Graduate School of Arts and Sciences section of this bulletin. Departments award tuition schol-

arships, teaching assistantships, and research assistantships on a competitive basis to graduate admissions candidates. Prospective and current students should consult with the individual departments to obtain detailed policies regarding degree requirements and programs.

Degree Audit Reporting System

DARS is a web based application that allows students to systematically assess their progress toward degree completion. A DARS audit will report detailed degree requirements, how coursework can be used to complete that degree, and completed and outstanding requirements. For more information visit

<http://degreeaudit.studentservices.tufts.edu>.

Financial Information

Expenses and Policies

All students (with the exception of those in the R.E.A.L. program) are expected to carry a full course load (four to five courses) except in cases of serious, documented medical problems.

A typical first-year student in residence at Tufts during the 2008-2009 academic year may expect the following expenses:

Tuition	\$37,952
Residence hall	\$5,428
Meal plan	\$5,090
Health service and student activity fees	\$888
Books, supplies, and miscellaneous expenses (estimated)	\$2,042
Total for year (estimated)	\$51,400

*The charges listed above are subject to change.

Tuition for Tufts undergraduates is a comprehensive fee that covers basic charges for instruction, costs of registration, most laboratory supplies, and other incidental items or services.

All first-year and sophomore students are required to live in university housing or recognized fraternities or sororities, and to purchase a meal plan. Commuting students pay no residence hall fee and are not required to purchase a meal plan.

Students select a meal plan or JumboCash in accordance with university requirements. JumboCash allows students to make purchases in all campus dining locations, including the Rez and Oxfam Cafe, and to pay for delivery of food from off-campus, late-night locations. Students may also use their JumboCash to pay library fines and to make purchases from the bookstore, the information booth in the campus center, and the copy center in Braker Hall. JumboCash may be converted to vending points for use in laundry and vending machines. Dining Services is located at 89 Curtis Street. For more information, call 617-627-3566.

The health service fee is mandatory and non-waivable and covers the cost of running a comprehensive outpatient health service as well as the counseling center. The fee covers students for unlimited primary care and walk-in visits to the Health Service, access to the Counseling Center, the first three psychiatric visits, necessary allergy injections and immunizations (excluding serum),

and an annual flu shot (providing stock is available) for those who desire inoculation. Laboratory tests, prescribed medications, and consultation with on-campus medical specialty consultants are not covered by the health service fee. Students who do not purchase the optional medical insurance are required to demonstrate that they have other medical insurance. Details regarding the fee and deadlines for waiving the insurance are available at <http://ase.tufts.edu/healthservices>.

All students are required to pay the student activity fee, which is proposed by the student government. Accepted students must pay an enrollment deposit, which is applied to tuition for the first year.

Housing Charges

Room assignments are made for the full academic year. The campus housing room rates set by the Board of Trustees will appear on the resident student's bill in two parts, identified as the housing commitment fee and room charge. The housing commitment fee is nonrefundable at the time a student selects a room, has a proxy select a campus room on his or her behalf, or otherwise accepts a room assignment from the Residential Life Office. The housing commitment fee is only refundable when:

- a) the student is placed on required leave or withdrawal by the university, including academic probation level II, or
- b) the student, subsequent to selecting a room, is admitted to a study abroad program. In such cases the student must file a study abroad leave of absence form with Undergraduate Education in Dowling Hall. Students in both Tufts and non-Tufts study abroad programs must file an update form, available at the Residential Life Office in South Hall, within ten (10) days of acceptance—no later than April 30 for fall semester housing cancellation and November 15 for spring semester housing cancellation.

The room charge portion of a student's bill will be equal to the room rate for the student's assignment, less the \$500 housing commitment fee.

Room selection for spring-only applicants is held during the first week of December. Once a spring-only room assignment has been selected by the student (or his or her proxy), or an assignment is offered and accepted, the student is subject to the

housing commitment fee.

Questions may be directed to the Residential Life Office, Tufts University, Medford, Massachusetts 02155, 617-627-3248, fax 617-627-3929, e-mail: reslife@tufts.edu, Web site: <http://ase.tufts.edu/reslife>.

Payment of Bills

Students are required to pay tuition, fees, room, and board prior to the start of each semester. Bills for the first semester must be paid in the first week in August; second semester bills are due and payable by the second week in December. The amount required is reduced by any financial aid awarded by or sent to the university on behalf of the student for the semester. Payment in full (after deduction for financial aid) must be made before each term either by check payment or by a financing plan. Detailed information about financing plans is sent to all students in April.

These charges do not include those incurred for courses an applicant must take to become fully qualified for admission. Charges will not be reduced when courses are accepted for transfer credit.

All university charges are collected by Student Financial Services. Without waiting for receipt of a formal bill, payments for tuition, fees, room, and board are to be made in Dowling Hall on or before the due date for the semester. Checks should be made payable to the Trustees of Tufts College.

If full payment has not been received, or financial arrangements have not been agreed upon by the specified due date, a late payment fee will be assessed monthly.

The following actions will take place should a student fail to meet his or her financial obligations to the university for outstanding student loans or balances on his or her account: the student may be denied access to university dining services; will not be allowed to access library resources; will be denied registration privileges; will not be issued an official transcript; and will be denied an on-campus room selection for an upcoming semester.

Any unpaid student account balance may be referred to our collection agency. The student will be responsible for all costs associated with collection, including collection agency fees, attorneys' fees, and court costs. The account will be reported to credit bureaus.

A candidate for a degree must have paid all charges ten days preceding commencement.

Diplomas and official transcripts of records for those in arrears are regularly withheld until all payments have been made.

Administrative Withdrawal

If a student's account remains unsettled beyond the billing due date, a subsequent bill will be issued reflecting a late payment charge. If the student's account remains unsettled after the first day of classes, the student will be subject to withdrawal from the university.

Students are strongly encouraged to communicate with Student Financial Services as soon as they encounter personal or financial difficulties so that the university may help identify possible solutions and alternatives for meeting individual needs.

Withdrawal/Leave Tuition Refund Policy

Students who elect to take a leave of absence or withdraw or who are required to withdraw will receive a tuition refund in accordance with the following schedule, based on the effective date of the leave.

Fall semester 2008

By September 1, 2008	100% of tuition charged is cancelled
September 2 to 15, 2008	90% of tuition charged is cancelled
September 16 to 22, 2008	80% of tuition charged is cancelled
September 23 to September 29, 2008	60% of tuition charged is cancelled
September 30 to October 6, 2008	40% of tuition charged is cancelled
October 7 to 13, 2008	20% of tuition charged is cancelled

Spring semester 2009

By January 13, 2009	100% of tuition charged is cancelled
January 14 to January 27, 2009	90% of tuition charged is cancelled
January 28 to February 3, 2009	80% of tuition charged is cancelled
February 4 to 10, 2009	60% of tuition charged is cancelled
February 11 to 17, 2009	40% of tuition charged is cancelled
February 18 to 24, 2009	20% of tuition charged is cancelled

No tuition refunds are made after the sixth week of classes.

The student is responsible for any unpaid charges and must make arrangements to pay this balance prior to leaving Tufts. Any outstanding balance will result in a hold on the release of any transcripts until paid in full. If the student's account is referred to a collection agency, the student will be responsible for all collection and litigation costs associated with this debt.

Residence Hall Charges

Residence hall charges will be refunded based on the above prorated schedule for the semester. The date of withdrawal from housing will be based on *the date that the room has been vacated and the room key returned to campus safety*. The housing commitment fee is nonrefundable.

Dining Charge

Students wishing to cancel their meal plan after the cutoff date will be assessed 50 percent of the prorated refund amount.

Other Charges

Other fees and charges such as the health service fee, the student activity fee, library or traffic fines, and traffic or parking citations are not refunded or prorated after the beginning of the academic year. If a student is enrolled in the optional health insurance plan, both the charge and the plan benefits remain in place through the end of the contract period. A student enrolled for only one semester will be charged the full student activity fee and health service fee.

Financial Aid

Financial aid awarded for the term will be cancelled and/or reduced according to the reduction policy published annually in the Tufts Financial Aid Information brochure.

Financial Aid

Tufts University students are eligible for a full range of financial aid in the form of university, state, and federal grants; long-term university, state, Federal Perkins and Stafford Loans; and federally subsidized (FWS) campus employment. In 2007–2008, 48 percent of full-time undergraduates received over \$58 million in these forms of aid and other government and foundation grants and loans.

38 percent of the entering class received over \$13 million in total aid, of which over \$11 million (85 percent) was in the form of grants. The average grant was \$24,500; the average award (including loan and job) was \$27,000 to entering students.

Application

Entering undergraduates, including transfers, apply for aid by submitting the Profile Form of the College Scholarship Service, the Free Application for Federal Student Aid (FAFSA), and copies of family federal tax returns before February 15. Decisions on the amounts and kinds of aid are announced in April, shortly after the letter of admission is mailed. Students requesting renewal of aid, and other undergraduates who have not received assistance previously, apply by April 15. Decisions are made in June. Satisfactory progress toward a degree is expected for continuance of aid. Preference in awarding grants each year is given to those who received aid in the previous year.

Applications for tuition scholarships and teaching assistantships in the graduate school are an integral part of the application for admission. Decisions are announced with the letter of admission or at a later date. Complete application instructions, deadlines, and links are available at <http://finaid.tufts.edu>.

Forms of Aid

University grants are by far the largest single source of funds received by Tufts undergraduates from the application procedure described above. They range from \$200 to more than full tuition each year and are combined with other scholarships, loans, and employment to meet the university's estimate of each student's need. For graduate students, scholarships range from quarter to full tuition as decided by the department. Teaching assistants normally receive tuition scholarships plus an annual stipend for teaching. If needed, graduate students also may apply for Federal Stafford and Perkins Loans.

Federal Supplemental Educational Opportunity

Grants (SEOG) are federal grants allocated to Tufts for exceptionally needy undergraduates. The average award is about \$2,000 a year; the range is from \$200 to \$3,000.

Federal Pell Grants are federal grants to which

undergraduates from low- and moderate-income families are entitled according to their financial circumstances. Application is made by completing the FAFSA and submitting it after January 1 preceding each academic year. This application data will be sent to Tufts Student Financial Services, which will draw the grant from the government. Only undergraduates are entitled to these grants. Awards range from \$400 to \$4,050.

Carl Gilbert Matching Grants are funds awarded to Tufts and other independent institutions by the Commonwealth of Massachusetts to be given as grants to needy Massachusetts undergraduates.

Tufts National Merit Scholarships: Entering first-year students who are National Merit finalists are eligible for scholarships of \$500 to \$2,000 per year for up to four undergraduate years for any semester in which the student is charged Tufts tuition. To enter the program, students must name Tufts as first choice in the National Merit competition. Honorary awards of \$500 per year for four years may be made to successful applicants who do not demonstrate financial need. Merit awards up to \$2,000 per year may be offered to applicants with demonstrated financial need. Those who need more than the \$2,000 award will be considered for additional loan, work, and grant aid up to the total amount needed. Need must be determined annually by Tufts based on the FAFSA analysis of family ability to meet total educational costs. In 2007-2008, 163 scholars were awarded \$195,000.

Federal Perkins Loans are awarded by Tufts to students of exceptional need from funds allocated annually to the university by the federal government and from funds repaid by previous borrowers.

Tufts loans may be offered to needy undergraduates not eligible for Federal Perkins Loans. Interest on Tufts loans is 8 percent and begins to accrue when the student leaves Tufts. Repayment of principal and interest begins six months after leaving Tufts and continues for five years. Tufts loans require a parental cosigner.

Massachusetts No-Interest Loans may be awarded to Massachusetts undergraduates of exceptional need from funds allocated to Tufts by the Commonwealth of Massachusetts. Repayment terms are very similar to Federal Stafford Loans but there is no interest charge.

Federal Stafford Loans: This program offers student loans subsidized by the federal government through lending institutions. Students may borrow up to \$3,500 for the first undergraduate year, \$4,500 for the second year, and \$5,500 per year for the remaining undergraduate years (maximum \$23,000) and up to \$8,500 per year for graduate study. A maximum of \$65,500 for undergraduate and graduate years is permitted under this program. Federal Stafford Loans are normally disbursed in two equal installments. The interest rate for new borrowers during repayment is 6.8 percent for graduate students and 6 percent for undergraduate students. Repayment begins six months after the student graduates or stops attending school on at least a half-time basis.

Students who are not eligible for a subsidized Federal Stafford Loan may borrow an unsubsidized Federal Stafford Loan. Students are responsible for interest while in school and may make monthly interest payments or capitalize the interest.

Dependent undergraduates may borrow up to the subsidized Federal Stafford Loan limits less the amount of any subsidized loan received. Graduate students and independent undergraduates may borrow up to the subsidized Federal Stafford Loan limit less the amount of any subsidized loan received plus \$6,000 per year for freshmen and sophomores, \$7,000 per year for juniors and seniors, and \$12,000 per year for graduate students. In order to advise students of their rights and responsibilities, an entrance interview is required of all first-time borrowers at Tufts prior to disbursement of the loan. Exit counseling is required of all borrowers before leaving the university.

Federal PLUS Loans: Through the Federal PLUS Loan program, parents of dependent undergraduates and graduate students may borrow up to the full cost of education minus any financial aid annually at a fixed rate of 8.5%. The loans are made by a bank or credit union that will request a credit check to be sure that the borrower will be able to make the monthly payments, which begin two months after the loan is received. PLUS loans must be used for college expenses, including room and board.

Tufts Tuition Stabilization Plan (TSP): Families may pay (or borrow to pay) the full four years' tuition and have the tuition frozen at the rate for the year in which the contract is signed. Room, board, and

fees are not subject to this option and must be paid before the beginning of each semester.

Federal Work-Study Program (FWS): FWS provides federal funds for Tufts to subsidize the hourly wages of students who need financial aid during the school year. Work-study positions are available either on-campus or with off-campus, nonprofit community service programs, and typically wages range from \$7.00 to \$15.00 per hour.

ROTC Programs: ROTC may be applied for before or after admission and used at Tufts. Applications may be obtained from Air Force or Navy recruiting officers, or students may join after registration and compete for two- or three-year Army scholarships. Many ROTC scholarships include full tuition, books, and fees, as well as a monthly stipend of up to \$500, while others offer up to \$20,000 toward tuition, plus a stipend. Tufts students participate in ROTC through units at nearby M.I.T. Most classes are held on the M.I.T. campus. After graduation, a 4-year active duty commitment is required, with pilots needing to serve longer. After undergraduate college graduation, other ROTC medical college scholarships may also be available. While Massachusetts law and Tufts policy prohibit discrimination based on sexual orientation, federal law regarding participation in military programs, including ROTC, currently accommodates sexual orientation only in very limited ways and is under legal challenge.

Contacts (at M.I.T.): Air Force: 617-253-4475, Army: 617-253-4471, and Navy & Marine: 617-253-2991.

Job Location and Development Program (JLD):

JLD aids all Tufts students, regardless of financial need, in finding campus or off-campus employment. Students may work part time while in school or full time during vacation. Students are encouraged to visit the Tufts Career and Employment Web site at <http://studentservices.tufts.edu/studentemployment/default.htm>, where they can register for an interactive job-search program providing access to a host of employment opportunities and services.

All information regarding federal student aid programs is correct as of February 2008, but is subject to change with the passage of new legislation.

For more information regarding financial aid policy and procedures, visit <http://finaid.tufts.edu/>.

General Undergraduate Information

Undergraduate Policies

Residence Requirement

The university requires eight semesters of full-time study for the baccalaureate degree, four of which must be completed at the Tufts University home campus or in Tufts University-sponsored programs abroad. No more than two semesters of full-time study after matriculation at Tufts may be spent at other approved institutions or on approved non-Tufts foreign study programs.

Students must be in full-time residence at Tufts for the final two semesters. Enrolled students may normally transfer courses only from accredited four-year colleges and universities. Candidates for combined degrees (bachelor's/master's degrees, liberal arts/engineering combined degrees, and the programs with New England Conservatory and the School of the Museum of Fine Arts) must complete their programs in no fewer than five years. Enrolled students may accelerate in the ways described below.

Completion of a specified number of courses does not in itself constitute an undergraduate education. Students need time to reflect on and absorb knowledge. Four years of full-time study in an academic environment provide the opportunity to explore a varied curriculum at a reasonable pace; to interact with and learn from fellow students representing a variety of national, ethnic, religious, and racial backgrounds; to be enriched by study in a foreign country; and to survey the cultural, recreational, and educational opportunities of Boston and New England.

Exceptions to the policy are rarely granted. Petitions may be made on the basis of unanticipated personal, family, or financial emergencies.

Advanced Standing

Once students have completed two full years at Tufts, they may advance their class standing if they meet the following criteria. Students earning a combination of AP credits, credits from certain foreign diploma examinations, credits from prematriculation transfer courses, and Tufts summer session credits (including Tufts in Talloires) totaling 5 to 8.5 will be eligible for one semester's advanced standing;

those earning 9 credits will be eligible for one year's advanced standing. Applying students must be in at least their fourth semester, must have declared a major, and must complete a Request for Advanced Standing form. Students matriculating before September 2007 may choose to accelerate their standing via these rules or via rules in place at the time of their matriculation. (Archived bulletins are available on-line.)

Students electing advanced standing are expected to complete the stated degree requirements with a minimum of thirty-four course credits for the College of Liberal Arts and thirty-eight for the School of Engineering, including credits awarded in determining advanced standing. All will include in their programs sufficient courses to meet the foundation, distribution, and concentration requirements of their college or school.

Students electing advanced standing must spend at least three academic years (six semesters) as full-time students. Ordinarily, two years or four semesters of the undergraduate's course of study must be taken at Tufts University's home campus. Up to one year or two semesters may be spent in a Tufts-related program, either foreign or domestic.

Advanced Placement and Acceleration Credit

Examinations of the Advanced Placement Program administered by the College Entrance Examination Board, special placement examinations offered at Tufts University, or other evidence of preparation at the level of college work may be submitted for evaluation by the appropriate department. Such work may result in a student being placed in an advanced course, but credit is awarded only for appropriate scores on standardized examinations. To determine course placement and credit, if any, based on advanced placement scores, consult the departmental listings below.

Acceleration credits are treated as regular course credits and, where appropriate, are accepted in partial satisfaction of the foundation and distribution requirements of the College of Liberal Arts or the School of Engineering. If the content of a course has been covered by advanced placement, the student may not take that course for credit toward the degree. Students do not need to take the next-level course in order to keep the AP credit (except where stated).

Please note: most medical schools do not accept acceleration credits in place of science courses with a laboratory component taken at college.

Art History and Studio Art

5: Placement into two-digit level courses (exemption from survey for the major). No acceleration credit.

Biology

5: Consult department regarding placement; normally, placement will be in Biology 13 or 14; one course credit which may count toward the major. Students who take both Biology 13 and 14 will not also be awarded acceleration credit.

Chemistry

5: Placement into Chemistry 31 or 51; two acceleration credits awarded.

Computer Science A and/or AB

If both tests are taken, only one acceleration credit is awarded to the student.

5 or 4: Placement into Computer Science 15; one acceleration credit.

Economics

5 in microeconomics: One acceleration credit; enroll in Economics 5.

5 in macroeconomics: One acceleration credit; enroll in Economics 5.

5 in microeconomics and macroeconomics: Two acceleration credits; exemption from Economics 5 prerequisite; eligibility for Economics 11, 12, or 18.

English Language and Composition and/or Literature and Composition

If both tests are taken, only one acceleration credit is awarded to the student.

5: Exemption from the College Writing Requirement; one acceleration credit.

4: Exemption from the first semester of the College Writing Requirement (placement into English 2 or an equivalent course); one acceleration credit.

Scores of 760 or higher on the SAT Writing Exam will exempt students from English 1.

Environmental Science

5 or 4: One course credit equivalent to Biology 7.

French and Spanish Language and Literature

5: Exemption from the Basic Language Requirement (Part I); placement into French/Spanish 22. One acceleration credit equivalent to French/Spanish 21 is granted and one course is required to complete Part II of the Foreign Language Requirement.

4: Exemption from the Basic Language Requirement (Part I); placement into French/Spanish 21. No acceleration credit is granted and two courses are required to complete Part II of the Foreign Language Requirement.

3: Exemption from the Basic Language Requirement (Part I); placement into French/Spanish 4. No acceleration credit is granted and three courses are required to complete Part II of the Foreign Language Requirement.

Italian Language and Culture

5: Exemption from the Basic Language Requirement (Part I); placement into Italian 21. No acceleration credit is granted and two courses are required to complete Part II of the Foreign Language Requirement.

4: Exemption from the Basic Language Requirement (Part I); placement into Italian 4. No acceleration credit is granted and three courses are required to complete Part II of the Foreign Language Requirement.

3: Placement into Italian 3. No acceleration credit is granted and one course is required to complete Part I of the Foreign Language Requirement.

Scores above 770 on the SAT II Subject Tests for French, Spanish, or Italian satisfy Parts I and II of the Foreign Language Requirement and confer an acceleration credit of one course that is equivalent to French/Spanish/Italian 22.

The Department of Romance Languages awards two acceleration credits, equivalent to French/Spanish/Italian 21 and 22, only to students who have completed the International Baccalaureate.

Students whose results on the Tufts Placement Test are superior to their scores on the Advanced Placement Test or the SAT II Subject Tests will be placed at the higher course level. Acceleration credit satisfies language course requirements (but does not satisfy the Liberal Arts humanities requirement).

See the appropriate coordinator of language instruction in the Department of Romance Languages for recommended courses to continue French, Spanish, and Italian.

German

5: Exemption from the Basic Language Requirement (Part I); placement into German 22 or 33 or 44; one acceleration credit. One course is required to complete Part II of the Foreign Language Requirement.

4: Exemption from the Basic Language Requirement (Part I); placement into German 21 or 33; one acceleration credit. Two courses are required to complete Part II of the Foreign Language Requirement.

Scores of 770 or higher on the German SAT II Subject Test satisfy both Parts I and II of the Foreign Language Requirement and also earn one acceleration credit.

3: Exemption from the Basic Language Requirement (Part I); placement into German 4; no acceleration credit.

2: Placement into German 3; no acceleration credit.

Hebrew

Scores of 760 or higher on the Hebrew SAT II Subject Test satisfy both Parts I and II of the Foreign Language Requirement and also earn one course credit.

History

If all three tests are taken, the student is awarded a maximum of two acceleration credits.

5 or 4: One acceleration credit, which may be counted as either humanities or social science distribution credit, but may not be counted toward the history major.

Latin

5 or 4: Exemption from the Basic Language Requirement (Part I); placement into Latin 21, 22, or 91; one acceleration credit.

The above placement and credit are also given for scores of 720 or over on the Latin SAT II Subject Test.

3: Exemption from the Basic Language Requirement (Part I); placement into Latin 21, 22,

or 91; no acceleration credit.

2: Placement into Latin 3; no acceleration credit.

Mathematics—Calculus AB and BC

AB 5, 4 and/or **BC 4** and/or **BC 3** with an **AB** subscore of **5** or **4:** One acceleration credit, equivalent to Mathematics 11, and placement into Mathematics 12 or one mathematics acceleration credit and placement into Mathematics 17.

BC 5: Two acceleration credits, equivalent to Mathematics 11 and 12, and placement into Mathematics 13, 18, or 46.

Please note: Acceleration credit may be counted as distribution credit in the mathematical sciences. Students with acceleration credit equivalent to Mathematics 11 may not also receive credit for Mathematics 5 or 11. Students with acceleration credit equivalent to Mathematics 12 may not also receive credit for Mathematics 12 or 17. However, Liberal Arts students who receive acceleration credit may also take Mathematics 6, 7, 8, 9, or 10 for credit.

Music

Consult department.

Physics B (non-calculus-based)

5: One acceleration credit equivalent to Physics 1; placement into Physics 2.

4: With successful performance on the Mechanics Placement Exam (offered during orientation), one acceleration credit equivalent to Physics 1 and placement into Physics 2.

Physics C (calculus-based)

MECHANICS SECTION

5: One acceleration credit equivalent to Physics 11; placement into Physics 12.

4: With a successful performance on the Mechanics Placement Exam (offered during orientation), one acceleration credit equivalent to Physics 11 and placement into Physics 12.

ELECTRICITY AND MAGNETISM SECTION

5: One acceleration credit for Physics 12.

BOTH SECTIONS

Students who receive acceleration credits for both Physics 11 and 12 achieve placement into Physics 13.

Please note: The School of Engineering does not accept Physics 1 and 2 for the fulfillment of its introductory science degree requirements.

**Political Science—Government and Politics—
U. S. and/or Comparative**

If both tests are taken, only one acceleration credit is awarded to the student.

5 or 4: One acceleration credit, which may not be counted toward the minimum required for a political science concentration, but may be counted as Liberal Arts distribution credit.

Psychology

5 or 4: Eligible for two-digit course. No credit.

Statistics

5 or 4: One acceleration credit, which may be counted as Liberal Arts mathematics distribution credit.

Foreign Language Placement

Listed here are the suggested placements for scores achieved on the SAT II Subject Test. If tests are taken in both language and literature, only one credit will be awarded for each language.

French	Italian/Spanish	
200–440	200–410	Not exempt
450–510	420–490	Placement into French/Italian/Spanish 2
520–590	500–580	Placement into French/Italian/Spanish 3
600–660	590–650	Placement into French/Italian/Spanish 4; exempt Part I
670–710	660–710	Placement into French/Italian/Spanish 21
720–760	720–760	Placement into French/Italian/Spanish 22
770–800	770–800	One credit; exempt Parts I and II

Latin

200–470	Not exempt
480–610	Placement into Latin 3
620–710	Exempt Part I
720–800	One credit; exempt Part I

German Hebrew Japanese Chinese

200–400	200–420	200–400	200–410	Not exempt
410–480	430–450	410–480	420–480	Placement into level 2
490–590	460–510	490–590	490–590	Placement into level 3
600–650	520–570	600–640	600–650	Placement into level 4; exempt Part I
660–710	580–670	650–700	660–700	Placement into level 21
720–760	680–750	710–750	710–750	Placement into level 22
770–800	760–800	760–800	760–800	One credit; exempt Parts I and II

International Diploma Credit

Tufts does not grant credit automatically for the diploma as a whole; rather, acceleration credit is awarded for each subject passed at an appropriate level. No more than nine credits total will be awarded. Students receiving nine credits will be allowed to graduate in six semesters instead of eight; however, this advanced standing will not be instated until after the student completes four semesters at Tufts. These credits may be used to satisfy Liberal Arts foundation and distribution requirements and as prerequisites for advanced courses. For possible credit from standardized examinations for foreign diplomas not listed here, students may apply to Undergraduate Education.

IMPORTANT INFORMATION CONCERNING INTERNATIONAL DIPLOMA CREDITS

COURSE	PLACEMENT	
	One Tufts Credit	Two Tufts Credits
Biology	Do not enroll in Biology 3 (may take either 13 or 14; not both)	Do not enroll in Biology 3, 13, or 14
Chemistry	Do not enroll in Chemistry 1, 11 or 16	Do not enroll in Chemistry 1, 2, 11, 12, or 16
Computer Science	Do not enroll in Computer Science 11	Consult department for placement
Economics	Enroll in Economics 5	Do not enroll in Economics 5
English	Do not enroll in English 1 or 3	Do not enroll in English 1, 2, 3, or 4
Environmental Science	Do not enroll in Biology 7	
Foreign Language	Do not enroll in level 21 or below	Do not enroll in level 21 or below
Mathematics	Do not enroll in Math 4, 5, or 11	Do not enroll in Math 4, 5, 11, or 12
Physics	Do not enroll in Physics 1 or 11	Do not enroll in Physics 1, 2, 11, or 12
Psychology	Do not enroll in Psychology 1	

BRITISH GENERAL CERTIFICATE OF EDUCATION A-Level

COURSE	GRADE	CREDIT/PLACEMENT
English	A	One Tufts credit; exempt from English 1 and 2
English	B	One Tufts credit; exempt from English 1
Economics	A, B or C	One Tufts credit; exempt from Economics 5
All other approved subjects (except those listed above)	A, B or C	Two Tufts credits; do not enroll in introductory level courses in relevant subject (see chart)

INTERNATIONAL BACCALAUREATE Higher Level

COURSE	GRADE	CREDIT/PLACEMENT
Economics	5 or higher	One Tufts credit equivalent to Economics 5; do not enroll in Economics 5
English	7	One Tufts credit; exempt from English 1 and 2
English	5 or 6	One Tufts credit; exempt from English 1
Foreign Language	5 or higher	Two Tufts credits; (students should take the Tufts Language Placement exam to determine level of placement, but should not enroll in a course below level 22)
Mathematics	6 or 7	One Tufts credit; equivalent to Math 11; do not enroll in Math 4, 5, or 11
All other approved subjects (except those listed above)	5 or higher	One Tufts credit; do not enroll in introductory level courses in relevant subject (see chart)

INTERNATIONAL BACCALAUREATE Subsidiary Level

COURSE	GRADE	CREDIT/PLACEMENT
English	6 or 7	One Tufts credit; exempt from English 1
Foreign Language	5 or higher	One Tufts credit; (students should take the Tufts Language Placement exam to determine level of placement, but should not enroll in a course below level 22)
Mathematics	6 or 7	One Tufts credit equivalent to Math 5
Further Mathematics	7	One Tufts credit equivalent to Math 12

**No other subjects are awarded credit for the subsidiary level.

FRENCH BACCALAUREATE

COURSE	GRADE	CREDIT/PLACEMENT
Economics	EC score of 10 or higher with a coefficient of 3 or higher	One credit equivalent to EC5
English	N/A	No credit or exemption for English with this diploma
Foreign Language	N/A	Exempt from Parts I and II of Foreign Language Requirement
Other	Scores of 10 or higher with coefficient of 3 or higher	Two Tufts credits; do not enroll in introductory level courses in relevant subject (see chart)

German Abitur

English:

No credit or exemption from English with this diploma

Foreign language:

Exempt from Parts I and II of Foreign Language Requirement

Grades of 1, 2, or 3 in approved subjects:

Two Tufts credits

Canadian CEGEP

Some credit is awarded for courses in the second year only.

Examination Credit

Students receiving credit from any of the previously mentioned exams must not take courses that cover the same material. The following list will assist in course selection. For subject tests not listed here, consult your academic dean.

Biology	One Tufts credit; do not enroll in Biology 3 (may take either 13 or 14; not both) Two Tufts credits; do not enroll in Biology 3, 13, or 14
Chemistry	One Tufts credit; do not enroll in Chemistry 1, 11, or 16 Two Tufts credits; do not enroll in Chemistry 1, 2, 11, 12, or 16
Computer science	One Tufts credit; do not enroll in Computer Science 11 Two Tufts credits; consult department for placement
Economics	One Tufts credit; enroll in Economics 5 Two Tufts credits; do not enroll in Economics 5
English	One Tufts credit; do not enroll in English 1 or 3 Two Tufts credits; do not enroll in English 1, 2, 3, or 4
Environmental Science	One Tufts credit; do not enroll in Biology 7

Foreign language	One or two Tufts credits; do not enroll in level 21 or below
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Mathematics	One Tufts credit; do not enroll in Mathematics 4, 5, or 11 Two Tufts credits; do not enroll in Mathematics 4, 5, 11, or 12
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Physics	One Tufts credit; do not enroll in Physics 1 or 11 Two Tufts credits; do not enroll in Physics 1, 2, 11, or 12
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Psychology	One Tufts credit; do not enroll in Psychology 1
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Resumed Education for Adult Learners (R.E.A.L.)

The Resumed Education for Adult Learners program is open to students 24 years of age or older. This unique undergraduate program meets the need for greater academic flexibility in the education of older students. It is open to those who have some college experience, with recent coursework a requirement. The R.E.A.L. program is particularly receptive to prospective students who have assumed leadership roles in local community affairs as well as to residents of Medford and Somerville. Students in the program are enrolled in regular undergraduate courses and pursue a course of study leading to a college degree in liberal arts or engineering, for which they are expected to fulfill existing requirements. The R.E.A.L. Program admits students for both the fall and spring semester of the academic year. For more information about the program, please call the Office of Undergraduate Admissions, located in Bendetson Hall, at 617-627-3170, or call the director, Jean Herbert, at 617-627-2000, or visit Dowling Hall.

Transfer Students

Entering transfer students are considered sophomores until their transfer credits have been evaluated. Transfer students are entitled to the same advanced placement, acceleration credits, and exemptions from foundation requirements as students who enter Tufts as first-year students, with the same stipulation that transfers may not receive credit for a course covering essentially the same material as that for which advanced placement credit is granted.

Transfer students with eligible scores on the SAT II Subject Tests and Advanced Placement Tests should have official records of their scores sent to Undergraduate Education before orientation, if they have not already been submitted during the admission process. Such credits will be approved only on the basis of official test records and not a transcript from the student’s previous institution.

Advanced placement or acceleration credit awarded by a previous institution on the basis of its own placement tests or alternative criteria is not transferable.

Students transferring from other institutions must spend a minimum of four full-time semesters and must complete at least half the credits toward their degree at Tufts or on a Tufts study abroad program.

Transfer of Credit from Other Institutions

In order to receive transfer credit from another accredited institution, a student must have received a grade of C- or better. Transferred credits are entered in the Tufts record without the grade. Students may transfer from other institutions no more than the equivalent of seventeen Tufts course credits for the College of Liberal Arts and nineteen Tufts course credits for the School of Engineering. Tufts does not accept transfer credits for internships.

A matriculated student may take courses at other accredited four-year colleges and universities and receive credit for them toward a Tufts degree by obtaining approval in advance from the relevant department concerned through WebCenter. Up to two semesters of full-time study after matriculation at Tufts may be spent at other approved four-year institutions or on approved foreign study programs. Students attending summer schools (other than Tufts Summer Session) are normally allowed to transfer no more than three credits earned in one summer, nor more than a cumulative total of five credits toward a Tufts degree.

Students who plan to complete a full-time semester elsewhere must attempt the equivalent of three or more Tufts credits to have it qualify as a full-time semester.

All students planning to transfer credits earned while on leave at other institutions should begin the process by first discussing their plans with their academic dean.

Secondary school students who have taken college courses should consult the appropriate departments regarding their placement and the possible award of acceleration credits. Credit is generally awarded only for courses taken at a college with regularly enrolled college students. Some colleges offer their courses in nearby secondary schools for classes composed entirely of secondary school students; credit is not awarded for these courses.

Academic Standing/Satisfactory Progress Toward the Degree

The following are guidelines for maintaining satisfactory progress toward the degree. Determination of a student’s academic status is made by the Committee on Academic Standing. The following procedures are guidelines; the committee reserves the right to make decisions on an individual student’s academic progress. Students are subject to action by the Committee on Academic Standing if they have accumulated one or more of the following during the semester: two Ds, one F, two Incompletes, fewer than three credits with C- or better, a semester grade point average below 1.80. Students are removed from probation if, in the succeeding semester, they earn 3.5 credits, three of which must be with grades of C- or better and no failing grades. An incomplete, even with a default grade of C- or better, is not counted as a grade. The minimum three graded credits may not be taken pass/fail. The committee also determines whether students are maintaining satisfactory progress toward the degree. An overall cumulative average of C- (1.67) is required.

College of Liberal Arts

Students are subject to action by the Committee on Academic Standing if they complete fewer than the following number of credits:

FALL	
First year	3 credits
Sophomore	10 credits
Junior	19 credits
Senior	27 credits
SPRING	
First year	6 credits
Sophomore	14 credits
Junior	23 credits
Senior	34 credits

School of Engineering

Students are subject to action by the Committee on Academic Standing if they complete fewer than the following number of credits:

FALL

First year	3 credits
Sophomore	12 credits
Junior	22 credits
Senior	32 credits (B.S., 31)

SPRING

First year	7 credits
Sophomore	17 credits
Junior	27 credits
Senior	38 credits (B.S., 36)

Academic Probation

Students who fail to meet these guidelines may be placed in any one of the following categories (arranged in order of increasing seriousness).

Probation I. A notice of Probation I indicates that, if the present level of performance were to continue through the following semester, more serious action would be necessary.

Probation II. A student's lack of meaningful progress toward the degree or weak academic performance during a single semester or over several semesters places the student on Probation II.

Probation III. A student on Probation III is not considered to be in good academic standing at the university. A student placed on Probation III is making poor academic progress and may want to consider taking a leave of absence.

Required to Withdraw. Students in this category are required to withdraw for one to four semesters. Tufts will accept transfer credit for no more than one semester's and one summer's work completed during the absence.

Permanent Academic Withdrawal. In rare instances, a student will be required to withdraw permanently from the university. Normally a student will have been required to withdraw on at least one previous occasion and, upon return, will have made no progress toward the degree.

Registration Information

Registration for courses is done through SIS online. Students register for courses in November for the coming spring term and in April for the next fall term. It is critical that students register for courses during this time. Students who are taking personal leaves of absence or leaves of absence to study elsewhere in the U.S.A. must complete a leave of absence form and contact their dean. Students taking a leave of absence to study abroad on a non-Tufts program must complete a leave of absence form and submit it to the office of Tufts Programs Abroad. International students taking a leave of absence must also contact the International Center at 617-627-3458. Failure to register or file the appropriate leave of absence could result in administrative withdrawal from the University.

Registration will reopen during winter and summer breaks. Students will be able to register for any open classes, drop any classes, and sign up for the waitlist during this period. Please note that the waitlist will be active throughout this time. If a student is number one on a waitlist for a course and another student drops this course then the first waitlisted student will be rolled automatically into the course. The ability to add courses online will remain open for the first two weeks of the term. Once the add period is over, students who wish to enroll in a closed course must get the instructor's signature and submit the add form to the Student Services Desk in Dowling Hall.

Sophomores, juniors, and seniors will be able to drop courses online through the end of the fifth week of classes. First-year students will be able to drop courses online through the end of the tenth week of classes. After these deadlines, a student may withdraw from a course until the last day classes meet (before reading period). The grade of W (withdrawn) will appear on the transcript, but does not affect a student's cumulative average. Petitions for W will not be accepted after the last day of classes. After that date, students must either finish the course and receive the appropriate grade, or request an I (incomplete) from the instructor and complete the work by six weeks into the following semester (or by a date set by the instructor).

Reduced Course Load

Permission to take a reduced program of courses may be granted to students in the Resumed Education for Adult Learners Program and those who

have completed eight semesters of full time study. Health needs may also merit a reduced course load; consideration for this is given by the Health Accommodations and Medical Leave Committee. Such students are considered to be making satisfactory progress if they complete each course with a C- or higher. A minimum of three credits is full time.

Grades

The standing of the student in each subject is expressed by one of the following letters:

- A** Superior work
- B** Meritorious work
- C** Work without marked merit or defect
- D** Unsatisfactory work but allowable for credit, subject to the restrictions specified under the requirements for graduation. Some departments disallow credit toward the concentration requirement.
- P** Passing work (D- or better): for courses taken under the pass-fail option, and for selected courses offered only pass-fail by departments. Grade point average is not affected.
- F** Failure: No credit is received. A grade of F is averaged into the grade point average.

No-grade status

- I** Incomplete: An indication by the instructor that more time will be allowed to complete the requirements of the course. An incomplete may be awarded only if the student has done substantial work in the course, the instructor judges the reasons for granting incomplete status to be valid, and the instructor determines that the work can be completed in the time specified on the incomplete form. The instructor is responsible for specifying on the incomplete form the reason for the incomplete grade and the conditions that must be satisfied for the awarding of a grade. A copy of this form must be submitted to Dowling Hall at the time final grades are reported.

It is the responsibility of the student to request an incomplete before the date of the required work. If an incomplete is granted, all work in the course must be completed on or before the date six weeks after the first day of classes in the subsequent semester (fall or spring only; summer terms excluded). If the student has completed the work within the stated time, it will be evaluated without

prejudice. Upon the student’s completion of work in the course, the instructor must submit a final grade to the registrar within eight weeks after the first day of classes of the subsequent semester. A course not completed by the designated time will receive the default grade specified on the incomplete form. Under exceptional circumstances, such as prolonged illness, a student may request an extension of the six-week deadline. Such an extension may be granted at the discretion of the instructor. Any such agreement between the student and faculty member must be submitted in writing to Dowling Hall.

- W** Withdrawn: An indication that a student has been permitted to withdraw from a course after the fifth week of a semester, but no later than the last day of classes.
- Y** An interim symbol used to denote the absence of a grade because the work on which the final grade is to be based extends beyond the time limits of the semester.
- NG** No grade: The instructor has no knowledge of the student listed on the grade sheet. The student who never attended the class may request to have the course and NG removed from the transcript by asking the instructor to complete the enrollment correction form, which instructors may get from their departmental staff assistant or from Dowling Hall.

In computing the average of a student’s grades, each course grade of A is counted as 4.00; B, 3.00; C, 2.00; D, 1.00. Appropriate value is given to plus and minus grades and to half-credit courses. Averages are computed to three decimal places, and semester and cumulative averages are rounded to two decimal places. Since changes cannot be made after graduation, seniors are urged to have rectified any errors on their transcripts well in advance of the graduation date.

Changes in Course Grades: Statute of Limitations

Any request for a change in a course grade must be made to the course instructor no later than six weeks into the following regular semester. In cases where the student is not on campus for the following regular semester, the request must be made no later than six weeks after the student returns. In cases where the course instructor is not on campus for the following regular semester, the request must be made to the departmental chair.

Quality Requirements

Students in the College of Liberal Arts must earn grades of C- or better in three-fourths of their courses taken at Tufts under standard grading, students in the School of Engineering must earn grades of C- or better in two-thirds of the courses submitted for the degree and in three-fourths of the courses taken for the concentration.

Pass-Fail Option

Within the limits stated below, students may elect to have their grades in certain courses recorded simply as pass or fail. The purpose of this option is to encourage students to extend their academic interests. Faculty advisers will approve selection of the option if this purpose is clearly fulfilled; it is not designed as a safety valve to permit students to carry unrealistic academic loads. A student will be graded as usual throughout the course, with final grades transcribed by the registrar into pass or fail. A pass does not affect the grade point average; a failing grade is averaged into the grade point average.

In a thirty-four course credit program, students are normally required to take at least twenty-six semester course credits under standard grading; the pass-fail option may be applied to any courses in excess of twenty-six, with the exceptions stated elsewhere in this section.

Transfer students and those students who transfer credit to Tufts from programs at other institutions must complete three-fourths of their work at Tufts under standard grading subject to the stated quality requirement. The pass-fail option may be applied to courses in the remaining one-fourth of the program with the exceptions stated below.

No distinction is made between regular courses that a student elects to take under pass-fail grading and those courses that may only be taken pass-fail.

All decisions with respect to the pass-fail option must be made within the first five weeks of any term. After five weeks, the student must complete a course under the grading system then in force or withdraw from the course. For liberal arts students, only electives may be taken pass-fail; courses taken to fulfill the foundation, distribution, and concentration requirements may not be taken pass-fail.

Repeated Courses

Students who receive a failing grade for a course may repeat the course and receive degree credit if a

passing grade is earned a second time. Both grades remain on the transcript and both the F and the passing grade are calculated into the cumulative average. Students may choose to repeat a course after receiving a D+, D, or D-. Both the repeated course, if passed, and the original course receive one-half their credit value in computing both grades for the grade point average and both grades remain on the transcript. Students who earn a grade of C- or above for a course may choose to repeat the course for a variety of reasons. Degree credit and cumulative average will reflect only the first passing grade earned in the course; record of the repeat and subsequent grade will appear. Studio art classes and performance classes in dance, music, and physical education may be repeated for credit. Creative writing classes at the introductory level may be taken twice in each genre (fiction, poetry, journalism). Creative writing classes in fiction and poetry at the intermediate level may also be taken twice for credit.

Extra Courses

Students may register for a maximum of 5.5 credits each semester. To add an additional credit, students must petition their academic dean for permission at the start of the semester, but not before. Such permission is rarely granted to first-year students.

Missed Classes

Students should make themselves aware of each professor's attendance policy. Students who must miss a class because of an illness or family emergency should speak with the professor directly, or consult their academic dean in Undergraduate Education in Dowling.

Dean's List

Each semester, students who have been enrolled with a minimum of 4.0 credits, received letter grades in a minimum of three credits, completed every course in which they were enrolled with no work incomplete (with the exception of Y), and earned a grade point average of at least 3.40 in the College of Liberal Arts or 3.20 in the School of Engineering will be placed on the Dean's List in recognition of their academic achievement. An indication of Dean's List status will be placed on their permanent record. Students in the combined-degrees program with New England Conservatory

of Music whose total course load equals 4.0 credits or more will be awarded Dean's List honors at both institutions if they meet Dean's List GPA requirements for the course work taken at each institution.

Internship Programs

Internships provide juniors, seniors, and in some cases sophomores with the opportunity to apply various types of knowledge and skills in a field-based situation. Two internship programs are available: internships for academic credit and internships that award transcript notation but no academic credit.

Internships for academic credit in a wide range of fields are offered by several departments or through the Experimental College. Students granted internships for academic credit must register for a relevant course and have a faculty adviser on campus as well as professional-level supervision at their workplace. They also complete and submit an internship agreement at the time they register for the course. All agreements must be signed no later than the add deadline of the semester. Participants are expected to demonstrate in a written project the learning that has taken place on the job by placing the work experience in an academic context. A minimum of twelve hours of work each week or 150 hours for the semester is required, and only two one-credit internships are normally accepted toward a degree. No credit is granted retroactively for these activities, and the two internships cannot be done in the same semester. Students may develop their own field-placement programs. However, all new proposals must be submitted to the appropriate department for approval. Tufts does not accept transfer credits for internships.

Students may also participate in the All-College Internship Program, which awards transcript notation but no academic credit. A faculty adviser is not needed to participate in this program because there is no academic component, but students do receive official recognition of their work on their transcript. Students register for the internship in Career Services by the second week of classes, spend a minimum of 100 hours over the course of the semester at the site, and complete an evaluation form at the close of the semester. Internships cannot be filed retroactively and students may receive no more than two notations on their transcript.

Study Abroad - Tufts Programs

Students are encouraged to study abroad under one of the established programs sponsored by Tufts University. (See Tufts Programs Abroad.) To apply to a Tufts Program Abroad, students must plan a program relevant to their degree program at Tufts, secure in advance the approval of their adviser, and meet the requirements of the program to which they are applying. (For further information on requirements, see <http://ase.tufts.edu/studyabroad>.) Among other requirements, students participating in Tufts Programs Abroad must be in good academic and disciplinary standing from the time of application through participation in the program.

Study Abroad - Non-Tufts Programs

To study abroad, students must plan a program relevant to their degree program at Tufts and must secure in advance the approval of their adviser and the director of Programs Abroad. Transfer credit toward the Tufts degree will be accepted only from students who are in good academic and disciplinary standing at the time of enrollment in the foreign program. A list of recommended non-Tufts programs is available in Dowling Hall. In order to have a semester of study away from Tufts count as one of the eight semesters of full-time study required for graduation, a student must attempt the equivalent of three or more transferable Tufts credits. To meet the costs of administrative procedures connected with study at other institutions, students studying on a non-Tufts program abroad will be charged a fee of \$200.

Study Elsewhere in the United States

To study elsewhere in the United States, students must take a leave of absence from Tufts and must secure in advance the approval of their adviser and their academic dean. Approved courses will be transferred from four-year, accredited colleges or universities if the student earns grades of C- or better. Students must get courses approved for transfer from the relevant department at Tufts through WebCenter. In order to have a semester of study away from Tufts count as one of the eight semesters of full-time study required for graduation, a student must attempt the equivalent of three or more transferable Tufts credits. To meet the costs of administrative procedures connected with study at other institutions, students studying elsewhere will be charged a fee of \$200.

Leaves of Absence and Transfers

Students considering a leave of absence or transferring to another school must consult their academic dean and complete a form online through Web-Center. The Residential Life Office must be notified if a housing contract has been signed. There is a penalty for failing to notify the Residential Life Office by certain deadlines (consult the Residential Life Office). Students receiving financial aid should also notify Financial Services. International students must contact the International Center for information on visa status.

Medical Leave

Medical leave is an option available to students who, for physical or psychological reasons, are unable to continue at the university. Appropriate medical evaluation is a required part of the process. In certain cases, mental health practitioners or physicians may recommend that it is not in a student's or the community's best interests for the student to continue at the university. The standard medical leave is for one year. In unusual circumstances a student may successfully demonstrate readiness to return earlier. Decisions about return eligibility are made by the Health Accommodations and Medical Leave Committee, a group composed of the staff of the Dean of Student Affairs, staff of the Dean of Undergraduate Education, and medical health practitioners or physicians. A student wishing to return from medical leave must apply by notifying Marisel Perez, Associate Dean of Student Affairs, Dowling Hall, at 617-627-3158. To be eligible to return for spring semester, application must be made by November 15 and by August 1 for the fall semester. For additional details, see the *Pachyderm*, a publication of the Dean of Student Affairs Office, or visit:

<http://studentservices.tufts.edu/dos/healthaccommodations.htm>.

Academic Ethics

A university is a community of individuals interested in the search for an understanding of knowledge. Absolute honesty on the part of every college student is and always shall be an integral part of the plan of higher education at Tufts University. Examples of academic dishonesty include plagiarism, handing in one paper for two or more courses without the knowledge and consent of the instructors involved, dishonesty on examinations, and the pur-

chase of papers to be submitted in a course.

Certain fundamental principles for the acknowledgement of sources apply to all fields and to all levels of work. The use of source materials of any kind (including the Internet) in the preparation of essays or laboratory reports must be fully and properly acknowledged. In a paper or laboratory report, a student is expected to acknowledge any expression or idea that is not his/her own. In submitting the paper, the student is stating that the form and content of the essay or report, in whole and in part, represent his/her own work, except where clear and specific reference is made to other sources. Even where there is not conscious intention to deceive, the failure to make appropriate acknowledgement may constitute plagiarism. Any quotation—even of a phrase—must be placed in quotation marks and the precise source stated in a note or in the text; any material that is paraphrased or summarized and any ideas that are borrowed must be specifically acknowledged. A thorough rewording or rearrangement of an author's text does not release the student from these responsibilities. All sources that have been consulted in the preparation of the essay or report should be listed in the bibliography.

Allegations are reported to the Office of the Dean of Student Affairs. If a student agrees with the charge and/or the nature of the evidence makes it clear that academic dishonesty has taken place, the dean may take appropriate action. A decision made in this way may be appealed to the Committee on Student Life (CSL) according to the policies set forth in *Tufts University Student Disciplinary System*.

Working through the Office of the Dean of Student Affairs, it may be possible for the faculty member and the accused student(s) to reach a resolution through mediation. Note that both parties must be willing to use mediation as an alternative means of dispute resolution for this to work. The mediation process is described in *Tufts University Student Disciplinary System*. Disciplinary decisions resulting from hearings may be appealed to the CSL.

Consequences for academic dishonesty include disciplinary probation, suspension, or expulsion. Instructors commonly assign an F for a course in which ethical practice is violated. For more information, please refer to *Academic Integrity @Tufts.edu*, available online or in Dowling Hall.

Privacy

The federal Family Educational Rights and Privacy Act of 1974 (FERPA) gives each Tufts student access to his or her educational records, the right to correct inaccuracies in the records and the right to control distribution. Since September 11, 2001, the Department of Education has stated that a college must provide (absent a request) information it reasonably believes will assist law enforcement officials in investigating or preventing terrorist activities. In addition, there are exceptions in the statute, such as a subpoena, that allow Tufts to release student records even if the student objects. A description of your rights under the act, the location of records pertaining to you, and the procedures for requesting access and invoking your right to control access appears in the *Pachyderm*, the Arts, Sciences, and Engineering student handbook.

Please note: Only directory information is made available to the public. Directory information includes whether a student is in attendance at the university and the student's local telephone number and e-mail address. Students may request that directory information not be released to anyone by completing a privacy request form available at the Student Services Desk. Such requests are subject to the exemptions provided by certain policies, including FERPA and the Patriot Act of 2001. Students should verify implementation of their request by calling Dowling Hall. A change in phone number, along with the request not to release the information, is suggested as the best way to ensure privacy.

Nondiscrimination Policy

Tufts University is committed to the fundamental principle of equal opportunity and equal treatment for every prospective and current employee and student. It is the policy of the university not to discriminate on the basis of race, color, national or ethnic origin, age, religion, disability, sex, sexual orientation, gender identity or expression, or status as a veteran in the administration of its educational policies, admissions policies, employment policies, scholarship and loan programs, and athletic or other university-sponsored programs.

For more information or to file a complaint of discrimination, contact the Office of Equal Opportunity and Affirmative Action at 617-627-3298 or visit www.tufts.edu/oeo.

Tufts Programs Abroad

Tufts University has been offering foreign study programs for more than four decades, and at present offers undergraduate programs for juniors and seniors to study in Chile, China, Ghana, Hong Kong, Japan, London, Madrid, Oxford, Paris, and Tübingen. Non-Tufts students may be admitted provided there is space available. In all programs, students attend the designated college or university. Integration into a foreign university and the cultural and social life of the host country is the aim of Tufts Programs Abroad. Further information is available in the program office at Dowling Hall, 617-627-2000, or visit <http://ase.tufts.edu/studyabroad>.

Tufts in Chile

A program of study at the University of Chile is available for the fall semester or the full year. The University of Chile—one of Latin America's oldest and most important universities—is located in Santiago, a metropolis set in a valley 3,000 feet up in the Andes. Santiago is home to many United Nations and other international organizations for the region and is one of Latin America's leading intellectual and cultural centers. Participants, who are expected to have completed Spanish 21-22 (Composition and Conversation) or the equivalent, enroll in regular courses at the University of Chile and live with Chilean families.

A resident director provides academic advising, assistance with homestays and extracurricular activities, and serves as liaison with the University of Chile. The program is of particular interest to students in Latin American studies, international relations, and environmental studies, but students from all majors are invited to apply.

Tufts in China

The Tufts-in-China program offers a fall semester at Zhejiang University in Hangzhou, China. Hangzhou is the capital city of the Zhejiang Province and is located about two hours southwest of Shanghai. Once the capital city of the Southern Song Dynasty (1127-1279), it is one of the best-known cities in China, both for its long and rich history and for its natural beauty. The region is famous for such products as silk and tea. The main campus of Zhejiang University is situated near the picturesque West Lake, whose natural beauty was

celebrated by ancient poets. Zhejiang University was established in 1998 when four individual universities were brought together. It is currently the biggest university in China, both in size (40,000 students) and in range of disciplines (104 undergraduate specialties).

The Tufts-in-China program is open to students who have completed Chinese 4. Intensive instruction in Chinese language, as well as courses taught in English in such subjects as history, Chinese culture, and literature are offered. Students are housed in the new international dormitory on campus.

A resident director provides academic advising and extracurricular social and cultural activities.

Tufts in Ghana

The Tufts-in-Ghana program, which takes place in the fall semester, links Tufts to the University of Ghana (Legon), located just outside the booming West African metropolis of Accra. The University of Ghana, founded in 1948, is a full-service research and teaching university offering students outstanding academic and extracurricular programs. The university's 4,500 undergraduate and graduate students are served by six residence halls, central and branch libraries, and a university hospital.

Two or three supervised excursions per semester will take students to the Dagbe Center for Arts and Culture, which provides an experience of traditional culture and the performing arts (drumming, singing, dancing) in a picturesque seaside village set among the palms one mile from the warm Atlantic Ocean.

The Tufts-in-Ghana program is designed to expand students' cultural awareness as they earn credit toward the undergraduate degree. In consultation with the resident director in Ghana, each student designs an academic program of four or five courses from the diverse array of subjects offered by the university's many academic departments. Special language courses for Tufts students are taught at the Ghana Language Center on the Legon campus. Students from all academic majors, including mathematics and the sciences, are encouraged to apply.

Tufts in Hong Kong

The Tufts-in-Hong Kong program is affiliated with the University of Hong Kong and is available for the spring semester. Hong Kong, an affluent mod-

ern city of more than six million, offers visitors a unique blend of Eastern history and Western influence. Returned to China in July 1997 after more than 150 years as a British Crown Colony, Hong Kong continues to enjoy a high degree of autonomy as a Special Administrative Region.

The University of Hong Kong, known as HKU, evolved from the former Hong Kong College of Medicine, which was instituted in 1887. Since its official opening in 1912, the university has embodied the pioneering spirit of Hong Kong. It remains at the forefront of breakthroughs in medical and scientific research. HKU has a student population of 15,000, including about 1,000 international students.

Courses are taught in English and are offered across a broad curriculum. Faculties open to Tufts-in-Hong Kong students include architecture, arts, education, engineering, science, and social studies. Students are housed in dormitories on campus.

A resident director coordinates student activities, living arrangements, and academic advising.

Tufts in Japan

The Tufts-in-Japan program offers a full year or a spring semester at Kanazawa University.

Kanazawa, located on Japan's western coast, is an ancient castle town with a rich heritage of arts and crafts, including silk dyeing, pottery, lacquerware, *Noh* theatre, papermaking, and confectionery. It boasts one of the most spectacular gardens in all of Japan. Students can visit the mansions and gardens of former samurai and tour the city's two temples. Students take classes at the newly rebuilt Kanazawa University, one of the leading national universities. Courses include Japanese language at the intermediate and advanced levels, as well as subject courses taught in English. Housing is in a dormitory on the Kanazawa University campus. Students must have completed Japanese 2 or the equivalent by the time of departure. All majors are welcome to apply.

A resident director coordinates extracurricular social and cultural activities and will serve as a contact person.

Tufts in London

The Tufts-in-London program is affiliated with University College London (UCL) and with the School of Oriental and African Studies (SOAS), both constituent colleges of the University of Lon-

don. Students enroll full time at either UCL or SOAS. Both are situated in the heart of the Bloomsbury district in central London, near the cultural and social life of the capital city. Tufts in London is a one-year program of academic study and is open only to full-year students. University College London is a comprehensive university offering courses across a broad curriculum, including biology and engineering. The School of Oriental and African Studies focuses on the languages, cultures, and societies of Africa, Asia, and the Middle East.

The program is under the overall supervision of a resident director who provides a full range of student services, including a program of extracurricular cultural and social activities, and coordinates all aspects of the program. Tufts-in-London students are housed in college dormitories that are located within a few minutes' walk of the campus.

Tufts in Madrid

The Tufts program in Spain is affiliated with the Autonomous University of Madrid and with the University of Alcalá. The program is primarily a one-year course of study; however, arrangements may be made to allow students to participate for the spring semester only at the Autonomous University of Madrid or the fall or spring semester only at the University of Alcalá. Although the program is particularly valuable for Spanish majors, students from departments and programs such as economics, history, international relations, political science, psychology, biology, and sociology have studied in Spain as well.

Preparation equivalent to the successful completion of Spanish 21-22 (Composition and Conversation) is required. Spanish 31-32 (Main Currents of Spanish Literature) or 34 (Survey of Latin American Literature) are highly recommended. The Tufts director in Madrid advises students in selecting courses from the university.

The Tufts director also teaches one course in Spanish theatre required for all students. The program offers an orientation session and group trips during the academic year. Monthly lectures and receptions are held at the program center, giving students contact with important figures from Spanish cultural and political life.

Students are housed with Spanish families living in Madrid or Alcalá.

Tufts in Oxford

Tufts and Pembroke College of the University of Oxford maintain an agreement under which three or four qualified Tufts students are selected to spend an academic year at Pembroke College as fully matriculated nondegree students.

Pembroke College was founded in 1624 and has a student body of 400. It is a friendly and informal college, emphasizing intellectual activity, but sports, drama, and music are also important. Oxford, with 9,000 undergraduates and 3,000 graduate students, is now over 800 years old and consists of thirty-five independent, self-contained, self-governed colleges and numerous other institutes and organizations. Students wishing to attend Pembroke College must show college-level course work in the subject they wish to pursue at Oxford.

Each applicant is required to have a 3.7 cumulative grade-point average (on a scale of 4.0) after two semesters. Pembroke will accept applications only from students who are prepared to study in the following areas: biochemistry; biological sciences; biopsychology; chemistry; economics; economics and management; English language and literature; English and modern languages (French, German, Italian, Spanish); mathematics; mathematics and philosophy; modern history; modern history and economics; modern history and English; modern history and modern languages; modern history and politics; modern languages (French, German, Italian, Spanish); philosophy, politics, and economics; philosophy; philosophy and modern languages; politics; psychology, philosophy, and physiology; theology.

Tufts in Paris

The Tufts-in-Paris program offers a combination of Tufts in-house courses taught by French professors and courses in French institutions of higher education in Paris, notably the public University of Paris I (Panthéon-Sorbonne) and University of Paris III (Sorbonne Nouvelle) and the private *Institut Catholique*. Courses are available in French and comparative literature, political science, economics, history, cinema and theater studies, communications, art history, philosophy, religion, psychology, European studies and international relations. All courses are taught in French. Qualified students may also apply for the full-year diploma program for international students at the prestigious Institut d'Etudes Politiques (Sciences-Po). Tufts in Paris is

primarily a one-year course of study; however, arrangements may be made to allow students to participate for the spring semester only. Although the program is particularly valuable for French majors, students from departments and programs such as economics, history, international relations, political science, psychology, and sociology have participated as well.

Preparation equivalent to the successful completion of French 21-22 (Composition and Conversation I and II) is required for the program. French 31-32 (Readings in French Literature I and II) is highly recommended. The program is under the overall supervision of a resident director, who advises students in selecting courses at the French universities in Paris. The Tufts-in-Paris program also offers its own courses in French, art history, and literature, and each student is required to take at least one course credit each semester from among these courses. The program offers an orientation program and group trips during the academic year.

Tufts-in-Paris students are housed with French families.

Tufts in Tübingen

Through its German-language department, Tufts sponsors study at Eberhard-Karls Universität in Tübingen, Germany. Tübingen is located south of Stuttgart in the state of Baden-Württemberg. The university, founded in 1477, has 20,000 students.

The program is primarily one year of academic study, although arrangements may be made to allow students to participate for the spring semester only. Undergraduates who have taken at least two years of college-level German may apply to the program. The program is not, however, limited only to German majors. In recent years, students have attended from departments and programs such as biology, chemistry, economics, international relations, music, political science, and psychology.

The Tufts director in Tübingen advises students in selecting a full course load at the university. All courses are taught in German. Each semester, the director organizes a five-day study trip to Thüringen (fall) or Berlin (spring).

Students in Tübingen are fully integrated into university life, living with German students in regular university dormitories. A unique opportunity to acquire the master's degree in German literature is offered by Tufts with the cooperation of the

Eberhard-Karls Universität in Tübingen. See German, Russian, and Asian Languages and Literatures for a description of this program.

Tufts European Center

The Tufts University European Center is an international conference and educational facility in the French Alps. Located on Lake Annecy in the village of Talloires, the European Center is housed in a restored eleventh-century priory.

The European Center hosts many important meetings each year on a wide range of topics. These events are sponsored by various faculty members and departments at Tufts as well as by other academic and professional organizations. Each summer Tufts' fourth campus opens its doors to selected students who are interested in international study. Through a variety of unique programs students learn firsthand about international relations, France's Celtic and Roman heritage, as well as the beauty and environment of the French Alps.

Tufts in Talloires

A six-week summer program for all students offering a variety of courses taught by Tufts faculty, including contemporary French culture, international relations, art history, and economics. Most courses are taught in English and students can earn two Tufts credits.

Tufts in Annecy

Students have the opportunity to immerse themselves in French language and culture during the month of July in order to help them acquire fluency from beginning to advanced levels. They attend a branch of the Université Savoisien in the city of Annecy and are housed with French families, benefiting from the abundance of cultural and recreational activities taking place in this festive city.

Tufts Summit

A program for high school juniors and seniors that introduces younger students to international relations and French language and culture. Students are housed with French families.

For more information about Tufts programs in the French Alps or about the European Center, visit <http://ase.tufts.edu/frenchalps>, call 617-627-3290, or e-mail france@tufts.edu.

Summer Session

Tufts University Summer Session offers more than 200 courses during two six-week sessions and one twelve-week session each summer. A list of summer course offerings, available in November, can be helpful in planning a year-round academic program. Two-thirds of the summer students also attend Tufts during the year. They attend summer classes for many reasons: to take a course or courses not available during the year, catch up on a missed course, devote time to a specific course in an intense six-week session, take an additional course(s) to lighten course load during the year, or work on an independent study or internship. Students pay a registration fee and tuition on a per-course basis. Registration information specifically for Tufts students can be found on the summer session Web site or in summer session publications. The Summer Session office is located at 108 Packard Avenue.

For more information on summer session programs and activities, visit <http://ase.tufts.edu/summer>, call 617-627-3454, or e-mail summer@tufts.edu.

Combined-Degrees Programs

Combined Five-Year Liberal Arts/Engineering Program

For most students entering college, the choice between liberal arts and engineering is a clear-cut matter. For some students, however, the choice is quite difficult. For the latter, both the professional flavor and occupational orientation of the engineering programs on the one hand, and the variety of course selection in the liberal arts curriculum on the other, have strong appeal. At Tufts it is possible for students to secure the advantages of both types of education under the combined five-year program.

With a normal course load in each of ten semesters, students may complete the degree requirements in both engineering and liberal arts. The five-year program includes two fields of major concentration, one in liberal arts and one in engineering. The plan has particular appeal for engineering students who wish to secure a more liberal arts education than is possible in a four-year engineering curriculum and for liberal arts students who desire a strong technological background. Two degrees are awarded on completion of the program. Both degrees are

awarded only on completion of the entire program; a student may not receive one degree earlier, even if the requirements for that degree have been met. Students who start a five-year program but decide within two years not to continue may complete the degree requirements for either engineering or liberal arts in the usual period of four years.

Students may apply for and be admitted to the combined five-year program only after entrance to Tufts. Because the program requires careful planning, students are encouraged to apply as early as possible. Application forms are available in Academic Services. Admission decisions are made twice a year, in January and in June. Five-year students are required to confer with their faculty advisers at the beginning of each semester to make certain that the courses that have been selected constitute a proper program. Five-year students must complete a minimum of forty-six courses and fulfill the foundation, distribution, and concentration requirements of both engineering and liberal arts. Within the School of Engineering, the B.S. degree may not be used as part of this program, except for the engineering psychology (human factors) program.

Combined-Degrees Program with New England Conservatory of Music

Tufts University and New England Conservatory of Music have by agreement instituted a full five-year program leading to a bachelor of arts or bachelor of science degree from Tufts and a bachelor of music degree from the conservatory. It is designed for students who wish to pursue studies on a musical instrument, voice, composition, music history, and theory without giving up the academic disciplines of a liberal arts degree. Admission to this combined-degrees program is generally gained by simultaneous application to both institutions. Students in the program will complete a minimum of twenty-four Tufts credits and will be in full-time residence for ten semesters, and will meet the foundation, distribution, and concentration requirements stipulated by the College of Liberal Arts. Prospective students are requested to address their concerns to: Dean of Enrollment Services, Office of Admission, New England Conservatory of Music, 290 Huntington Avenue, Boston, Massachusetts 02115, or Associate Dean Jeanne Dillon at Tufts University.

Combined-Degrees Program with the School of the Museum of Fine Arts

Tufts University and the School of the Museum of Fine Arts have by agreement instituted a five-year program leading to a bachelor of fine arts degree and a bachelor of arts or science degree. Admission to this combined-degrees program is by simultaneous application to both institutions, or for students enrolled at Tufts by application to the Museum School, usually in the first or second year. Students in the program will meet the foundation, distribution, and concentration requirements stipulated by the College of Liberal Arts. Requirements for the degree in art (B.F.A.) include many of the same academic requirements plus five semester courses in art history and eighty-four credits in studio art. Normally, the majority of the academic work is taken on the Tufts Medford/Somerville campus, and at least seventy credits of studio art are commonly taken at the Museum School. The entire five-year program consists of a minimum twenty-four academic courses and eighty-four credits of studio art. Information regarding the combined-degrees program may be obtained from the Admissions Office or the Academic Affairs Office, School of the Museum of Fine Arts, 230 The Fenway, Boston, Massachusetts 02115.

Combined Bachelor's/Master's Degrees Program

Combined bachelor's/master's degrees programs are offered by the College of Liberal Arts, the School of Engineering, and the Graduate School of Arts and Sciences. Exceptional students may combine undergraduate and graduate courses and are simultaneously enrolled in bachelor's and master's degrees programs. Both degrees are awarded only on completion of the entire program; a student may not receive one degree earlier, even if the requirements for that degree have been met. Combined-degrees students must pay four years of undergraduate tuition and the entire tuition for the master's degree.

The combined-degrees program is one way of recognizing the fact that an increasing number of undergraduates are entering college with exceptional preparation in certain areas and that many are capable of doing graduate work in their junior and senior years.

Students seeking admission to the program should consult their undergraduate major advisers

and their prospective graduate advisers before applying to the graduate school. Combined-degrees students are expected to fulfill all the requirements of the undergraduate and graduate programs. No courses offered in fulfillment of one set of requirements may be used for the other.

Admission to the program is normally during the junior year. Only in exceptional cases will an application be accepted after the junior year. Therefore, students interested in the program should contact their advisers early in their academic career to facilitate program planning. A student may elect to withdraw from the program at any time by filing the appropriate petition.

Combined Bachelor's/Master's in Public Health (M.P.H.) Degrees Program

(SEE HEALTH PROFESSIONS PROGRAMS FOR DESCRIPTION.)

Combined-Degrees Programs with The Fletcher School of Law and Diplomacy

College of Liberal Arts

The combined-degree program is conducted jointly by the undergraduate college and The Fletcher School of Law and Diplomacy. It offers an opportunity for a limited number of highly qualified Tufts undergraduates in Arts and Sciences to earn both the bachelor's degree in their selected major and the Master of Arts in Law and Diplomacy (MALD) degree on completion of a total of five to six years of study. Students may apply for the program once they have completed and received grades in at least twenty undergraduate credits.

A total of sixteen Fletcher course credits are required for the MALD degree. As many as four of these courses may be used to fulfill requirements for the bachelor's degree. Fletcher courses will be taken over a period of two and a half to three years, during which time the student will complete his or her academic work for the bachelor's degree. No more than a combined total of five undergraduate and Fletcher courses may be taken during any one semester, no more than four of which may be Fletcher courses. The student's program must be coordinated to satisfy both the Fletcher requirements and those of the undergraduate department. Credit toward the MALD degree will not be allowed for Fletcher courses taken through cross-registration or Fletcher Summer School before

beginning the combined-degrees program. Cross-registration for courses at Harvard or other institutions will not be approved until the student has completed at least eight Fletcher courses. Upon admission to this combined-degree program, the student must work with both his or her major advisor, respective academic dean and the Fletcher registrar to ensure that he/she is meeting all requirements for both the bachelor's and MALD degrees. These meetings must take place before beginning coursework toward the MALD degree.

The normal length of this program is six years. Students who are completing this combined-degree program in a total of six years will be required to satisfy the residency requirement of eight semesters toward the bachelor's degree and four semesters toward the MALD degree. Tuition will be assessed so that during semesters 1-8, they will pay Arts and Sciences tuition and then during semesters 9-12, they will pay tuition at The Fletcher School.

Some students opt for an accelerated program where they complete the combined-degree program in a total of five years. In this scenario, students would satisfy the residence requirement of the bachelor's degree upon completion of 7 semesters, after which they would begin paying tuition to Fletcher for 3 semesters.

Those wishing to apply for the program should do so during the semester following the one in which they complete twenty undergraduate credits. If admitted to the program, they will begin taking Fletcher courses at the start of the following semester, whether it begins in January or September. The application deadlines are October 15 for January admission and January 15 for September admission.

Eligibility for financial aid will be based upon where the student is charged tuition for a particular semester. When students are charged and pay tuition to Arts and Sciences, they would be eligible to apply for undergraduate financial aid and when they are charged and pay tuition to The Fletcher School, they would be eligible to apply for financial aid from The Fletcher School. Students should be aware that financial aid eligibility may vary significantly between the undergraduate program and The Fletcher School program.

The application fee is not required for combined-degree program applicants. Application forms, requests for interviews, and information on the The Fletcher School may be obtained from the

Fletcher School Admissions Office (Goddard 213) or by calling 617-627-3040.

School of Engineering

The Engineering-Fletcher degrees (EFL) program is conducted jointly by the School of Engineering and the Fletcher School of Law and Diplomacy. Highly qualified high school students will be admitted to the School of Engineering and conditionally admitted to the Fletcher School during their senior year. These students will earn a bachelor of science in their selected ABET-accredited degree from the School of Engineering in four years.

The curriculum consists of a total of thirty-nine credits of which eight pre-Fletcher courses should be chosen. The required courses are Political Science 51, International Relations; Economics 5, Principles of Economics. The remaining five elective courses should either be foreign language courses or other courses with international focus. These elective courses should be approved by the Fletcher program adviser. Foreign language competence equal to the intermediate level (the equivalent of four semesters) is a minimum prerequisite for enrollment at Fletcher. Students are also required to complete at least one substantive internship in one of their undergraduate summers. This internship should be in an area appropriate to the study of international affairs.

In order to gain official admission to the Fletcher School, students must obtain a minimum of 3.60 GPA in the pre-Fletcher requirements and a minimum of 3.40 GPA in the remaining credits by the end of the first semester of their senior year.

Combined Liberal Arts/Dental Seven-Year Program

(SEE HEALTH PROFESSIONS PROGRAMS FOR DESCRIPTION.)

Teacher Licensure Programs

Tufts offers several programs for undergraduate students who are interested in obtaining Massachusetts licensure as teachers. The program preparing candidates for licensure as a teacher of young children (Pre-K to grade 2) is administered through the Eliot-Pearson Department of Child Development. The program preparing candidates for licensure as a teacher of elementary school children (grades 1 to 6) is administered jointly by

the Departments of Education and Child Development. The program preparing candidates for licensure as an art teacher is in collaboration with the School of the Museum of Fine Arts, Boston; students complete a bachelor of fine arts in art education that prepares them for licensure as teachers of visual art for children in grades Pre-K to grade 8 or grades 5 to 12.

Programs preparing early childhood, elementary teachers, and art teachers at all levels are approved by the Massachusetts Department of Education. Undergraduates seeking licensure as teachers complete at least one semester of full-time student teaching in the schools under the guidance of a cooperating teacher. They must also pass the Massachusetts Tests for Educator Licensure (MTEL), administered through the Massachusetts Department of Education, if they wish to be licensed to teach in Massachusetts public schools. More information about the state licensure process and test can be found on the Tufts Department of Education Web page at

<http://www.ase.tufts.edu/education/student/licensure.asp>.

Participation in the licensure program is contingent on evidence of competence in oral and written English, the attainment and maintenance of at least a 3.0 grade point average in the subject area that the student intends to teach, and the feasibility of completing the academic and professional courses required for state licensure. Only courses receiving grades of C or better may be used to fulfill the subject area or education program requirements for licensure.

Department of Education

The undergraduate program of teacher preparation and licensure in the Department of Education requires that students complete a departmental major in the academic subject area that they plan to teach, and an additional nine course credits of professional preparation, including supervised student teaching. For elementary teacher licensure, undergraduates who complete the department's program of professional courses are eligible to apply for licensure as elementary teachers after completing the Massachusetts state educator tests. For visual art teacher licensure, students complete a bachelor of fine arts degree in collaboration with the School of the Museum of Fine Arts, in visual art education that prepares them for licensure as teachers of visual art for children in grades Pre-K to 8, and 5 to 12. Tufts Department of Education also offers a master

of arts in teaching (M.A.T.) degree and a master of arts in education (M.A.) degree that may be completed in a fifth year of study after the undergraduate programs. Students considering these degrees should inquire about these programs during their sophomore year. The M.A.T. programs lead to licensure at the elementary level and middle and high school levels in art, biology, chemistry, earth sciences, English, general sciences, history, mathematics, physics, political science/political philosophy, social studies; and as elementary, middle, or high school teachers of classical humanities, French, German, Latin, Japanese, and Spanish. In addition, the department offers graduate programs leading to licensure as school psychologists for all grade levels.

Students are assigned two program advisers—one in the Department of Education and a liaison faculty adviser from the department representing the subject area that the student wishes to teach. The advisers assist students in planning a program of study that fulfills the requirements for state licensure. To receive an application or for additional information, students may contact the Department of Education in Paige Hall at 617-627-3244.

Eliot-Pearson Department of Child Development

The program of teacher preparation and licensure in early childhood education requires that students complete a departmental major in child development and additional course work in professional preparation, including supervised teaching practica. Students who successfully complete the department's program of professional courses and state testing requirements are eligible for licensure as teachers of young children in Pre-K to grade 2, or as elementary teachers (grades 1 to 6) through a joint program offered with the Department of Education. For additional information, students may contact the Department of Child Development at 617-627-3355.

School of the Museum of Fine Arts

The program in art education requires that students complete eighty-four credit hours in studio art and nineteen academic courses, including education, art education, and supervised teaching practica. Students who successfully complete the program are eligible for licensure as teachers of visual arts in Massachusetts and other reciprocal states.

For more information, contact the School of the Museum of Fine Arts, Admissions Office at 617-369-3626 or Patty Bode, the Director of Art Education at 617-369-3613.

Health Professions Programs

The health professions advisers work with students exploring various careers, advise them regarding curriculum, internships, and the application process, and offer a variety of programs and workshops each year. Students are encouraged to meet with an adviser at any point in their college career. Students interested in attending health professions schools are urged to read the Tufts University Health Professions Handbook, available in Dowling Hall or online at www.studentservices.tufts.edu/HPA, and to seek advice from the health professions advisers.

The program director also sits on the Policy Board of the Community Health Program, a multi-disciplinary major for students interested in health care issues, policy and community, and population health care. Many pre-health students opt to pursue this major. For more information, visit <http://ase.tufts.edu/bulletin/community-health.html>.

Predental, Premedical, and Preveterinary Programs

There are no formal predental, premedical, or preveterinary majors at Tufts. Many preprofessional students major in biology, but a significant number choose an area of interest ranging from art history to child development to engineering. The major is not an important consideration for admission to medical school, as long as the science and non-science academic record is sound. Dental, medical, and veterinary schools vary in their minimum requirements for admission. There are, however, certain courses that virtually all these schools require:

1. Biology: two courses with laboratory, preferably in areas of cellular and molecular biology, genetics, and physiology.
2. Chemistry: two courses of inorganic with laboratory; two courses of organic with laboratory.
3. Physics: two introductory-level courses with laboratory.
4. Mathematics: the number of mathematics courses required varies from none to two.
5. General requirements: U.S. schools desire evi-

dence that students can read and write English well. Most schools require one year of college-level English. Biomedical professional schools prefer students with broad general knowledge including understanding of different cultures and languages.

A few medical schools have other requirements and it is recommended that students acquaint themselves with the special requirements for admission to schools in which they are especially interested. Also, some schools will not accept advanced placement credit or shortened courses for satisfying their science or nonscience requirements and will want candidates to take additional science courses. Premedical students should consult *Medical School Admission Requirements* (www.aamc.org), and predental students, *Admission Requirements of U.S. and Canadian Dental Schools* (www.adea.org). These are published annually.

Veterinary schools have more variability in their requirements than medical and dental schools. Students should consult *Veterinary Medical Schools Admissions Requirements* (www.aavmc.org).

Predental, premedical, and preveterinary students may apply in the summers following junior year or senior year or as alumni for any application year. Science requirements should be completed by the previous spring semester. Usually, students take the medical and dental aptitude tests at this time.

Letters of recommendation written by faculty members who know the candidate well are very important. It is strongly recommended that students become well acquainted with individual faculty. Participation in small seminar classes and joining in undergraduate research programs are two ways of getting to know individual faculty members. Students are also urged to learn as much as possible about health care through undergraduate research, volunteer work at health-care facilities, or summer employment. Students interested in veterinary school should have experience in the care of animals and, if possible, should have participated in biomedical research or environmental projects, or have assisted a practicing veterinarian.

Finally, there are more qualified applicants than spaces in these professional schools. As a consequence, some qualified students will not be admitted. High grades, strong letters of recommendation, and high aptitude scores are essential for—but do not guarantee—admission.

The Health Professions Recommendation Committee coordinates the preparation of composite letters of recommendation to the schools. All students who apply should register with the committee the year they will apply. The deadline for registering with the committee is April 1 of the application year. It is increasingly important to begin the application process at an early date (e.g., in May of the junior year) for students wishing to attend professional school immediately after graduation. However, taking a year or two off after graduation and before applying can strengthen an applicant's credentials.

Tufts University School of Medicine—Early Acceptance

For a very select group of sophomores, the School of Medicine offers an opportunity for early acceptance into the medical school. To be eligible, students must complete two semesters of general chemistry, two of introductory biology, and one of organic chemistry by summer of sophomore year. Qualified applicants need to perform extremely well in all their academic work, and should demonstrate a mature, informed motivation for a medical career. If accepted, a student will still complete the remaining two undergraduate years before beginning the four-year medical school curriculum. However, with an assurance of admission, the student may be more likely to explore the curriculum more fully by studying abroad, writing a thesis in a nonscience discipline, or pursuing another significant academic interest. At the end of the junior year, those students who were accepted the previous year make their final commitment to attend Tufts University School of Medicine. The medical school, in turn, expects accepted students to maintain the same level of performance in their course work during their junior and senior years.

For more information, visit www.tufts.edu/med/.

Cummings School of Veterinary Medicine—Early Acceptance

For a very select group of sophomores with commitment to veterinary medicine and experience working with animals, the School of Veterinary Medicine provides an opportunity for early acceptance into the veterinary school. To be eligible, students must complete two semesters of general chemistry and two of introductory biology by the end of sophomore year. If accepted, a student will

still complete the remaining two undergraduate years before beginning the four-year veterinary school curriculum. The veterinary school expects accepted students to maintain the same level of performance in their course work during their junior and senior years, but the GRE test is not required for matriculation.

For more information, visit www.tufts.edu/vet/admissions/.

Tufts University School of Dental Medicine—Early Acceptance for Engineering Students

For a very select group of sophomores in the School of Engineering with a commitment to dental medicine, an early acceptance program to the School of Dental Medicine is offered. To be eligible, students must complete two years of calculus, two of physics, and two of general chemistry by summer of sophomore year. Qualified applicants need to perform well in all their academic work. If accepted, students will complete the remaining two undergraduate years before beginning the four-year dental school curriculum. They will also complete two semesters of biology, one semester of organic chemistry, and one semester of biochemistry. At the end of the junior year, those students who were accepted the previous year make their final commitment to attend Tufts University Dental School. The dental school, in turn, expects accepted students to maintain the same level of performance in their course work during the senior year. It is also expected that the candidates will receive at least a 16 academic average score, a 16 total science score, and a 16 perceptual ability score on the administration of the dental aptitude test.

Combined Liberal Arts/Dental Seven-Year Program

Tufts undergraduates who are completing their first year are eligible to apply for a program that will allow them to complete their undergraduate degree in the College of Liberal Arts and their degree in the School of Dental Medicine in seven years rather than the traditional eight. Students may apply to the program during the spring semester of their first year at Tufts. Successful candidates for the program will likely have maintained a 3.2 GPA overall, a 3.2 GPA in dental school prerequisite courses, and will receive at least a 17 academic average score and a 16 perceptual ability score on the administration of the

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dental aptitude test. Applicants to the program will have completed either the introductory chemistry or the introductory biology sequence by the end of their first year.

For more information, visit www.tufts.edu/dental/student_admissions/combined.html.

Combined Bachelor's/Master's in Public Health (M.P.H.) Degrees Program

A combined bachelor's/M.P.H. program is offered in conjunction with the Graduate Programs in Public Health at Tufts' School of Medicine. This program allows students who are planning to pursue a career in public health the opportunity to complete a portion of their requested course work as undergraduates, leaving them with only eight more courses to complete the M.P.H. program. Interested students may apply at the end of their sophomore year or the beginning of their junior year. This program is available to students in all majors. More information is available at

<http://www.tufts.edu/med/gpph/index.html>.

Postbaccalaureate Premedical Program

Tufts provides the opportunity for college graduates who did not study the sciences to prepare for entrance into a health-care profession of their choice.

A concentrated program of study, supplemented by a network of personalized advising and support, gives Tufts graduates the needed advantage when applying to competitive medical schools and related graduate programs. The program is flexible and allows students to develop an individualized program of study, chosen from a wide range of course offerings. This flexibility allows students to pursue careers in medicine, dentistry, veterinary medicine, physical therapy, occupational therapy, osteopathic medicine, optometry, podiatry, or as a physician assistant or nurse practitioner.

Tufts also provides a variety of workshops specifically for students in the program: applying to and interviewing at health professions programs, options for financing a health-care education, and strategies for studying science. Students may also attend public lectures at the Sackler School of Graduate Biomedical Sciences and the Schools of Medicine, Dental Medicine, and Veterinary Medicine. To be eligible, students should have a bachelor's degree and a minimum of a 3.0 undergraduate grade point average. The typical student excelled in

an undergraduate field other than science, but has recently made a commitment to pursuing a career in the health-care profession. The program is not remedial.

For more information and an application, visit www.studentservices.tufts.edu/postbac.

Prelaw and Prebusiness

Prelaw

Prelaw students may select from a variety of majors; there is no specific prelaw major. Students considering law school are encouraged to take a variety of courses in which they may develop their writing abilities, critical thinking and reading expertise, oral communication, analytic problem-solving approaches, and research skills. Each skill offers valuable preparation for law school. Advising for prelaw is organized by Karen Garrett Gould, Associate Dean of Undergraduate Education. Students thinking about attending law school are urged to direct their immediate questions to prelaw@ase.tufts.edu.

Pre-Business Programs

Most MBA programs welcome students from diverse backgrounds, thereby enriching the discourse and dynamics of the classroom. Thus, there is no single academic track that is recommended. Corporate employers who recruit at Tufts typically invite students from a variety of majors to interview. However, they do seek indication of a student's interest in their business and/or industry which is most often reflected through internships or extracurricular activities. Likewise, candidates are encouraged to experience the workplace prior to business school. This employment allows individuals to better understand their interests, to discover new areas for exploration, and to contribute more fully to the program itself. To learn more about internships, recruiting, and graduate school admissions, students may visit Career Services (<http://careers.tufts.edu>) with offices located in Dowling 740.

Experimental College

The Experimental College will celebrate its forty-fifth anniversary in 2009. This marks it as one of

the nation's oldest and most successful centers for educational innovation at work within the setting of a traditional liberal arts university. Throughout its history, the Experimental College has embodied the commitment of Tufts University to the vitality of undergraduate education. The college has become a place where faculty, administrators, and students work together to shape new courses and programs.

Governed by an elected board consisting of faculty, staff, and students, the Experimental College has been granted a good deal of latitude and flexibility in its role as a locus for collaborative learning and teaching. First and foremost, the Experimental College offers a carefully selected range of courses intended to broaden and enrich the traditional curriculum. It also administers two unique first-year programs called Explorations and Perspectives. Both of them combine advising and academics with peer-group support and close contact among entering students, upper-level undergraduates, and concerned faculty.

The Experimental College also provides forums for inquiry such as noncredit colloquia, conferences, and workshops that meet the expressed needs of the university community as a whole. The Experimental College does not offer any academic concentrations of its own. However, certain courses will be cross-registered with a specific department, while others may be accorded concentration or distribution credit on an individual basis by petition.

More information regarding the programs and activities of the Experimental College is available from the office at 95 Talbot Avenue, at www.excollege.tufts.edu, or by calling 617-627-3384.

Experimental College Courses

Designed primarily for undergraduates, Experimental College courses are open to all members of the university. They are credit-bearing electives taught in accordance with university standards. Students should refer to the Ex College website for specific information, detailed course descriptions, and daily updates .

Instructors in the Experimental College include departmental faculty, members of the university's administration and staff, graduate students, and—in large measure—persons in the greater Boston community who have some special expertise to share. Qualified upper-level undergraduates also are given the opportunity to teach courses of their

own design. These usually carry full credit but are graded on a pass-fail basis. The undergraduate instructors receive credit, as well, for their teaching and for taking part in a seminar on pedagogy given by the director of the Experimental College.

On the average, the Experimental College offers close to sixty courses each year. A selected list of some recent offerings follows.

A History of Documentary Film

Advertising and Poetry

Latinos, Racism, and Media

Internet Law

Experimenting with Philanthropy

Obesity and Children

Explorations

Explorations are intended to both establish a sense of community and promote critical thinking. Each Exploration group consists of twelve to fourteen entering students who meet weekly in seminars designed and team-taught by two upper-level students. A faculty member or professional staff person selected by the student leaders assists in planning, serves as academic adviser to the first-year students, and attends weekly seminar meetings. Thus, incoming students receive both immediate and sustained contact with a group of their peers, with their upper-level student-teachers, and with their academic adviser.

Perspectives

Like Explorations, the Perspectives program uses upper-level students as peer teachers and advisers, but rather than each team of student leaders choosing their own subject area, all the groups attempt to answer questions about the movies as art, business, and culture. The work done by each Perspectives group will be grounded in a program-wide study of how movies work as movies, how they communicate meanings to an audience through the use of visual and audio codes that we, as moviegoers, have come to learn in much the same way that we learn to understand a spoken language.

Auditing for Breadth

Auditing for Breadth allows students to broaden their education by attending courses in which they might not otherwise enroll. A student may elect to audit any three courses during his/her tenure as an undergraduate at Tufts. Faithful attendance is the

major requirement for each audit. Students select their own courses to audit but must have the approval of the course instructor. One course credit is awarded on completion of the three audits and a short paper. More information and faculty approval forms are available at the Experimental College office.

Quidnuncs

The Latin term quidnunc translates into English as "what next?" This program is designed in that spirit, allowing students to study as part of a peer group that will collectively investigate an interdisciplinary topic of the group's own choosing. Previous groups have studied international health care, electronic journalism, creating a sex education curriculum, sustainable development in Nicaragua, and conflict resolution and cooperative games.

Communications and Media Studies

Communications and Media Studies (CMS) is an interdisciplinary program that is part of the Experimental College and houses three minors: mass communications, film studies, and multimedia arts. Intellectually, it places the study of media in critical contexts. Each semester, CMS offers courses of its own through the Experimental College, while coordinating and publicizing media courses offered in other departments. It also registers, supervises, and grants credit for communications-related internships. See Communications and Media Studies on page 126 for more information.

TUTV

The Experimental College is the administrative home to TUTV, the on-campus access channel. Faculty-sponsored and student-run, TUTV broadcasts on a closed-circuit network inside all the residence halls. Its charter mandates a broadcast schedule that incorporates public information, original programming, and support for curricular initiatives. TUTV continues to attract more and more students who develop, along with location and studio production skills, the ability to manage an organization, make critical and ethical decisions, and interact in a positive manner with students, faculty, and administrators. In short, the students who run TUTV learn to become leaders.

TuftsFilmWorks

Established and administered by the associate director of the Experimental College, TuftsFilm-

Works (TFW) is the university's first center for film and multimedia production. Relying on new digital video technologies, TFW is the umbrella structure under which the Experimental College nurtures a wonderfully hard-working and creative brood of student filmmakers. Among the projects they have completed are a full-length, Hollywood-style romantic comedy; an experimental film mixing found celluloid with digital video; a music video with superimposed, hand-drawn animation; a documentary about Mongolia (filming for which was all done on location); and an hour-long concert DVD shot live with seven cameras. All TFW students are trained to understand and appreciate the craft of filmmaking while learning to use cutting-edge digital production and editing equipment. At the same time they are engaged in ongoing studies of film history and style.

Special Events

Over the last fifteen years, the Experimental College has sponsored an annual forum, Opening Up the Classroom, where equal numbers of students and faculty have come together over dinner to share ideas about current controversies on pressing issues in higher education. This forum has become a campus tradition and has focused on such topics as service learning, grading, the first-year experience, the business of higher education, the impact of technology on teaching and learning, ethical behavior in and out of the classroom, and the university's high profile in the popular press. In addition, every four years, the Experimental College sponsors a campus-wide Election Night Extravaganza, during which students, faculty and administrators come together to watch and comment on the results of the presidential, congressional, and state races.

Jonathan M. Tisch College of Citizenship and Public Service

Robert Hollister, *Dean and John DiBiaggio Professor*

Nancy Wilson, *Director and Associate Dean*

Molly Mead, *Director, Faculty Programs;*

Lincoln Filene Professor

Brian O'Connell, *Professor of Public Service*

Shirley Mark, *Director, Lincoln Filene Center for
Community Partnerships*

Mindy Nierenberg, *Student Programs Manager*

Melissa Russell, *Alumni Coordinator*

Roberta Oster Sachs, *Senior Lecturer; Director, Media and Public Service Program*

Tom Birmingham, *Senior Fellow*

Steve Curwood, *Senior Fellow*

Cindy Gibson, *Senior Fellow*

William Harris, *Senior Fellow*

Peter Karoff, *Senior Fellow*

Frank Reece, *Senior Fellow*

Margie Reedy, *Senior Fellow*

Alan Solomont, *Senior Fellow*

Susan Stroud, *Senior Fellow*

FACULTY STEERING COMMITTEE

Rob Hollister, *Tisch College*

Linda V. Beardsley, *Education*

Marina Bers, *Child Development*

Drusilla Brown, *Economics*

Doug Brugge, *Department of Sciences*

Steve Cohen, *Education*

Chris Economos, *Friedman School of Nutrition Science and Policy*

Ross Feldberg, *Biology*

Robyn S. Gittleman, *Experimental College*

Barbara Grossman, *Drama and Dance*

John C. Hammock, *Friedman School of Nutrition Science and Policy and Fletcher School*

Hosea Hirata, *German, Russian, and Asian Languages and Literatures*

Bruce Hitchner, *Classics*

Charles Inouye, *German, Russian, and Asian Languages and Literatures*

James Jennings, *Urban and Environmental Policy and Planning*

Erin Kelly, *Philosophy*

Jonathan Kenny, *Chemistry*

Lionel McPherson, *Philosophy*

Molly Mead, *Tisch College*

Aviva Must, *Family Medicine and Community Health, School of Medicine*

Miriam Nelson, *Friedman School of Nutrition Science and Policy*

Susan Ostrander, *Sociology*

Mary Rose Paradis, *School of Veterinary Medicine*

Kent E. Portney, *Political Science*

Chris Rogers, *Mechanical Engineering*

Barbara G. Rubel, *Tufts Community Relations*

Debra Samdperil, *Artist's Resource Center, Museum School*

Anthony Schlaff, *Family Medicine and Community Health, School of Medicine*

Howard Spivak, *Pediatrics, School of Medicine*

Chris Swan, *Civil and Environmental Engineering*

Don Wertlieb, *Child Development*

Stanton Wolfe, *Public Health and Community Services*

Jean Wu, *American Studies Program*

The Jonathan M. Tisch College of Citizenship and Public Service (Tisch College) is a university-wide resource—providing student programs, supporting faculty research and curriculum development, and catalyzing community building—to make the values and skills of active citizenship a hallmark of a Tufts University education. Since its founding in 2000, Tisch College has emerged as a national leader in preparing university students to become engaged public citizens and community leaders who will help build a more equitable world.

Tisch College works with all Tufts schools and disciplines to ensure that students graduate from Tufts University prepared to be committed public citizens and leaders who take an active role in building stronger communities and societies. It achieves its mission by identifying, generating, and supporting Tufts students, faculty, staff, alumni, and community partners who develop effective approaches to active citizenship at the university and in communities around the world.

Student Programs

Education for active citizenship is the theme that links student programs at Tufts. Through Tisch College, students can learn about innovative student organizations that connect students to local communities and engage in interactive seminars and programs structured to build lifelong knowledge and skills related to active citizenship. They can also connect with campus volunteer services that have local, national, and international scope.

The **First-Year Education for Active Citizenship Course** prepares students to engage as active citizens. This semester-long course introduces students to the community, provides students resources to work in collaboration with organizations, and teaches the skills needed to engage others across campus. Students who successfully complete this course are invited to be part of the Citizenship and Public Service Scholars program.

Students accepted into the **Citizenship and Public Service Scholars** program commit to rigorous local or international community project work, training, and knowledge development over three years. Scholars actively seek out and encour-

age collaboration with their peers. Participants in this program also have access to dynamic interactive workshops that build their capacity to make a difference through active citizenship. Previous workshops have focused on race, class and privilege, public speaking, fundraising, and conflict resolution.

A wide variety of courses at Tufts educate students for roles as active citizens. Tisch College supports the Education for Active Citizenship curriculum that spans all schools of Tufts, and includes courses such as **Building Bridges**, a program in Chinatown that combines learning with active citizenship, as well as **Race in America**, **International Health Policy or Cultural Legacies of the Atomic Bomb**. For a comprehensive listing of Education for Active Citizenship courses, visit the Tisch College Web site (<http://activecitizen.tufts.edu>).

Tisch Active Citizens Summer (ACS) provides financial support to students engaged in citizenship work during the summer. Tisch College also helps to provide community engaged summer research opportunities, through the **Summer Scholars Program** in collaboration with the dean of Undergraduate Studies, and Washington, D.C. internships with alumni mentors, through the **Omidyar Summer Internships** managed by Career Services. The **Tisch Civic Engagement Fund (CEF)** is an opportunity for students independently engaged in active citizenship work to receive financial support. The goal of the program is to encourage students to develop new approaches to positive change and for existing student groups to integrate citizenship into their activities.

The **Weston Howland Jr. Award for Civic Leadership** recognizes an individual outside of Tufts with a record of exemplary civic leadership. Through his or her actions, this individual demonstrates a commitment to active citizenship and engagement within a community. The awardee spends one day in the fall on the Tufts Medford campus, sharing his or her experiences with students, faculty, and staff, and serving as a model active citizen.

Faculty Programs

Tisch College works in partnership with Tufts faculty to advance education for active citizenship through teaching, research, and community projects. This work is accomplished through several initiatives.

The Tisch College **Faculty Fellows** program is a two-year program designed to accelerate the work of Tufts faculty members who are applying tenets of active citizenship to their curriculum and/or research interests. It supports Tufts faculty research that builds knowledge about civic engagement, is “civically engaged,” or develops curricular approaches to help prepare students to be effective citizens. Fellows are selected because of their potential to engage other faculty and infuse the theme of education for active citizenship throughout the university.

The **Civic Engagement Research Group** convenes faculty and community members doing scholarly work on some aspect of civic engagement or who regularly provide students with opportunities to conduct research related to civic engagement. The group aims to create and sustain a supportive and stimulating intellectual community, learn from one another about current thinking in their various fields, share work in progress, and develop common projects.

Alumni Programs

Tisch College celebrates, educates, and engages Tufts alumni interested in building stronger communities and societies, and collaborates with other university offices and schools to provide programming options for alumni around the world.

Tisch College works with the Tufts University Alumni Association (TUAA) to develop active citizenship programming for Tufts alumni closer to home, including developing civically focused mentorships for current Tufts students.

Alumni Service Day has become a staple feature of reunion programs. Alumni who gather on campus during Alumni Weekend have the opportunity to connect with one another and the community in a meaningful way through an afternoon of community service.

Citizenship Circle Dinners provide participants with a chance to network over a casual dinner with others who share similar interests. The dinners provide a convenient way for young alumni to connect with and learn from alumni they otherwise may not meet.

Lincoln Filene Center for Community Partnerships

The Lincoln Filene Center for Community Partnerships (LFC) at Tisch College contributes to education for active citizenship by facilitating relationships between Tufts University and surrounding communities that are strong, meaningful, and sustainable. The LFC advances active research, education, and community service partnerships between Tufts students and faculty and organizations in the partner communities of Boston's Chinatown, Grafton, Medford, Somerville, and the Mystic Watershed. LFC supports and encourages students and faculty members working with partner communities and organizations to address community-identified needs. These positive citizenship activities can take many forms: academic research, curriculum development, forums and conferences, course work, internships, and volunteer work.

Tisch College is located in Lincoln Filene Hall on the Medford campus. For more information, call 617-627-3453 or visit <http://activecitizen.tufts.edu/?pid=236>.

Institute for Global Leadership

The mission of the Institute for Global Leadership (IGL) is to prepare new generations of critical thinkers for effective and ethical leadership, ready to act as global citizens in addressing international and national issues across cultures. In 2005, the Institute for Global Leadership was named a distinctive, cross-school program of the university, with the objective of enhancing the interdisciplinary quality and engaged nature of a Tufts education and to serve as an incubator of innovative ways to educate learners at all levels in understanding and engaging difficult and compelling global issues. The institute encourages "thinking beyond boundaries and acting across borders."

The institute emphasizes rigorous academic preparation and experiential learning. Students learn through intensive engagement in classes, global research, internships, workshops, simulations, and international symposia, all involving national and international leaders from the public and private sectors. These activities stress critical and normative thinking, written and oral communication skills, problem solving, and an interdisciplinary approach to learning. There is an emphasis both on individual progress and on collaborative

effort. Students produce tangible outcomes to their studies through their research projects, the international forums, and other significant initiatives. The experience helps stimulate intellectual curiosity and build individual self-confidence and independence, while at the same time developing analytical and practical leadership and decision-making skills.

The IGL currently runs a number of core programs and hosts several student-initiated programs. These are unique programs whose alumni have remarkable records as proven leaders in the public and private sectors.

The IGL is located at 96 Packard Avenue. For more information, call 617-627-3314 or visit www.tuftsgloballeadership.org.

Core Programs

Education for Public Inquiry and International Citizenship (EPIIC)

The cornerstone of the institute, EPIIC is a rigorous, carefully integrated multidisciplinary program on a global theme that is open to students of all majors and years. Since its inception at Tufts in 1985, EPIIC has been challenging students, as well as policy makers and the public at large, to think critically about questions of pivotal importance to the world. Its main components are a yearlong colloquium, research projects, an international symposium, professional workshops, and public service initiatives. Through its programs dedicated to presenting a continuum of viewpoints, EPIIC contributes to civil discourse and substantive debate in the public realm. Diverse practitioners such as senior intelligence experts, human rights activists, journalists, and government officials have noted that EPIIC affords them an open forum, critical to developing new ways of thinking and new initiatives. Past topics have included "International Terrorism" (1986); "The West Bank and Gaza Strip" (1987); "Transformations in the Global Economy" (1993); "Ethnicity, Religion and Nationalism" (1994); "The Future of Democracy" (1997); "Global Inequities" (2002); "The Role of the U.S. in the World" (2004); and "Oil and Water" (2005). The 2005-06 topic was "The Politics of Fear" and the 2006-07 topic is "Global Governance." For more information, visit www.epiic.org.

Inquiry

Working with public and private schools in more than seven states, Inquiry is one of the university's largest and most diverse public service initiatives. It provides a unique opportunity for high school students to participate in an intellectual and challenging yearlong program, culminating in a role-playing simulation on an important international issue.

Tufts students act as mentors and coaches for the high school students. In its fifteen-year history, more than 3,000 high school students and 500 Tufts students have participated. For more information, visit www.epiic.com/inquiry/inquiry.html.

China Cross-Cultural Leadership Program (formerly TILIP)

In 1998, Tufts University, in cooperation with Peking University (Beijing), the Chinese University of Hong Kong, and the University of Hong Kong, began this unique leadership program. The program is an important effort to shape a generation of new leaders and foster cross-cultural team building through intensive, intellectual inquiry, and practical study and internships with dynamic companies and organizations. Students from all four universities spend the summer in Hong Kong, working in pairs at specifically designed internships and attending the Leadership Lecture Series and a weekly seminar. The internships are project-based and designed explicitly for this program. The sponsoring institutions include the government of Hong Kong SAR, Hongkong and Shanghai Banking Corporation, Crown Worldwide, and the Trade Development Council. Students also spend three weeks in mainland China—Shanghai and Beijing—before they return to their respective universities to plan the annual international symposium held at Tufts University, where they all reconvene each winter. The 2005-06 topic is “China’s Future Challenges.” The program also collaborates with the U.S. Military Academy at West Point each year, with the students spending a day at the academy and a delegation of cadets attending the symposium. For more information, visit www.tilip.org.

INSPIRE (Institute Scholars and Practitioners in Residence)

This program brings scholars and practitioners to campus for public lectures, classroom lectures, and research and career advising. Recent participants have included Jack Blum, senior counsel for special

projects for Finance Sector Compliance Advisers Limited and an expert on controlling government corruption, international financial crime, money laundering, international tax havens, and drug trafficking; Peter Droege, the Asia-Pacific chair of the World Council for Renewable Energy and director of Solar City for the International Energy Agency; Mort Rosenblum, Associated Press correspondent for more than thirty years and the former chief editor of the *International Herald Tribune*; and David Wortmann, director of strategic planning for First Solar.

Global Research and Internships

Students are encouraged to conduct original, policy-oriented research and projects that allow them to test their theories and assumptions on the ground. Since 1986, more than 500 students have conducted research or participated in an international internship in more than sixty countries. Topics range from implementing sustainable energy strategies to Somaliland’s future economic viability to Panama’s demilitarization. These projects often develop into significant projects and senior honors theses. One individual project evolved into the Central American Peace Process Project and a collaboration with the Project on Justice in Times of Transition and culminated in a conference in Toledo, Spain, on lessons learned with the senior negotiators and participants from the peace process. Another project culminated in an informational DVD on the history of the Somali Bantu before their resettlement in the United States; the DVD is being narrated by actor Danny Glover and is being distributed within the local communities taking in the Somalis. For more information, visit www.tuftsgloballeadership.org/.

Voices from the Field

For the past five years, the IGL, in collaboration with the Office of the President, has brought back to campus midcareer alumni (the Voices) who are presently working in the fields of nation building, complex humanitarian emergencies, human rights, U.N. peacekeeping, refugee assistance, preventive diplomacy, conflict resolution, and development assistance. They engage in several days of intense roundtable conversation and a full day of undergraduate advising. For more information, visit www.tuftsgloballeadership.org.

EXPOSURE is a program dedicated to mentoring and developing young, knowledgeable photojournalists and the advancement of human rights through the facilitation, distribution, and instruction of photojournalism and documentary studies. Working with the VII Photo Agency and de.MO, a design and publishing company, EXPOSURE has also mounted a number of professional exhibitions and offered students the opportunity to participate in professional photography workshops from Kosovo to Bali to Argentina. Upcoming workshops are planned for Philadelphia (with Tufts alumnus and Pulitzer Prize-winning photographer Jim MacMillan), and Cuba and Cambodia with award-winning photographer Gary Knight and journalist Mort Rosenblum. EXPOSURE also hosted the first annual VII Seminar in April 2005. For more information, visit www.tuftsgloballeadership.org/.

Dr. Jean Mayer Global Citizenship Lecture Series

This series, and its accompanying award, honors the legacy of former Tufts University president and chancellor Jean Mayer by bringing distinguished individuals to campus who combine scholarship and public service and who are dedicated to helping solve some of the world's pressing challenges. Past recipients include General Romeo Dallaire, Sylvia Earle, Shirin Ebadi, Murray Gell-Mann, Conor Cruise O'Brien, Luis Moreno Ocampo, Gwyn Prins, Mary Robinson, Amartya Sen, Wole Soyinka, Ronald Takaki, and Archbishop Desmond Tutu.

Student-Initiated Programs

New Initiative for Middle East Peace (NIMEP)

NIMEP is a nonpolemical student think tank and outreach initiative aimed at finding progressive solutions to the historic conflicts in the Middle East. In 2005, NIMEP published the first issue of its journal, *NIMEP Insights*. The journal featured student research papers from NIMEP trips to Israel, the West Bank, and to Egypt, as well as the IDI trip to Iran. NIMEP also initiated and continues to teach the Soliya course. Soliya is a Web-based videoconferencing course in which small groups of university students from the United States and predominantly Muslim countries in the Middle East engage in intensive dialogue about the relationship between the United States and the Arab and Muslim world. For more information,

visit www.tuftsgloballeadership.org/NIMEP/.

Iran Dialogue Initiative (IDI)

IDI's mission is to facilitate educational dialogue and exchange between Tufts University students and students at the School for International Relations (SIR) in Tehran. This is a nonpolemical and nonpolitical initiative. IDI organized the first official U.S. university visit to Iran since the 1979 revolution, where ten Tufts students spent two weeks traveling through Iran and meeting with their peers at SIR as well as at Mofid, a religious university in Qom. For more information, visit www.tuftsgloballeadership.org/.

Building Understanding through International Learning and Development (BUILD) in Nicaragua

BUILD Nicaragua participants spend a semester learning about international development, cross-cultural exchange, the history and politics of Nicaragua, and the needs of the rural community of Siuna, Nicaragua, before spending their winter break working in the community. This is a project in collaboration with the Tisch College for Citizenship and Public Service and Bridges to Nicaragua. For more information, visit

<http://www.tuftsgloballeadership.org/programs/build.html>.

Engineers Without Borders (EWB)

A collaboration with the School of Engineering, the mission of the Tufts chapter of Engineers Without Borders is to design sustainable development projects for communities around the world and to engage students, faculty, and the campus in the process. The group traveled to Tibet in 2005 to help build solar cookers and latrines. For more information, visit <http://ase.tufts.edu/ewb/>.

Tufts Uganda Internship Program (TUIP)

Tufts interns work with Friends of Orphans, the United Movement to End Child Soldiering in Uganda, and community leadership on the planning, development, implementation, and sustainability of a broad range of projects. TUIP was developed out of an EPIIC student research project and is a collaboration with the International Relations Program, the Tisch College for Citizenship and Public Service, and the Peace and Justice Studies program. For more information, visit <http://ase.tufts.edu/pangea/uganda.html>.

Tufts Energy Security Initiative (ESI)

ESI was developed by students who participated in the 2005 EPIIC “Oil and Water” course. It is an effort to educate the campus about global energy supply and demand, alternative energy sources, and the geopolitical consequences of the world’s quest for energy sources. For more information, visit www.tuftsgloballeadership.org

Henry R. Luce Program in Science and Humanitarianism

In 2005, the IGL was asked to coordinate the Henry R. Luce Program in Science and Humanitarianism at Tufts. The program’s interdisciplinary curriculum and research innovations build on pre-existing strengths of Tufts University’s focus on undergraduate teaching and advising for responsible citizenship and global leadership. The Luce Professor of Science and Humanitarianism, Astier Almedom, became an IGL Fellow. For more information, visit

<http://fletcher.tufts.edu/faculty/almedom/profile.asp>.

Academic and Support Services

Library Resources at Tufts

The Tufts University libraries support the educational and research programs of the university by serving students, faculty, and staff. On the Medford/Somerville campus are the Tisch Library serving the schools of Arts & Sciences and Engineering; the Edwin Ginn Library of the Fletcher School of Law and Diplomacy; and the Department of Digital Collections and Archives, which manages the university’s growing digital collections and houses the university’s archives. The Hirsh Health Sciences Library serves the Tufts health sciences schools on the Boston campus. The Webster Family Veterinary Medical Library serves the Grafton campus.

The Tufts libraries share one Integrated Library System (ILS). The online catalog provides access to resources physically and virtually available within the Tufts libraries and beyond. The resources of these libraries include almost 3 million bibliographic items: books, microforms, slides, pamphlets, and government publications. The libraries subscribe to more than 5,000 print periodicals. Along with the catalog of the libraries’ rapidly expanding collections, each library’s Web

site hosts a state-of-the-art array of electronic databases, links to other Web sites, systems and services including a body of research tools accessible from each library’s home page using any Web browser. Web resources are selected by the libraries for their value to Tufts faculty and students and include a substantial number of electronic resources: over 20,000 electronic journals, which contain full-text articles, in over 400 electronic databases and indexes, and over 4,000 electronic books.

Students and faculty can also gain access through the university libraries to the resources of the nineteen academic and research libraries belonging to the Boston Library Consortium and, through interlibrary loan, to library collections throughout the country and abroad.

Tisch Library

The Tisch Library provides support for the instructional and research needs of the Schools of Arts & Sciences and Engineering. The physical facilities of the Tisch Library consist of the Tisch and the Lilly Music Library, and reading rooms for biology, chemistry, and physics, a university-wide Geographic Information Systems (GIS) Center, and The Tower cafe.

Special collections include the library of Hosea Ballou 2d, the Ritter collection of musicology, the P.T. Barnum collections, the Bolles collection of English history, and other rare books and manuscripts. These special collections are housed in the Digital Collections and Archives Department on level G of Tisch Library (<http://dca.tufts.edu/index.html>), which also contains documents, memorabilia, and publications relating to the operation and history of the university, as well as archival copies of Tufts University dissertations.

The Irene Eisenman Bernstein Media Center contains facilities for viewing DVD, laserdisc, slides, films, videotapes, recordings, and audiotapes.

The Lilly Music Library is located in the new state-of-the-art Granoff Music Center connected to the Aidekman Arts Center and across from the new Sophia Gordon Residence Hall. The Lilly Music Library provides a modern and comfortable environment to access over 35,000 musical scores, sound recordings, and books on music, subscriptions to approximately 70 music periodicals cover-

ing a wide range of musical genres, and a growing number of sophisticated electronic resources for music study, including audio databases.

For more information on Tisch library services and collections, visit

<http://www.library.tufts.edu/Tisch>.

Edwin Ginn Library, The Fletcher School

The Edwin Ginn Library of The Fletcher School is one of the largest specialized libraries in the field of international affairs. The library's collection of primary and secondary reference and research materials has been developed with careful attention to the content of The Fletcher School curriculum and the research interests of students and faculty. The library contains over 120,000 volumes and 875 current periodicals, serials, and foreign newspapers. It has League of Nations and United Nations documents, and publications from numerous international organizations in print and online

Ginn Library has substantial collections in the fields of international law and organizations; human rights; economic and political development; international energy resources and environmental matters; international security and peacekeeping; conflict negotiation; international business and finance; and the uses of the sea and outer space.

Librarians offer workshops throughout the year on research techniques and effective use of electronic resources. The library sponsors book talks on new faculty and student publications, and hosts exhibits of interest to the Fletcher community.

Special collections donated to The Fletcher School include the Edward R. Murrow Collection; the John Moors Cabot Collection; the Philip Kingsland Crowe Collection; and the Walter Wriston Collection.

For more information visit

<http://www.library.tufts.edu/ginn/>

Hirsh Health Sciences Library, Boston Campus

The Hirsh Health Sciences Library (HHSL) is the primary library of the Tufts University Boston Campus, including the Schools of Medicine, Dental Medicine, the Sackler School of Graduate Biomedical Sciences, the Gerald J. and Dorothy R. Friedman School of Nutrition Sci-

ence and Policy, the Jean Mayer U.S.D.A. Human Nutrition Research Center on Aging at Tufts University, and Tufts- New England Medical Center.

The HHSL maintains collections in medicine, dental medicine, nutrition, veterinary medicine, and supporting collections in the basic sciences. Tufts University libraries jointly provide access to approximately 15,800 e-journals; 6,170 of these titles are in the fields of health sciences. The library's Special Collections Room includes works on the history of science and medicine, imprints prior to 1914, and historical artifacts. Relocated in 1986 to the Arthur M. Sackler Center for Health Communications and renamed the Hirsh Health Sciences Library in 2005, the library provides a broad range of print and electronic resources to support the Tufts Health Sciences Schools of the Boston Campus. The library undertook a two-phase major renovation project during 2004 and 2005 to meet the expanding technological and study needs of the schools it serves. Its 49,000-square-foot space seats 360 comfortably for individual or group studying. Classrooms, microcomputer labs and seminar rooms are equipped with current media presentation units for teaching and studying. Public computer workstations and nomadic and wireless computing capabilities are available throughout the library for studying or searching the Tufts Network and Internet.

For more information, visit

<http://www.library.edu/hsl/index.html>

<http://www.library.tufts.edu/hhsl/>.

Webster Family Library, Grafton Campus

The Webster Family Library, located in the Franklin M. Loew Veterinary Medical Education Center, contains the largest collection of clinical veterinary medicine literature and resources in New England. It includes materials on medicine and surgery for large, small, and exotic animals; animal welfare; wildlife diseases and ecology; conservation medicine; laboratory animal science; and veterinary practice management.

A state-of-the-art computer laboratory provides students and faculty with an extensive array of personal computing options and specialized user training as well as expanded access to a wide range of electronic resources. For more information, visit www.library.tufts.edu/vet/.

Digital Collections and Archives (DCA)

Encompassing the university archives and managing the Tufts digital library, the DCA supports the teaching and research mission of the university through creation and maintenance of digital library collections and the tools to access those collections. It collects, organizes, preserves, and makes available records of permanent administrative, legal, and historical value in fulfillment of its mandate as the depository of archival and historical materials. The DCA provides records management services to administrative offices in all divisions and departments of the university. For more information, visit <http://nils.lib.tufts.edu/>.

Computer Services

Within Arts and Sciences, and Engineering, computer services are offered on the Medford/Somerville campus both by University Information Technology (UIT), the university's central computing organization, and by Information Technology Services (ITS), a schools based computing organization.

UIT offers access to Trumpeter, the university e-mail system, and access the Internet, including the World Wide Web. Information Technology Services (ITS) on the Medford campus provides support for students to check the status of their accounts or deal with account management issues at the computing center at Eaton Hall during walk-in hours or by appointment. UIT also supports numerically intensive research and scientific computing by providing access to high-performance cluster computing.

Information Technology Services (ITS) maintains three computer labs on the Medford campus for both teaching and course work and for general use computing. A PC and Macintosh computer lab, located in Eaton Hall, has over 150 computers available for general-use computing and course work. In the same building is a PC instructional facility with 18 computers used for teaching. The Braker Hall computer lab is a Macintosh-only lab with 18 G4 computers available for teaching. All labs and computers have high-speed Internet connections, printing, and a wide variety of software. More information about these computer labs and the other services ITS offers can be found at <http://ase.tufts.edu/its/>. Students should also check with their departments, many of which

make their own computing facilities available for use by their students.

Teachers' Resources

Writing Across the Curriculum

Tufts students actively seek out the more than twenty writing workshop (ww) courses that are offered through the Writing-Across-the-Curriculum program each semester. Under the guidance of codirectors John Fyler (English) and Robert Cook (Psychology), Tufts faculty members opt to add an additional workshop section (fifty minutes each week) to their regular courses in order to use writing to assist students in gaining a better understanding of a subject. Writing is viewed as a tool that helps to examine, refine, clarify, and share ideas and questions. Writing workshop sections are intimate and limited to twenty students, although they are frequently smaller in enrollment. Students do not earn additional course credit, but receive recognition on their transcripts.

Workshops and stipends are provided for faculty members who wish to participate in this popular program. For more information, visit <http://ase.tufts.edu/wts/teachResources.asp>.

Writing Resources

Writing Resources aims to promote and support the teaching of writing across the university. Its mission is to work with faculty who wish to incorporate more writing into their classes. The staff offers faculty workshops on teaching with writing, designing writing assignments, and responding to student writing. Workshops on writing pedagogy are also offered for teaching assistants during the academic year and in the summer institute. Writing Resources is housed within the Academic Resource Center, and its staff includes Carmen Lowe, the Director of the ARC, and Amalia Jiva, Assistant Director of Writing Resources. For more information, visit <http://ase.tufts.edu/wts/> or contact Amalia.Jiva@tufts.edu. Faculty may meet with Carmen or Amalia one-on-one to discuss writing pedagogy.

The Writing Fellows Program unites faculty and students in an effort to enhance the quality of student writing. The Writing Fellows are highly trained undergraduate tutors who assist students with writing in designated courses. Nominated by faculty and selected through a competitive application process, Writing Fellows are assigned to par-

ticular classes related to their major fields of interest. They work closely with the same 12-15 students on drafts of papers and oral presentations throughout the semester. Professors participating in the program receive training and feedback on creating effective writing assignments, responding to student writing, and integrating other aspects of sound writing pedagogy into their courses. The program aims to foster the process of writing by making time and energy for review and revision. Its basic philosophy is that writing is a process and must be taught, learned, and practiced as such. Peer-to-peer collaboration within the writing process works across the curriculum and throughout the university to make students at Tufts better, more engaged writers. For more information, visit <http://ase.tufts.edu/wts-writingfellows>.

Critical Thinking and Ethics

Teaching students how to think critically is fundamental to our educational mission. What counts as good evidence? What is an argument? How do we make good decisions and solve problems creatively? What counts as good scientific reasoning? How do we identify genuine instances of cause and effect? How can we best teach the important skills required for analytic thought and argumentation? And how do we introduce the teaching of ethics into our courses? Susan Russinoff (Philosophy) has been highly successful in working across the curriculum with faculty who are interested in infusing their courses with critical thinking skills. Through short workshops during the academic year and more extended work sessions during the summer, existing courses are redesigned and new courses are developed that enhance students' capacity for careful thought. For more information, contact Susan.Russinoff@tufts.edu.

Technology and Teaching

Technology continuously alters what we know, just as it changes how we learn and how we express what we think we know. When used effectively, computers and other technologies can enrich the classroom experience and promote learning at all levels. Bernhard Martin (German, Russian, and Asian Languages and Literatures) is available to consult faculty members and departments wishing to incorporate new technologies for both research and teaching purposes. For more information, contact Bernhard.Martin@tufts.edu.

The instructional services division of Information Technology Services (ITS) provides support to instructors using Blackboard course ware. Blackboard is an easy-to-use course management system that allows instructors to create Web-based course sites and employ a number of synchronous collaboration tools. For more information, contact Neal.Hirsig@tufts.edu.

Center for Interdisciplinary Studies

The Center for Interdisciplinary Studies (CIS) brings together a group of programs that share a common interest in the application and integration of diverse perspectives and methodologies in order to better understand our world. Programs physically housed at the center in Eaton Hall include American Studies, Asian Studies, Peace and Justice Studies, and Women's Studies. Other programs affiliated with the center include Africa and the New World, Archaeology, Communications and Media Studies, Community Health, Environmental Studies, the Experimental College, International Relations, Latin American Studies, Latino Studies, Middle Eastern Studies, and World Civilizations.

The center is committed to building links between programs, developing new courses, training faculty to employ interdisciplinary approaches in the classroom, sponsoring speakers and conferences, and promoting interdisciplinary research. Center staff also serve as a clearinghouse for information on interdisciplinary activities on campus.

The center is located in Eaton Hall. More information is available at <http://ase.tufts.edu/cis/>.

Engineering Project Development Center

The Engineering Project Development Center (EPDC), located in Anderson Hall, is a facility at Tufts that supports the undergraduate engineering curriculum. This facility is a start-to-finish project center that enables students to take their projects from the initial idea stage to the final product and presentation stage.

In the teamwork area, students work in their project development groups brainstorming their ideas and accessing information from Tisch Library as well as over the Internet. After finalizing their design plans, they move to the computational design studio. This is where the real design work takes place, as students apply their CAD skills to

their project design on state-of-the-art PC workstations. After their design is complete, they use the prototype development shop to build a scaled model or prototype to test their design.

As the use of computers in engineering continues to increase, it is important that engineering students are able to develop intuitive, practical skills through hands-on testing and application of their ideas. After building and testing their prototypes, students use the presentation preparation studio to create computer and video presentations. Students then present their projects to other students, faculty, and industry representatives in the video conference room. For more information, visit <http://ase.tufts.edu/epdc> or call 617-627-2208.

Academic Resource Center

The Academic Resource Center, located in Dowling Hall, provides academic assistance to students who wish to study more effectively. Free peer tutoring in any subject is available during designated drop-in hours and by appointment in Dowling Hall, in the residence halls, and around campus. Students may obtain a tutor by accessing the online tutor finder on the ARC Web site.

In addition to tutoring, undergraduate tutors conduct review sessions before examinations in a large number of courses and organize study groups for interested students. They also conduct workshops on time management and exam preparation.

Writing assistance is available for undergraduate and graduate students at any stage of the writing process. Writing tutors hold tutoring appointments and drop-in hours for students seeking assistance with writing assignments, personal essays for applications, and larger projects such as senior theses and dissertations. Oral communications tutors help students improve their presentation skills.

ARC staff and Time Management Consultants are available to provide counseling for students who are having academic problems or who wish to obtain advice about course selection, exam anxiety, motivation, or time management.

For more information, visit <http://ase.tufts.edu/arc>.

Services for Students with Disabilities

Tufts University is committed to providing support for all students so that they may achieve their

academic potential. The university welcomes applications from students with disabilities and assures them that the university will provide access to all programs for which they are qualified.

Specific assistance is provided for students coping with serious illness (medical and mental health) and those with documented learning disabilities, attention deficit disorder, or impaired hearing, speech, vision, or mobility. Information about resources to assist students with disabilities and procedures for arranging reasonable accommodations can be obtained through the Program Director of Disability Services in the Academic Resource Center at Dowling Hall.

Each student's program of study is given individual attention to take personal needs into account with respect to academic and nonacademic assistance. The center will arrange academic support services such as readers, tutors, note takers, extra time on exams, and exam proctors.

Special effort is made to make possible participation in extracurricular activities and encourage personal development and independence.

Questions about Tufts policy may be addressed to the Academic Resource Center. For more information, call 617-627-2000.

Career Services

Tufts Career Services offers services and programs to help students with all facets of career development and job hunting: career counseling, job and internship listings, campus recruiting, résumé preparation, career fairs, alumni presentations, networking, interviewing, and more. Staff members are available by appointment to assist in making and reevaluating career decisions, setting realistic goals, and developing skills and strategies to realize these goals. Students are encouraged to use Career Services as early as their first year and to continue throughout their tenure at Tufts.

The Career Services Web site (<http://careers.tufts.edu>) provides continually updated information on programs and panels, career fairs, and professional development events. The site also provides links to a wealth of career planning and job search resources, internship and full-time job listings, cover letter and résumé advice, self assessment and skills inventories, the Tufts Career Network, as well as information about jobs, employers, and industries. Most recently, online tutorials have been added to allow students

to access the information they need on a 24/7 basis.

Career Services is located on the seventh floor of Dowling Hall, 419 Boston Avenue. Appointments may be scheduled in advance by calling 617-627-3299.

Tufts Health and Wellness

Tufts University Health Service (TUHS) is located at 124 Professors Row, across from the field and tennis courts on the Medford/Somerville campus. During the academic year, the hours are 8:00 a.m. to 7:00 p.m. Monday through Thursday, 8:00 a.m. to 6:00 p.m. Friday, and 10:30 a.m. to 5:00 p.m. on Saturday and holidays. TUHS is professionally staffed by physicians, nurse practitioners, and physician assistants, all of whom have worked in college health for a number of years. It has an on-site, full-service certified laboratory. Health Service provides primary care and urgent health care to the undergraduate and graduate students on the Medford/Somerville campus. Health Service works closely with local hospitals should hospitalization be required.

Prior to registration each student is required to submit to the Health Service a fully completed health questionnaire that includes a medical history, complete physical examination results, laboratory tests, and immunization history.

Tufts University policy requires that each student have medical coverage under an accident/sickness insurance plan with benefits comparable to the university's student plan. The university offers a comprehensive plan at a reasonable cost for students and, if necessary, their spouses/partners and children.

All full-time students are automatically charged for the Tufts student accident/sickness insurance plan. If students are covered under their parents' or other private insurance plan and they do not want the university's student plan, it may be waived by submitting a waiver form to the Health service prior to the waiver cutoff date. For a complete explanation of the health fee, see Expenses. For more information, visit:

<http://ase.tufts.edu/healthservice/>.

Health Education

The Alcohol and Drug Program uses an integrated, multi-pronged approach to substance use, misuse, and abuse on campus. Focus is placed on the per-

sonal and the individual as well as the environmental factors that influence alcohol and drug use in an effort to promote wellness in our community and to optimize the academic success of our students.

Program offerings include prevention education, outreach and training programs, addiction counseling, support group services, assessments by a professional clinician, treatment referral and information, support for family members and children of addicts, information on policies and procedures, and opportunities for student leadership and campus dialogue.

The Health Education Program is located at the Tufts Health Service, 124 Professors Row. For more information, call 617-627-5495.

Counseling and Mental Health Center

The Tufts University Counseling and Mental Health Service (CMHS) is located at 120 Curtis Street, and is open Monday through Friday from 9:00 a.m. to 5:00 p.m. CMHS is staffed by professionally trained counselors who have special expertise in working with college students. At CMHS, we strive to help students address their concerns and build on their strengths, in order to make the most of their college experience. Although we do provide services for students in mental-health crises, our primary goal is prevention. Thus, we make every effort to assist students before their concerns may develop into more serious problems.

At CMHS, we care about protecting students' privacy, and believe that counseling is most effective when students feel comfortable speaking openly with their counselor. Within CMHS and Health Services, we abide by current codes of professional ethics regarding confidentiality, as well as by state and federal laws protecting your Private Health Information.

Counseling services are provided to eligible students at Tufts free of charge. This includes full-time undergraduate students and graduate students who are covered by the comprehensive health fee. If students are referred for psychiatric medication, the first three visits with the prescribing clinician are free of charge. Subsequent visits can be charged to insurance, or paid for out of pocket.

Additionally, CMHS offers after-hours crisis intervention counseling in the case of potentially

dangerous or life-threatening mental health emergencies.

CMHS also provides information and applications for graduate and professional school tests, including the Miller Analogies Test.

For more information, visit <http://ase.tufts.edu/counseling/>.

Services for Undergraduate Commuters

For the incoming student who commutes, it is important to have a home base on campus. Commuters are urged to get involved in the mainstream of campus social life.

Tufts offers a number of resources to make commuter life a little easier. Founded in 1963, the Off-Hill Council is the campus organization for commuters. The council coordinates academic, athletic, and other special activities for both commuting and residential students. Hillside House, located at 32 Dearborn Road in Somerville, is the headquarters of the Off-Hill Council. Meetings are held at the house every Monday at 11:30 a.m. The fifteen-room house has facilities for studying, cooking, recreation, and occasional overnight stays. It serves as a gathering place for commuters throughout the day and night. It is probably the best location for keeping notebooks and belongings between classes or for studying with a friend. Hillside House is always open for undergraduates who commute from home. The university employs two comanagers who reside in the house whenever school is in session. They are responsible for making arrangements for commuting students to stay overnight. Students commuting from home may stay overnight as often as they wish, provided space is available.

For more information, contact the coordinator in Dowling Hall at 617-627-3158.

Campus Life

The Office for Campus Life at Tufts University seeks to build community and inspire the growth of the whole student by being a catalyst in the lives of students through a support system of guidance, compassion, service, and leadership. The Office of Campus Life, located in the Mayer Campus Center, fosters the growth and development of students in the areas of leadership and programming, and assists students in planning and

coordinating a broad range of social, cultural, and educational programs.

Students looking for opportunities to become involved on campus with affiliated student organizations should visit <http://ase.tufts.edu/osa/>. Students also have the opportunity to join student organizations by attending the Student Activity Fair—held the first Monday after classes begin, both fall and spring semesters.

More information about the Office of or events on campus is available at the Information Booth, 617-627-3145; the Office of Campus Life 617-627-3212; and online at <http://ase.tufts.edu/osa/>.

International Center

The International Center provides immigration advising and visa documentation for approximately 1,000 students, faculty, and research scholars representing more than 100 countries on all campuses. Additionally, the office provides counseling and advising services to undergraduate and graduate students as needed. A small emergency loan fund exists to assist students in financial need.

The International Center issues visa documents to nonimmigrant students, faculty, and research scholars. Tufts is legally required to report to the U.S. Citizenship and Immigration Services (USCIS) when students or faculty/research scholars fall out of compliance with the USCIS regulations. For detailed information on the Student and Exchange Visitor Information System (SEVIS), refer to the Web site, www.tufts.edu/programs/sevis.

The International Center coordinates a number of activities throughout the year, including an undergraduate preorientation program for new international students and for a number of American first-year students. This program is run by undergraduate volunteer host advisers who are both international and American. The center, in conjunction with the International Club, organizes an annual weeklong intercultural festival in the spring semester. The center serves as adviser to the International House (a special interest house) and the International Club.

The center also provides programs for graduate international students. The Intercultural Conversation Program is available for graduate students

who wish to meet with a partner on a regular basis to practice spoken English and to develop a friendship.

The center is located at 20 Sawyer Avenue. For more information, visit <http://ase.tufts.edu/icenter>, call 617-627-3458, or fax 617-627-6076.

Africana Center

Founded in 1969, the Africana Center works to augment the academic mission of the university and to ensure that all students of African descent have access to a variety of academic, cultural, and student resources available on campus. The center works with students, faculty, and staff across ethnicities, nationalities (American Caribbean, South American, etc.), gender, and sexual orientation to celebrate, recognize, and honor the vast contributions of people of African descent to Tufts and the community at large.

The center sponsors a variety of programs, including an annual Cape Cod Orientation Retreat and a Peer Academic Leader program. Throughout the year, the center coordinates events and activities that are open to all members of the university community. These events reflect and celebrate the scholarly and creative endeavors of people of African descent.

The center serves as a resource for student organizations including the Pan African Alliance (PAA), the Caribbean Club, the African Student Organization (ASO), undergraduate student mentoring programs, the Black Women's Group, the Black Men's Group, Black Pre-Law Society, Black Theatre Company, the National Society for Black Engineers (NSBE), *Oryx* literary magazine, the Black Graduate Student Association, and the residential unit, Capen House. In addition, the center works with the coordinators of the Tufts-in-Ghana program, the Historically Black College and University Exchange Program, and the Black Alumni Association.

All students are invited to visit the Africana Center (8 Professors Row). There is a library with resource materials and a computer lab for student use.

For additional information or to be added to the listserv, contact the Africana Center by phone 617-627-3372, fax 617-627-3382, e-mail af-am@tufts.edu, or visit <http://ase.tufts.edu/africana>.

Asian American Center

The Asian American Center, founded in 1983, is a resource for the university and the Asian/Asian American communities and fosters a supportive environment for the academic and personal development of students by offering programs and services. The center recognizes the distinct East Asian, Southeast Asian, and South Asian cultures and identities present in the Tufts community, and advocates for students to ensure a successful college experience.

The center coordinates educational and cultural programs focusing on Asians in the United States and the diaspora. The center collaborates with other centers, academic departments, and student organizations to provide programming to Asians and Asian Americans. Ongoing programs include the Georges Island orientation outing, Peer Leader Program, Discover Boston (a community learning activity), alumni networking reception, and Asian American month, recognized nationally during May but celebrated at Tufts in November.

The center has computers for student use and information on campus events, community programs, and academic and work opportunities. All students have access to books, periodicals, and newspapers pertaining to the Asian/Asian American experience and current events. The center offers a meeting space and many opportunities for intercultural learning among students of different Asian ethnicities.

The director provides academic and personal advising on course selection, majors and careers, transition to college, and identity formation and development, and works with other programs and offices to ensure that Asian/Asian American student needs are being met.

The center staff works with student groups through the Pan-Asian Council, a collaborative of representatives from the Asian student organizations including the Asian Community at Tufts, Chinese Students Association, Filipino Cultural Society, Hawaii Club, Hong Kong Students Association, Japanese Culture Club, Korean Students Association, Taiwanese Association of Students at Tufts, Thai Club, Tufts Association of South Asians, Vietnamese Students Club, and Asian Christian Fellowship. The director also serves as adviser to the Asian American House (Start House), a residential unit.

The center is located in Start House, 17 Latin Way. For more information, visit <http://ase.tufts.edu/asianam/>, call 617-627-3056, or e-mail asianamcenter@tufts.edu.

Latino Center

The Latino Center, founded in 1993, provides resources for the Latino student population at Tufts. The center's primary mission is to create a supportive environment for students by offering programs and services that build a strong Latino community on campus.

In collaboration with the Association of Latin American Students (ALAS), the center coordinates Latino Heritage Month in October. Programs throughout the year include the Latino Peer Leader Program and Retreat for first-year students, Latina Women's Group, Mujeres and the Latino Men's Group.

The center offers a friendly space for studying, group meetings, or informal conversation. Resources include a computer lab; a library of books, periodicals, and videos reflecting Latino culture and experience; and a bulletin board of job listings. A newsletter, *Noticias*, is published by the center. The director offers academic, career, and personal advising focusing on a wide variety of topics such as course selection, cultural identity issues, discrimination, family concerns, culture shock, and successful adaptation to the university environment. The director is the adviser to ALAS and to La Casa, the residential house on campus.

The Latino Center is located at 226 College Avenue. For more information, visit <http://ase.tufts.edu/latinocenter> or call 617-627-3363.

Lesbian, Gay, Bisexual, Transgender Center

Staffed by students and a full-time director, the Lesbian, Gay, Bisexual, Transgender (LGBT) Center offers a safe, supportive environment for LGBT and questioning students as well as straight allies. The center provides programming, advising, and educational resources on issues of sexual and gender identity, and aims to improve the experience of gay, lesbian, bisexual, and transgender students at Tufts, as well as to provide campus-wide education about sexuality, gender, and the effects of homophobia.

The center organizes numerous events throughout the year, including the annual

statewide Safe Colleges Conference, an LGBT-focused conference for college students. The center also runs a number of support and discussion groups and offers referrals to various resources in the Boston area. Students, faculty, and staff can make individual appointments to speak with the director, and both the director and student members of Team Q are available to speak to classes and other groups about sexual orientation and gender.

Resources include computers for student use, a book and video library, a video lounge, meeting room, and quiet study space. The center works closely with the group for undergraduates, Tufts Transgender Lesbian Gay and Bisexual Collective (TTLGBC), and the Rainbow House, a special-interest house for LGBT and ally students, as well as the LGBT Faculty/Staff Caucus, and Pride on the Hill, the alumni group.

The center is located at 226 College Avenue on the second and third floors. For more information, call 617-627-3770 or visit <http://ase.tufts.edu/lgbt>.

Women's Center

The Women's Center, founded as a student organization in 1973, addresses matters of specific concern to women in order to create an atmosphere that is safe, supportive, and intellectually rich for both men and women. The center provides programming, counseling, information, and resources on these issues from a variety of perspectives that take into account differences of race, ethnicity, religion, sexual orientation, and socioeconomic class.

The Women's Center Student Board, a student advisory committee, coordinates events for the community. The peer education program provides information and workshops on sexuality, body image, careers, and other contemporary concerns. The Campus Violence Prevention Project is a federally funded program of the center focusing on educating students about sexual assault, rape, relationship violence, and stalking.

The director is available for counseling or discussions with students, faculty, and staff on topics including discrimination, harassment, rape, abuse in relationships, and concerns about eating or body image.

The center houses a resource room, lounge area, and staff offices. The resource room, staffed by students, has information on events, internships,

community organizations, and current issues including health, politics, racism, and sexuality. The lounge is open to all students on a drop-in basis every day.

The center is located at 55 Talbot Avenue. For more information, visit <http://ase.tufts.edu/womenscenter>, or call 617-627-3184.

Religious Centers

The Chaplaincy—A Center for All Faiths

The Chaplaincy -- A Center for All Faiths
The university chaplain is housed in Goddard Chapel which stands near the heart of the university campus. Acknowledging the religious diversity of campus life, the chaplaincy is open to people of all faiths for study, fellowship, counseling, and services. The chaplaincy serves as an umbrella for the activities of campus religious organizations, promoting dialogue and understanding between people of different faiths. To this end, it sponsors interfaith programs of a religious, cultural, and ethical nature.

In addition to the university chaplain, four chaplains appointed by their faith communities -- the Roman Catholic Archdiocese of Boston, the United Church of Christ, the B'nai B'rith Hillel Foundation, and the Islamic Society of Boston--and approved by the university serve the campus and work closely together in their campus ministries. The university chaplain, Reverend David O'Leary, has an office in Goddard Chapel. The Roman Catholic chaplain, Ms. Ann Penick, the Protestant chaplain, Rev. Barbara Asinger, and the Muslim chaplain, Imam Nouredine Hawat all have offices in the Tufts Interfaith Center, 58 Winthrop St., Medford. Catholic mass is celebrated on Sundays in Goddard Chapel. Rev. Asinger conducts Sunday Protestant services in Goddard Chapel and Imam Hawat leads Friday prayer services in the Tufts Interfaith Center. The Jewish chaplain, Rabbi Jeffrey Summit, who serves as the director for Hillel on campus, has an office in the Granoff Family Hillel Center on Capen St. and Jewish services are held there. Other denominational groups and religious organizations also contribute to religious life on campus.

For more information, visit <http://www.tufts.edu/chaplaincy> or call 617-627-3427.

The Catholic Community at Tufts

The Catholic Community at Tufts is located in the Tufts Interfaith Center, 58 Winthrop St., one block down from Carmichael Hall in Medford.

There is a wide range of programs and events: Welcome BBQ in the fall, fall and spring retreats, monthly dinners, faith formation, RCIA, Confirmation, eucharistic minister and lector training, service outreach opportunities, liturgical dance, Lenten Simple Suppers, Easter Brunch, and the annual end-of-the-year BBQ. Ann Penick is the Catholic chaplain. During the academic year mass is celebrated at Goddard Chapel at 10:00 p.m., and there is a weekly mass schedule during Lent.

For more info, call 617-571-5269 or e-mail at ann.penick@tufts.edu.
The Protestant Ministry
The Protestant Ministry offices are located in the Tufts Interfaith Center, 58 Winthrop St. Pastoral counseling and activities are provided by the Protestant Chaplain. During the academic year, a student-involved, general Protestant worship service is held in Goddard Chapel on Sundays at 7:30 p.m. with a fellowship time preceding worship. The Protestant Ministry relates to the Protestant Student Fellowship, the Asian Christian Fellowship, the Capen Fellowship, the Tufts Christian Fellowship, and TU3 (Tufts University Unitarian Universalists).

For more info, e-mail barbara.asinger@tufts.edu.

Tufts Hillel

The Granoff Family Hillel Center is located on the main quad, next to Miller Hall. Striving to create a sense of Jewish community, Hillel involves undergraduate and graduate students, faculty, staff, and administrators, and works closely with other Jewish campus organizations, including Tufts Friends of Israel and the Bayit (Jewish Culture House). In addition to serving the needs of the Jewish community on campus, Hillel is a resource for information about Judaism. Student leadership works closely with the professional staff to conduct a variety of activities, including religious observances, cultural celebrations, study groups, and lectures. Jewish religious services of all levels of observance are provided every Shabbat and on holidays, and Kosher Shabbat dinners are held every week. Most programs are initiated by the standing committees: education, religious, social/cultural, advertising,

social action, international Jewry, outreach, and holidays and festivals. Board meetings are held on Mondays, and everyone is welcome and encouraged to get involved. Rabbi Jeffrey Summit, Hillel director and chaplain, is available to students, staff, and faculty for counseling or informal conversation.

For more information, visit www.tuftshillel.org or call 617-627-3242.

Tufts Islamic Community

The Islamic Community at Tufts is located in the Tufts Interfaith Center, 58 Winthrop St. and provides an opportunity for Muslim students to gather for worship, social activities, and education. There are weekly prayer services at 1:30 p.m. on Fridays during the academic year. Imam Nouredine Hawat is available to the community.

For more info, visit

<http://www.ase.tufts.edu/msat> or contact the Imam at nouredine.hawat@tufts.edu.

Tufts University Art Gallery

The mission of the Tufts University Art Gallery is to animate the intellectual life of the greater university community through exhibitions and programs that explore new, global perspectives on art and art discourse. The gallery is dedicated to conceiving and presenting art exhibitions and educational programs that support the academic and civic ideals of Tufts University. These ideals include excellence, intellectual and social engagement, and the balance of scholarship and teaching (including fostering mentoring relationships). The university and the gallery value a worldview that encompasses both local and global perspectives.

The gallery fosters cultural exchange by creating a forum for art produced by emerging and midcareer artists, by featuring new work of established artists, and by exposing fresh interpretations and scholarship on art.

The gallery's major constituencies include current students, faculty, and staff on the Tufts Medford/Somerville campus; the School of the Museum of Fine Arts, and the other Tufts schools; the greater university community of alumni, parents, donors, friends, and neighbors; the regional and New England arts community; and arts professionals (including exhibiting artists).

Each year the gallery also mounts thesis exhibitions by candidates for the master of fine arts degree in studio art, offered by Tufts in affiliation

with the School of the Museum of Fine Arts in Boston. The gallery also serves as a venue for an exhibition organized by students in the exhibition planning class of the Museum Studies Program.

The Tufts University Art Gallery's exhibition-space consists of the Tisch and Koppelman Galleries; the Remis Sculpture Court; the New Media Wall for short works in video, animation, and film; and the Slater Concourse Gallery (a Tufts community gallery). More information is available at <http://ase.tufts.edu/gallery>.

Balch Arena Theater

Every year the Balch Arena Theater presents three major productions in which students are encouraged to participate. Opportunities are provided for involvement in acting, directing, design, stage management, and arts administration.

Up to ten undergraduate-directed productions are mounted annually. The summer season offers students a chance to work in Magic Circle Theater for children ages eleven to fifteen, and in Creative Arts for children ages seven to ten. The Balch Arena Theater is the home of many of the university's drama groups, including Pen, Paint, and Pretzels, the drama honor society.

The theater also hosts dance performances, lectures/demonstrations, and other special events. The theater's box office, costume shop, and scene shop employ students to support the many theater-related activities throughout the year.

Foreign Language and Culture Media Center

Located in the F. W. Olin Center for Language and Culture Studies, the Foreign Language and Culture Media Center supports and supplements foreign language instruction in a multimedia setting. Students using audio and videotapes may work in basic to advanced levels of language instruction, study interview and culture tapes, or listen to and view taped classics of foreign literature and music. Using the center's video cameras, students may produce plays or performances for use in class, or they may produce the center is the teleconference reception site for the Medford/Somerville campus. Since the mid-1960s, the center has maintained Tufts Audio Archives, a collection of formal lectures, symposia, readings, and informal presentations.

For more information, visit <http://ase.tufts.edu/lmc> or call 617-627-3036.

Athletic Facilities

The athletic program at Tufts provides students with numerous opportunities to compete in intercollegiate, intramural, and club sports, and to engage in general recreation. The intercollegiate athletics program at Tufts features thirty-one Varsity sports, most of which compete as members of the NCAA Division III, ECAC, and NESCAC. Ten Club Sports offer competitive sport that is student run and open to all who are interested. The athletic program also offers a wide selection of intramural sports that are designed to be more recreational in nature as well as a wide variety of health and fitness related activities.

The Gantcher Family Sports and Convocation Center offers a 200-meter track and four indoor tennis courts, the Ames Human Performance Center features the Lunder Fitness Center. Cousens, Chase, and Jackson Gymnasiums, Carzo Cage, Hamilton Pool, and several fields are also available for recreation except when varsity teams are practicing or hosting events. Permission and reservations may be required for some facilities. Schedules of the various recreational facilities are published in a brochure available from the athletic program office in Cousens Gymnasium. For more information, visit <http://ase.tufts.edu/athletics> or call 617-627-5005.

Osher Lifelong Learning Institute

Tufts University Osher Lifelong Learning Institute (Osher LLI) is a community of diverse and stimulating people who connect with each other to learn, socialize and form new friendships. We depend on the energy, enthusiasm, dedication, concern for quality and the thoughtfulness and vitality for each member to build a solid, dynamic learning environment to which everyone contributes and from which all gain a sense of accomplishment.

Peer led study groups take place four times annually on the Medford campus and at Brookhaven in Lexington campus are the educational foundation of Osher LLI and active learning is its central principle. Osher LLI is committed to the concept that “third agers” learn best when they are actively involved in their own learning process ~ peer learning ~ a form of learn-

ing in which students are engaged in teaching each other.

The program exemplifies Tufts University’s commitment to community service and lifelong learning. We seek to engage the minds, elevate the spirits, and foster the well-being of our members through a wide range of educational programs and opportunities for volunteer service and social activity.

Departments, Programs, and Research Centers

In the following section you will find descriptions of departments and programs, with their degree requirements and lists of their faculty. Descriptions of courses can be found online at <http://studentservices.tufts.edu/registration.htm>.

Detailed course descriptions can also be found in handbooks issued by individual departments and programs. These handbooks often describe courses not listed in the online bulletin.

A supplement, available prior to registration each semester at Student Services, lists the courses that are offered the following semester, including their credit value and the times they are offered. Up-to-date information about which courses are offered in a given semester is available online at <http://webcenter.studentservices.tufts.edu/courses/main.asp>.

Courses numbered 1 through 99 are for undergraduate credit only; those numbered 100 through 199 are for both undergraduate and graduate credit; those numbered 200 through 299 are intended primarily for graduate credit, although undergraduates may take these courses for credit with permission of instructor and/or department.

Africa in the New World

DIRECTOR:

Associate Professor Daniel W. Brown, *Department of German, Russian & Asian Languages and Literature*

Faculty Coordinator:

Associate Professor Ikumi Kaminishi, *Art and Art History*

The Africa in the New World (ANW) interdisciplinary minor encourages students to explore Africa, the African diaspora in the Americas, and global Africa through a range of perspectives. Particular emphasis is given to three intellectual currents: diaspora studies, identity construction, and globalization. ANW sponsors an annual Africa-Diaspora lecture series to showcase these themes.

REQUIREMENTS

To fulfill the ANW minor, students must choose five courses from at least three departments or programs of the university, bringing to bear the knowledge and perspectives of various disciplines on a single subject. In addition to the five courses, a student is required to complete an appropriate project, such as a thesis, an oral presentation, or a performance, which integrates the knowledge and methodologies of the disciplines involved and must include a written analysis. The integrative project will be given one-half or one course credit under CIS 90-91 designations and will receive a letter grade.

Students interested in a major concentration may propose an ANW Plan of Study in African studies, African-American studies, or African diaspora studies.

Note: Courses cannot count for both the ANW interdisciplinary minor and the African/African American culture option.

For more detailed information, please visit the Web site <http://ase.tufts.edu/anw/>.

American Studies

DIRECTOR:

Associate Professor Deborah Pacini Hernandez, *American Studies/Anthropology*

FACULTY:

Professor Frances Sze-Ling Chew, *Biology/American Studies*

Professor Carol Flynn, *English*

Professor Jonathan Kenny, *Chemistry*

Associate Professor Eric Rosenberg, *Art and Art History*

Associate Professor Christina Sharpe, *English*

Associate Professor Alice Trexler, *Drama and Dance*

Assistant Professor Sabina Vaught, *Education*

Assistant Professor Adriana Zavala, *Art and Art History*

Senior Lecturer Edith Balbach, *Community Health*

Senior Lecturer Jeanne Dillon, *American Studies*

Senior Lecturer Jean Wu, *American Studies*

Lecturer Jennifer Burtner, *Anthropology*

Lecturer Steven D. Cohen, *Education*

Lecturer Lisa Coleman, *American Studies*

Lecturer John F. Hodgman, *American*

Studies/Entrepreneurial Leadership

Lecturer Ronna Johnson, *English/American Studies*

Lecturer Joan Lester, *American Studies*

Lecturer Carmen Lowe, *American Studies*
Lecturer Nancy Wilson, *Jonathan M. Tisch College of
Citizenship and Public Service*

American Studies is a quintessentially interdisciplinary endeavor that seeks to cut across disciplinary boundaries in its analysis of U.S. society and culture. It examines the historical, social and cultural underpinnings of what is commonly referred to as the "American experience." The intellectual signature of Tufts' American Studies Program is its emphasis on how the intersecting dynamics of race, ethnicity, class, and gender produce dissimilar "American" experiences for individuals and groups, and how political, economic and social systems shape crucial public domains such as education, health, work and the environment. We are also interested in critical studies of representation in the performing arts, the visual arts, humanities and popular culture. American Studies has also been increasingly concerned with the ways that other countries perceive and interpret the United States, and conversely, how people in the United States perceive and represent their neighbors inside and outside of the Western hemisphere.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

To graduate with a bachelor of arts degree in American Studies, a student must complete ten courses: one Foundation course AMER10-20; one Integrative Seminar AMER 181-190; one History course with at least two-thirds of course content focused on some aspect of the U.S.; five credits that form a thematic interdisciplinary cluster, including at least two courses at the 100+ level. The last two courses are American Studies 198 Senior Special Project, taken in either the fall or spring semester of the senior year, plus one elective course (content to coordinate with coursework of interdisciplinary cluster); OR American Studies 199 Senior Honors Thesis, taken in both semesters of the senior year. The Senior Special Project or Honors Thesis must integrate or expand some aspect of the interdisciplinary cluster's theme.

Interdisciplinary clusters: The major themes of the American Studies Program can be explored in depth through interdisciplinary clusters. Students select five courses from departments

throughout the university which will relate to a cluster's theme. (Students may also design their own cluster by writing a proposal describing the theme, intellectual rationale and course content for the proposed cluster.) The capstone SSP or HT must expand on some aspect of the cluster.

The director and other faculty advisers work closely with students in tailoring individual programs reflecting particular interests and providing a framework for the continued integration of knowledge at more advanced levels. The American Studies program office is located at 110 Eaton Hall. For more information, call 617-627-2311, visit <http://ase.tufts.edu/amstud>, or e-mail the program coordinator, Sheila.Driscoll@tufts.edu.

Anthropology

Professor David M. Guss, *Chair; Aesthetic anthropology, theory, cultural performance, myth and ritual, folklore, popular culture, urban anthropology, placemaking; Latin America*

Associate Professor Stephen M. Bailey, *Biological and nutritional anthropology; the Americas, Southeast Asia, China*

Associate Professor Deborah Pacini Hernandez, *Sociocultural anthropology, popular music and culture, comparative Latino studies; Spanish Caribbean*

Associate Professor Rosalind H. Shaw, *Sociocultural anthropology, ritual and religion, gender; West Africa, South Asia*

Assistant Professor Amahl Bishara, *Media, human rights, the state, journalism, democracy, the politics of place, knowledge production: the Middle East*

Assistant Professor Sarah Pinto, *Medical anthropology, gender, reproduction, health care, body, caste; India*

Lecturer Lauren A. Sullivan, *Prehistoric archaeology, origins of complex societies; Mesoamerica*

Anthropology provides an understanding of the forms and causes of worldwide human diversity. This diversity, both cultural and biological, is seen in the widest comparative and evolutionary framework. Customarily, the field is divided into cultural anthropology (a social science) and physical anthropology (a natural science). Cultural anthropology in turn is separated into ethnology, archaeology, and linguistics. The anthropology major enables students to view contemporary social and biological problems from an anthropological

perspective as part of a liberal education. It also prepares students to pursue graduate studies in anthropology or related fields.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Anthropology

Ten courses, including: One Gateway (introductory level) sociocultural anthropology course (Anthropology 10-39), One Gateway biological anthropology or archaeology course (Anthropology 40-59), Anthropology 130, Seven additional anthropology courses, at least one of which must be an area-focused course numbered below 160, and two of which must be upper-level seminars (Anthropology 160-189).

Please note: We strongly recommend taking the theory course (Anthropology 130) in the junior year. A maximum of two courses cross-listed in other Tufts departments may be counted toward the Anthropology major. The department encourages majors to explore the possibility of undertaking a senior thesis.

For more detailed information, please visit the Web site <http://ase.tufts.edu/anthropology>.

Applied Physics

(FOR DEGREE REQUIREMENTS, SEE PHYSICS.)

Arabic

(SEE GERMAN, RUSSIAN, AND ASIAN LANGUAGES AND LITERATURES.)

Archaeology

DIRECTOR:

Professor R. Bruce Hitchner, *Classics*

PROGRAM COMMITTEE:

Professor David M. Guss, *Anthropology*

Professor Jack Ridge, *Geology*

Associate Professor Stephen M. Bailey, *Anthropology*

Associate Professor David M. Gute, *Civil and Environmental Engineering*

Associate Professor Steven Hirsch, *Classics*

Assistant Professor Emma Blake, *Greek archaeology*

Lecturer Peter Der Manuelian, *Classics*

Lecturer Lauren A. Sullivan, *Prehistoric archaeology, origins of complex societies; Mesoamerica*

Lecturer Anthony Tuck, *Classics*

Our understanding of the majority of the human past, for which the written record is nonexistent or minimal, is based on a material record. Archaeology examines this record of human activity to recover and interpret information about past societies and cultures. There are many subdisciplines within archaeology, reflecting both the specific periods and regions into which we divide the human past, and the different approaches to the recovery and analysis of the evidence about that past.

Tufts offers a general interdisciplinary undergraduate major in archaeology, incorporating courses from the arts, humanities, natural sciences, and social sciences. Ideally, a student in archaeology will combine course work with firsthand experience in recovery, conservation, and interpretation of material remains.

The archaeology program has affiliations with several summer field schools, including the Murlo excavation in Italy, the Talloires/Mt. Musièges excavation in France, the Old Sturbridge Village Field School, and with the Center for Materials Research in Archaeology and Ethnology based at M.I.T., an alliance of Boston-area programs that offers specialized course work in the scientific dimensions of archaeological study. Students are encouraged to take appropriate course work at the universities affiliated in the Boston Consortium (Boston College, Boston University, Brandeis University).

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The undergraduate major consists of eleven courses, including a core of four required courses plus a selection of seven elective courses distributed among three broad subject areas. Students are advised to complement their archaeology major with a second major or a minor in a related field. Archaeology majors are strongly encouraged to pursue some independent research project or field research component in archaeology either as part of a senior thesis or summer scholar's project. This can include, among other things, participation in excavations, museum work, archaeological preservation, etc.

Eleven to Thirteen courses distributed as follows:

I. Four courses in core curriculum

1. **Anthropology 39**
2. **Archaeology 30** (cross-listed as **ANTH 50**; formerly **ANTH 30**)
3. **Archaeology 27** (cross-listed as **CLS 27** and **FAH 19**)
4. **Geology 2**

II. Seven Courses from History, Natural/Social Sciences and Archaeology

(Only courses which have direct content, theoretical, or technical relevance to archaeology are included here. However, other courses in History, the Natural Sciences, and Archaeology may be considered for inclusion if approved by a faculty adviser in the archaeology program. Transfer courses from other institutions limited to two unless approved by advisor.)

A. Two History courses taken from Cls 26, 37, 38, 85, 86, 185, 186; Hist 6, 15, 16, 17, 43, 65, 70, 75, 82, 102, 109-01, 119-12, & 170.

B. Two Natural/Social Science courses taken from Anth 40, 49 (formerly 20), 126, 132, 150, 182; Biology 7 or 10 (student may not count both Bio 7 and Bio 10), 143, 144; Chem 2, 8; Geo 32

C. Three Archaeology courses taken from Arch 26, 49, 51, 52, 91, 92, 160, 163, 164, 167, 168, 187, 188, 190, 191, 192; Classics 26, 87, 88, 160, 163, 164, 167, 168, 187, 188; FAH 103, 104, 105, 106

III. Interdisciplinary Capstone (optional)—Archaeology 193 and 194 or other approved courses

GRADUATE PROGRAM

Master of Arts in Classical Archaeology

(SEE CLASSICS FOR PROGRAM DESCRIPTION.)

For more detailed information, please visit the Web site <http://ase.tufts.edu/archaeology>.

Architectural Studies

DIRECTOR:

Associate Professor Daniel M. Abramson, *Art and Art History*

ADVISORY COMMITTEE:

Robyn Gittleman, *Director, Experimental College*

Professor Rachel Bratt, *Urban and Environmental Policy and Planning*

Professor Masoud Sanayei, *Civil and Environmental Engineering*

Tufts offers several curricular paths for students interested in the study of architecture and the built environment. The various curricular paths in architectural studies provide opportunities to study architecture as a liberal arts or engineering major or minor and, if desired, help prepare for future graduate study and careers in architecture and other allied disciplines, such as landscape architecture, urban planning, and historic preservation. All the curricular paths emphasize architecture's interdisciplinary character and take full advantage of course offerings in both the College of Liberal Arts and the School of Engineering.

In addition to the courses of study outlined below, students interested in pursuing graduate studies in architecture should take one or two semesters of calculus (Mathematics 11-12) and physics (Physics 11-12), and are encouraged to take Drama 10 for public speaking.

For more information, contact Professor Daniel Abramson (Art and Art History) or Professor Masoud Sanayei (Civil and Environmental Engineering).

COLLEGE OF LIBERAL ARTS

Major in Architectural Studies

The Department of Art and Art History offers an interdisciplinary major in architectural studies for students in the College of Liberal Arts who are interested in the study of architecture's history, theory, and social practice. Architectural Studies consists of nearly one hundred courses in over a dozen departments. The major's core curriculum provides a foundation in art and architectural history and theory, in engineering and design, and in the humanistic and social science aspects of architecture. Architectural studies majors then design their own elective program of upper-level study from designated courses in architectural history, studio art, civil engineering, the humanities, and the social sciences. Several opportunities exist for study abroad. In spring of the senior year, all majors complete an integrative project, either as individual or honors study or through an internship. The architectural studies major totals twelve courses: seven core classes and five multidisciplinary electives. Completion of an intensive summer architectural design course from an accredited architecture school (e.g. Career Discovery at Harvard's Design School) exempts majors from the FAM 22 requirement.

Required Core Curriculum**Art History 1** Art, Ritual, and Culture**Art History 8** Introduction to Architecture, 1400 to the present**Art History 98** Architectural Studies Senior Project Seminar

Upper-level architectural history class (FAH 103-106, 125-127, 134, 195, 196, 290; CE 94)

Engineering 2 (or an EN-CE course, Area D below)

FAM 22 Architectural Design Humanities/social sciences core course (Area C below)

Multidisciplinary Electives

Five courses chosen from at least three of the following four disciplinary areas.

A. Architectural and Art History

B. Studio Art

C. Humanities and Social Sciences

D. Civil Engineering

A. ARCHITECTURAL AND ART HISTORY**Art History 2** Art, Politics, and Culture**Art History 15/115** Japanese Architecture**Art History 18** Archaeology of Palestine**Art History 19** Classical Archaeology**Art History 21** Early Islamic Art**Art History 23** Art and Politics of the Middle Ages**Art History 25/125** Medieval Architecture**Art History 34/134** Renaissance Venice**Art History 90/190** British Architecture**Art History 95/195** Boston: Architecture & Urbanism**Art History 103** Aegean Archaeology**Art History 104** Greek Art and Archaeology**Art History 105** Tyrrhenian Archaeology**Art History 106** Roman Art and Archaeology**Art History 120** Armenian Art, Architecture, and Politics**Art History 126** Monasteries and the Arts**Art History 127** Cathedrals and the Arts**Art History 192A** Armenian Architecture and Sculpture**Art History 196** Museum Architecture**Art History 290** Seminar in Architectural History and Theory

Civil and Environmental Engineering 94 Structural Art and Modern Architecture

Drama 119 History of Style and Décor**B. STUDIO ART****FAM 15** Computer Art**FAM 20** Design: Foundation**FAM 21** Design: Intermediate to Advanced**FAM 22** Architectural Design**FAM 23** Intermediate to Advanced Architectural Design**FAM 26** Beginning through Intermediate Drawing**FAMB 32** 3-D Computer Animation**FAM 39** Graphic Design**FAM 63** Perspective Drawing**FAM 77** Sculpture**FAM 93** Watercolor**FAMB 32** Computer Animation**Drama 19** Principles of Theatrical Design**Drama 21** 3-D Computer-Assisted Design**Drama 29** Scene Painting**Drama 93-02** Architectural Styles and Designs**Drama 125** Scene Design**C. HUMANITIES AND SOCIAL SCIENCES**(Courses with asterisk count toward core requirement.)**Anthropology 30** Prehistoric Archaeology**Anthropology 128** Mesoamerican Archaeology**Anthropology 162** Anthropological Approaches to Art and Aesthetics**Anthropology 183** Urban Borderlands***Child Development 174** Designing Educational and Therapeutic Environments**Economics 30** Environmental Economics and Policy**Economics 124** State and Local Public Finance***Economics 127** Urban Economics***English 92D** Architecture and the Imagination***English 116** Mapping London**History 193** Cities and Modernity of South Asia**History 290** Material Culture**Philosophy 52** Aesthetics**Political Science 75** Politics in the City***Political Science 195** Politics of Sustainable Communities**Psychology 27** Perception**Psychology 28** Cognitive Psychology**Psychology 53** Engineering Psychology**Psychology 130** Advanced Engineering Psychology***Sociology 113** Urban Sociology***Sociology 149/UEP 181** Homelessness in America**UEP 200** Land Use Planning**UEP 201** Land Use Planning II***UEP 205** Urban and Environmental Planning and Design**UEP 209** Urban Economic and Social Policy***UEP 213** Housing Policy

***UEP 261** Community Development, Planning, and Politics

UEP 271 Community Economic Development

***UEP 272** Real Estate Development and Finance

UEP 284 Developing Sustainable Communities

***UEP 294** Physical Planning & Design

D. ENGINEERING

Civil and Environmental Engineering 2 Civil Engineering Materials

Civil and Environmental Engineering 22 Structural Analysis **Civil and Environmental Engineering 24** Steel Design

Civil and Environmental Engineering 25 Reinforced Concrete Design

Civil and Environmental Engineering 42 Geotechnical Engineering

Civil and Environmental Engineering 53 Engineering Economy

Civil and Environmental Engineering 185 Legal Issues of Engineering

Civil and Environmental Engineering 188 Engineering Design with CAD

Engineering 1 Introduction to Computers in Engineering (half credit)

Engineering 2 Engineering Graphics (half credit)

Engineering 5-CE Skyscrapers (half credit)

Engineering 23-CE Infrastructure Engineering (half credit)

Engineering 24-CE Earthquake Engineering (half credit)

Engineering 39-CE Bridge Design (half-credit)

Engineering Psychology 61 Human Factors and Ergonomics

Engineering Psychology 161 Human Factors in Product Design

Engineering Science 5 Applied Mechanics (Statics)

Engineering Science 9 Applied Mechanics (Strength of Materials)

Engineering Science 25 Environment and Technology

Engineering Science 27 Environmental Health and

Safety Engineering Science 52 Engineering Management

Engineering Science 88 CAD for Engineers

SCHOOL OF ENGINEERING

BSE Degree Program in Architectural Studies

A bachelor of science in engineering with a program in architectural studies is available for students

interested in a professional career in architecture or in the historical, aesthetic, and engineering aspects of buildings and other structures. This program, offered jointly by the Department of Civil and Environmental Engineering and the Department of Art and Art History, provides a solid foundation in both the technical aspects of structural systems and the aesthetic and functional characteristics of buildings from an architectural and art history point of view. The flexibility of the BSE degree allows greater concentrations in both art history and studio courses than would otherwise be possible, while providing a coherent basis for graduate work in architecture or design. The faculty adviser for this program is Professor Masoud Sanayei.

Degree Requirements

A minimum of thirty-eight courses is required, to be distributed in the following categories:

- 1) Eleven introductory courses as required for the professional degrees in engineering (see School of Engineering Information);
- 2) Engineering science: Engineering Science 5, 9, 88, and an engineering science elective;
- 3) Civil engineering: Civil and Environmental Engineering 2, 22, 42; plus three from Civil and Environmental Engineering 24, 25, 81, 123, 124, 125, 146, 149, and 188;
- 4) Architectural studies: Art History 1, 8, 98, 198; two studio courses, including architectural design (FAM 22) and either FAM 20, 26, or 63; one elective (selected from disciplinary areas A, B, C above);
- 5) Humanities and social sciences: five courses;
- 6) Free electives: five courses.

UNDERGRADUATE MINOR PROGRAMS

Architectural Studies

The Department of Art and Art History offers a minor in architectural studies for both liberal arts and engineering students consisting of five courses:

Art History 1 Art, Ritual, and Culture

Art History 8 Introduction to Architecture, 1400 to the present

Engineering 2 (or an EN-CE course, Area D above) Studio Art (FAM 20, 22, 23, 63; DR 21)

Upper-level architectural history class (see major Core Curriculum above)

Note: Engineering students minoring in architectural studies replace the engineering requirement with an approved

course from the major's disciplinary areas A, B, or C (see above)

Architectural Engineering

The Department of Civil and Environmental Engineering offers a minor in architectural engineering for students in the College of Liberal Arts. The faculty adviser for this minor is Professor Masoud Sanayei.

Art and Art History

Associate Professor Cristelle Baskins, *Chair; Italian Renaissance art, secular painting and narrative, gender and women's studies*

Professor Andrew McClellan, *Dean of Academic Affairs for Arts & Sciences, Director Museum Studies, Baroque-rococo art, museum history and theory*

Professor Judith Wechsler, *National Endowment for the Humanities Professor of Art History; French art—realism to postimpressionism, history of drawing, art on film*

Associate Professor Daniel M. Abramson, *Director Architectural Studies, Architecture from Renaissance-contemporary, architectural theory, architecture and urbanism of Boston, on leave fall 2008*

Associate Professor Eva Hoffman, *Director of Undergraduate Studies, Islamic art, portable arts, theories and methods*

Associate Professor Ikumi Kaminishi, *Director Graduate Studies, Asian art and architecture, Buddhist painting, narrative studies*

Associate Professor Christina Maranci, *Arthur H. Dadian and Ara Oztemel Chair of Armenian Art and Architectural History, Medieval Armenian Art and Architecture*

Associate Professor Peter Probst, *Contemporary African art, critical theory, visual culture, globalization*

Associate Professor Eric Rosenberg, *American art, modern and contemporary art, theories and methods*

Assistant Professor Monica McTighe, *Art Since 1960, including the history of installation and site-specific art, photography, film and video, on leave 2008-09*

Assistant Professor Karen Overbey, *Medieval art & Architecture, Relics and Reliquaries, Early Irish art, theories and methods*

Assistant Professor Adriana Zavala, *Modern and contemporary Latin American art, art of Mexico, and gender and women's studies*

ASSOCIATED FACULTY/AFFILIATES

Susan Lush, *Associate Dean of Academic Affairs, School of the Museum of Fine Arts*

Patrick Carter, *Tufts Studio Arts Coordinator, School of the Museum of Fine Arts*

Amy Ingrid Schlegel, *Director Tufts University Art Gallery; Curatorial studies*

What is art history? Every human culture has produced art, and the study of visual imagery affords unique insights into our own culture and those of other nations that make up our “global village.”

The history of art is the study of form and meaning in the visual arts from their beginnings to the present. The wide range of courses offered by the department aims to familiarize students with important artists, traditions, and themes in world art and visual culture. Some courses will focus on individual achievements, great artists and schools, while others will explore significant periods, such as the Renaissance or the 1960s, or themes that cut across time and cultures, for example, the treatment of nature or the fear and destruction of images (Iconoclasm and Iconophobia).

As a humanistic discipline, the history of art emphasizes scholarly investigation and critical analysis over technical training. However, majors are encouraged to take studio courses as part of their program and to take advantage of Tufts' affiliation with the School of the Museum of Fine Arts.

Significant portions of the western visual tradition are covered by our courses, on the introductory and advanced level, as are the arts of Africa, Asia, Islam, Latin America and the Middle East. In recent years the discipline of art history has been shifting away from the study of “great” artists and their works toward a more contextual appreciation of how works of art function and we are valued in society.

In addition to courses on individual figures, you will find courses offered on a range of thematic, often interdisciplinary subjects, such as iconoclasm, mentioned above, or colonialism, gender, monuments, museums, pop culture, and the role of art critics. We also offer regular courses on film and film history.

Studio courses given on the Tufts campus and at the School of the Museum of Fine Arts (230 The Fenway, Boston) enable the student to become acquainted with one or more of the creative disciplines. Tufts University students are admitted free to the Boston Museum of Fine Arts through a special institutional membership. Field trips to museums, sites, and collections are regularly scheduled.

UNDERGRADUATE PROGRAM

The department offers the bachelor of arts degree in art history. There is no studio art major, but two programs offered in cooperation with the School of the Museum of Fine Arts are available to students with a strong preparation in this area. Both require admission to the Museum School and have an academic component. One is the B.F.A. degree program available through the College of Special Studies; the other is the combined five-year B.F.A. and B.A. or B.S. degrees program. Interested students may contact Susan Lush at the Museum School, 617-369-3610.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

For the bachelor of arts degree in art history, ten courses are required for the major: Art History 1, 2, and 100; one non-Western course (Asian, African, Islamic, or Latin American); one course in each of the periods ancient/medieval, Renaissance/baroque, nineteenth to twenty-first centuries; and three electives, two of which may be approved courses in a related field (e.g., history, literature, studio art). Besides Art History 100, two other departmental courses must be at the 100 level or above. Concentrators are strongly encouraged to take an upper-level seminar (Art History 200–290) as one of their required 100-level courses, and a studio art class as a related field course.

Prospective majors are encouraged to take 001 and 002 early in their undergraduate program and to discuss a course of study with an undergraduate advisor when they begin to consider majoring in art history, preferably in their sophomore year. FAH 100 is a required course and is normally taken in the senior year.

For inquiries about the Art History Major, please contact the Undergraduate Advisor, Associate Professor Eva Hoffman.

UNDERGRADUATE MINOR PROGRAM

The Department of Art and Art History offers minors in studio art, in art history, and in architectural studies, each requiring the completion of five courses. Details are available from the departmental office.

ARCHITECTURAL STUDIES PROGRAM

The Department of Art and Art History offers an interdisciplinary major and minor in architectural

studies for students interested in the study of architecture's history, theory, and social practice. The major's core curriculum provides a foundation in art and architectural history and theory, in engineering and design, and in the humanistic and social science aspects of architecture. Architectural studies majors then design their own elective program of upper-level study from designated courses in architectural history, studio art, civil engineering, the humanities, and the social sciences. In spring of the senior year, all majors complete an integrative project, either as individual or honors study, or through an internship.

For the minor in architectural studies, students take five designated courses from the major's core curriculum, which provide a basic foundation to architecture's interdisciplinary aspects.

The architectural studies program is designed specifically to provide a broad-based liberal arts education in architecture. It may also help students prepare for graduate study and careers in architecture and other allied disciplines, such as landscape architecture, urban planning, and historic preservation. For details, see full description under Architectural Studies. The faculty adviser for architectural studies is Professor Daniel Abramson.

GRADUATE PROGRAM

The Department of Art and Art History offers the master of arts degree in art history, and in art history and museum studies; the master of fine arts degree in studio art; and the M.A./M.F.A. combined-degrees program.

Master of Arts: Art History

Applicants for the master of arts degree are expected to offer for admission the equivalent of a Tufts bachelor of arts degree (usually with a major in art history), demonstrated reading knowledge of one foreign language, Graduate Record Examination results of 500 minimum, and a writing sample.

The course of study leading to the master of arts degree normally includes eight semester courses in the history of art, a comprehensive examination, and a thesis or two qualifying papers. The courses must be taken at the intermediate or advanced level (numbered 100–290) and should include *Historiography and Methodology 101*; a minimum of three courses should be seminars. In the comprehensive examination given at the completion of course work, students must demonstrate general knowledge of the history of art as well as compe-

tence in a particular field. The written thesis involves original research and is defended before a committee of graduate faculty.

Most students in the master of arts program serve wherever possible as teaching assistants, research assistants, or in related activities for at least one semester. Stipends will be paid, but no academic credit will be given.

Master of Arts: Art History and Museum Studies

For students entering the program Fall 2007 - The student will take six semester courses at the graduate level in the history of art, including Historiography and Methodology 101, and five courses in museum studies; write a graduate thesis, two qualifying papers or a qualifying paper and an art history seminar; fulfill the foreign language requirement; take the comprehensive examination; and serve as teaching or research assistants whenever possible as currently stipulated in the program requirements for the master's degree. Please see certificate in Museum Studies if your primary goal is vocational training.

Master of Fine Arts: Studio Art

The master of fine arts degree offers students concentration in the visual arts. Students may concentrate in a single medium or may work in an interdisciplinary manner, drawing on Tufts' diverse studio offerings to expand upon their particular area of concentration.

The requirements include two years of studio work, two yearlong graduate seminars at the Museum School, a master's exhibition, and four academic courses at Tufts University. The original creative work in the master's exhibition is held at Tufts University Gallery and presented to a jury of the joint faculty.

At least two of the academic courses must be chosen from the series of intermediate and advanced courses in art history (numbered 100 to 290); two may be chosen from graduate courses in related fields, subject to approval of the department.

Applicants for admission to the master of fine arts program must complete the graduate school admissions packet. The applicant should have the equivalent of a bachelor of fine arts degree. A slide portfolio should be submitted, consisting of no more than twenty two-by-two thin plastic-mounted slides (boxed, not in a plastic sleeve) and, if submitting video, no more than ten minutes of video. The

application packet and portfolio should be sent to the Graduate Admissions Committee, Admissions Office, School of the Museum of Fine Arts, 230 The Fenway, Boston, Massachusetts 02115, by January 15. Finalists will be contacted approximately by the second week in February to arrange an interview at the School of the Museum of Fine Arts. All applicants are notified by the second week in March. For more information, write to the admissions office at the Museum School at the above address.

M.A./M.F.A. Combined-Degrees Program

Students who wish to pursue both the master of arts degree in art history and master of fine arts degree must complete separate applications for each program. Combined-degrees students complete all studio requirements, including a master's exhibition, and all art history requirements, including a written thesis. The art history courses for the master of arts degree fulfill the academic requirements for the M.F.A. degree as well. As in all combined master's degrees programs, two tuitions are charged, and the student is eligible for scholarship aid within each program.

Studio Courses

Through a cooperative agreement between Tufts University and the School of the Museum of Fine Arts (the Museum School) at 230 The Fenway in Boston, students may elect courses in studio art for credit at Tufts. Two studio courses may be taken to fulfill the arts distribution requirement. Classes are taught both on the Tufts campus, in studios located in Lane Hall and Jackson Gymnasium, and at the Museum School in Boston. More than eighty studio credits are offered to Tufts students each semester. They range from foundation through advanced levels and are distributed throughout the following media and areas: art foundations, calligraphy, clay/ceramics, computer art, design, drawing, film, graphic design, metals/silversmithing, painting, photography, printmaking, sculpture, sound, stained glass, and video.

A listing of the specific studio art courses that are being taught during the current school year are available at <http://www.smfa.edu/>. These classes are coded as follows: FAM—Medford/ Somerville campus; FAMB—Museum School, night; FAMD—Museum School, day. Registration for FAM and FAMB courses takes place through the

ART AND ART HISTORY >

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ASTRONOMY >

regular registration process at Tufts. FAMDC courses must be registered for at the Museum School during its registration period.

Students who have questions about studio courses or need help in planning a comprehensive program of study should contact Patrick Carter, studio coordinator at Tufts, Fine Arts Department, 11 Talbot Avenue, 617-627-2014.

Questions regarding registration procedures can be directed to the Museum School's Office of the Registrar, 617-369-3099. For more detailed information, please visit the Web site <http://ase.tufts.edu/art>.

Asian Studies

FACULTY COORDINATOR:

Associate Professor Ikumi Kaminishi, *Art and Art History*

Asian Studies is an interdisciplinary program that gives students an opportunity to study systematically the history and cultures of one of the world's most important regions.

ASIAN STUDIES MAJOR

Eleven courses as follows:

a. An Asian language: 21, 22, 121, 122.

Students who have placed out of one or more of these courses still need to take eleven courses to complete the major. They must either study a second Asian language through 122, or take extra Asian culture courses or Asian language courses beyond 122.

b. Six Asian Studies culture courses, which must include three from each of the following two groups:

- 1) Anthropology, economics, political science, and history
- 2) Art history, literature, music, drama, religion, and thought

One course in an affiliated field such as Asian American Studies or Middle Eastern Studies may be substituted in either of these two groups with the permission of the adviser, provided that it is directly relevant to a student's category c project.

c. An independent thesis-writing course:

Students must produce a thesis of creative work on an Asia-related topic. The topic should be chosen in consultation with the student's Asian Studies

adviser, who should serve as his/her instructor in a directed research, senior honors thesis, or other independent study course. A paper written for a seminar or colloquium may be used to satisfy the requirement, as long as this course is not one of the six Asian culture courses. The thesis will be graded by the adviser and one other faculty reader. The latter need not be associated with the program. The program may organize opportunities for students to publicly present their research results.

INTERDISCIPLINARY

MINOR IN ASIAN STUDIES

Students may acquire an interdisciplinary minor in this program by constructing a thematic course of study related to Asia, taking five course credits from at least three departments, and completing an appropriate project, such as a thesis or performance, integrating the knowledge and methodology of the disciplines involved. No more than two of the five courses may be language courses. Only language courses numbered 22 or higher will be accepted for Asian Studies credit. (See Interdisciplinary Minor Program for details.)

For more detailed information, please visit the Web site

<http://ase.tufts.edu/grall/asian/requirements.asp>.

Astronomy

Professor Kenneth R. Lang, *Astronomy*

Assistant Professor Marianne Vestergaard,

Astronomy/Astrophysics

Research Associate Professor Robert F. Willson,

Astronomy

The science of astronomy concerns the general picture of the universe in its broadest sense, from atoms to assemblages of galaxies. Courses in astronomy fall under the Department of Physics and Astronomy. Astronomy may be elected as a major field through a suitable Plan of Study. Students considering a career in astronomy or astrophysics, however, are urged to investigate the possibility of a joint major with physics or mathematics, or an undergraduate concentration in astrophysics.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Astrophysics

Four courses in astronomy more advanced than Astronomy 10; two courses in mathematics more advanced than Mathematics 13/18; four courses in physics more advanced than Physics 2 or 12, including Physics 13 and 64 or equivalent laboratory experience. One mathematics course may be replaced by approved advanced course in a related field. Research experience is strongly recommended.

UNDERGRADUATE MINOR PROGRAM

Minor in Astrophysics

The program requires the completion of five courses. The student takes Physics 11 and 12 (or 1 and 2) and any three courses from the following: Astronomy 21, 22, 101, 111, and 112.

GRADUATE PROGRAM

Advanced degrees (master's and doctoral) are offered in experimental radio astronomy and astrophysics. Additional advanced courses may be taken through a cooperative program with Boston University.

For more detailed information, please visit the Web site <http://ase.tufts.edu/physics>.

Astrophysics

(FOR DEGREE REQUIREMENTS, SEE ASTRONOMY OR PHYSICS.)

Biochemistry

(FOR DEGREE REQUIREMENTS, SEE BIOLOGY OR CHEMISTRY.)

Bioengineering

Professor Sergio Fantini, *Biomedical Engineering; Biomedical optics, near-infrared spectroscopy, diffuse optical imaging*

Professor David L. Kaplan, *Biomedical Engineering/Chemical and Biological Engineering; Biopolymer engineering, biomaterials, tissue engineering, regenerative medicine*

Professor Krishna Kumar, *Chemistry;*

Novel methods for rational design and construction of artificial proteins, molecular enzymes, and self-assembling biomaterials

Professor Barry A. Trimmer, *Biology; Central processing of sensory information by receptors, second messengers and synaptic networks in insect model system, neural control of soft-bodied locomotion*

Professor David R. Walt, *Robinson Professorship in Chemistry; Surface, polymer and materials chemistry, fluorescence resonance energy transfer, immunosensors, corrosion sensing, neurotransmitter sensing, micro- and non-sensors, cell-based biosensors, and sensors based on principles of the olfactory system*

Associate Professor Caroline G. L. Cao, *Mechanical Engineering; Endoscopy and surgery, human factors, remote instrumentation, human-machine interface*

Associate Professor Mark Cronin-Golomb, *Biomedical Engineering; Optical instrumentation, laser tweezers, atomic force microscopy, nonlinear optics*

Associate Professor Van Toi Vo, *Biomedical Engineering; Biomedical instrumentation, vision and ophthalmology, telemedicine*

Assistant Professor Irene Georgakoudi, *Biomedical Engineering; biomedical imaging*

Assistant Professor David H. Lee, *Chemistry; Hierarchical self-assembly of intermediate filaments, role in biomaterials to protein hormone assemblies that regulate fatty acid metabolism, relevance to obesity*

Assistant Professor Kyongbum Lee, *Chemical and Biological Engineering; Biochemical and biomedical engineering, metabolic engineering, tissue engineering, bioinformatics, and systems biology*

Assistant Professor Blaine Pfeifer, *Chemical and Biological Engineering; Metabolic engineering, drug delivery, biomaterials*

Research Assistant Professor Greg Altman, *Biomedical Engineering; Collagen-based matrices, ligament formation, impact of mechanical forces on human adult stem cell differentiation, bioreactor system, in vitro tissue formation and development*

Research Assistant Professor Aurelie Edwards, *Chemical and Biological Engineering; Biological transport phenomena involving fluid and solute transport in living tissues (kidney and eye) to address organ function, disease origin, and drug delivery*

Bioengineering is the integration of physical, chemical, or mathematical sciences and engineering principles for the study of biology, medicine, behavior, or health. The bioengineering programs provide comprehensive education and research at the School of Engineering and the School of Arts and

Sciences in collaboration with Tufts' medical, dental, veterinary, and nutrition schools.

A number of part- and full-time degree programs and certificates are offered in the fields of biomedical engineering, biotechnology, and drug discovery and assessment. Biomedical engineering involves the application of state-of-the-art technology to device design and fabrication; biotechnology includes protein expression, folding and assembly, biomaterials and tissue engineering, and biofilms as examples; drug discovery and assessment includes disease markers, resistance mechanisms, and new drug discovery.

For information on programs in bioengineering, please contact the bioengineering center office at 617-627-2580.

UNDERGRADUATE PROGRAMS

Biomedical Engineering

(SEE BIOMEDICAL ENGINEERING FOR A DESCRIPTION OF THE PROGRAMS.)

Biotechnology

(SEE BIOTECHNOLOGY FOR A DESCRIPTION OF THE PROGRAMS.)

GRADUATE PROGRAMS

Graduate degree programs are tailored to the background and goals of the individual student. Graduate students at both the master's and Ph.D. level carry out challenging research projects within the Bioengineering Center or in other Tufts departments or professional schools. Internships and training opportunities in which students can gain firsthand practical and laboratory experience are also available at local biotechnology and biomedical companies. Degree programs may be pursued on a part-time or full-time basis.

Master's programs may be either course-based (such as the practice-oriented master of engineering degree), or research-based (thesis or research project). Full-time degree candidates are eligible for sponsored research projects. Doctoral programs may be pursued part-time, with a one-year residency requirement.

Biomedical Engineering

(SEE BIOMEDICAL ENGINEERING FOR A DESCRIPTION OF THE PROGRAMS.)

Biotechnology

(SEE BIOTECHNOLOGY FOR A DESCRIPTION OF THE PROGRAMS.)

CERTIFICATE PROGRAMS

Four-course graduate-level certificate programs are designed for science, engineering, and medical professionals seeking graduate-level programs to expand their knowledge of biomedical science, biotechnology, and engineering. Certificates are offered through the Office of Graduate Studies, and in conjunction with the departments of biology, chemistry, chemical and biological engineering, and biomedical engineering. The certificate programs can be completed on a part-time, nondegree basis by students who are seeking professional training in the field or preparing for a degree program. In most cases, courses taken as a certificate student can be transferred into a related master's degree program. The programs are open to students who have already earned a bachelor's degree.

Bioengineering

The certificate program in bioengineering consists of an interdisciplinary course of study that allows students to focus on areas such as biomedical instrumentation, biomedical optics, biomaterials/biotechnology and tissue engineering. Courses are taught by faculty in engineering as well as experienced clinical professionals from Tufts' health science schools.

The certificate requires four courses.

One bioengineering introductory course:

Biomedical Engineering 250 Introduction to Biomedical Engineering I (focus on biomedical engineering and instrumentation)
or **Biomedical Engineering 162** Molecular Biotechnology (focus on molecular biology and engineering aspects of biotechnology)

One physiology course (choose five modules):

Biomedical Engineering 121/122 Engineering Challenges in Physiology I and II (modules include general, neurology/nose, skeletal/bone, respiratory, cardiovascular, renal, gastrointestinal, endocrine, eye, dental)

One engineering elective in biomedical instrumentation, biomedical optics, biomaterials, biotechnology, or tissue engineering

One capstone course:

Biomedical Engineering 100 Design of Medical Instrumentation
or **Biomedical Engineering 164** Biomaterials and Tissue Engineering

For more detailed information, please visit the Web site <http://chem.tufts.edu>.

Bioengineering Certificate Program

Faculty advisers:

Professor Sergio Fantini, *Biomedical Engineering*
Professor David L. Kaplan, *Biomedical Engineering / Chemical and Biological Engineering*

The booming biomedical industry demands skilled professionals whose expertise can cross traditional boundaries of science and engineering. Companies are seeking electrical engineers who understand the medical uses of diagnostic imaging instrumentation, biotechnology professionals with training in tissue engineering to develop tissue implants, and mechanical engineers who are well-versed in biomaterials to design artificial joints.

The certificate in Bioengineering addresses this need through a highly interdisciplinary course of study that allows students to focus on biomedical instrumentation, biomedical optics, biomaterials/biotechnology and tissue engineering or other related areas of study. Courses are taught by faculty in engineering as well as experienced clinical professionals from Tufts' world-renowned health science schools.

The program is open to students with at least a bachelor's degree in engineering, science, or health science.

With this certificate engineers can launch careers in biomedical instrumentation design. Clinical practitioners and technicians can shift careers to biomedical equipment sales. It is also a useful technology complement for executives, medical professionals, and policy makers interested in the application of technology to the medical, business or legal profession.

The certificate requires the completion of four courses.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

Biology

Associate Professor Juliet Fuhrman, *Chair; Immunology and parasitic diseases*
Professor Frances Sze-Ling Chew, *Ecology, plant-insect interactions*
Professor David E. Cochrane, *Cell physiology, inflammation*
Professor Susan G. Ernst, *Developmental biology*
Professor Sara M. Lewis, *Evolutionary and behavioral ecology*
Professor Sergei Mirkin, *White Family Chair in Biology, Molecular genetics*
Professor Colin M. Orians, *Ecology, plant-herbivore-environment interactions*
Professor Jan A. Pechenik, *Invertebrate zoology, marine invertebrate reproduction*
Professor J. Michael Reed, *Conservation biology, ornithology, behavior*
Professor L. Michael Romero, *Physiological endocrinology, physiology of stress*
Professor Eli C. Siegel, *Microbial genetics*
Professor Barry A. Trimmer, *Henry Bromfield Pearson Professor of Natural Science; Neurotransmitters and receptors in insects, intracellular signals*
Associate Professor Harry A. Bernheim, *Organismal physiology, immunology*
Associate Professor George S. Ellmore, *Drapner Ring Scholar; Plant development, experimental plant morphology, anatomy*
Associate Professor Ross S. Feldberg, *Biochemistry, DNA metabolism*
Associate Professor Catherine Freudenreich, *Molecular biology and genetics*
Associate Professor Kelly A. McLaughlin, *Cell biology, cell signaling of organogenesis*
Associate Professor Philip T. B. Starks, *Evolutionary dynamics of parasite and host populations*
Assistant Professor Mitch McVey, *Molecular biology, genomic instability*
Lecturer Michelle Gaudette, *Molecular biology, gene regulation of development*
Lecturer Margaret A. Lynch, *Cell biology, molecular biology of plant and animal cells*
Adjunct Professor David L. Kaplan, *Biotechnology, biomaterials*
Adjunct Associate Professor Mark Pokras, *Department of Environmental and Population Health, Wildlife Medicine, Grafton campus*

Biology is the scientific study of living organisms. Derived from the search for organized under-

standing of plants and animals in their natural environments, contemporary biology is increasingly successful in characterizing the basic molecular processes that are essential to all forms of life. Modern experimental studies on the origin, evolution, and physiological mechanisms of life are of profound philosophical importance and provide the underlying foundation for research in biology and for the teaching of biology. They also provide the basic knowledge used in applied fields such as medicine, biotechnology, and environmental biology.

Biology students should aspire to understand the central principles governing life processes at both molecular and higher levels. An increased comprehension of the problem-solving methods of science, as used within the laboratory and in the analysis of contemporary environmental and biosocial problems, should be a concomitant goal. Biology majors, especially those preparing for graduate work, are expected to learn how to critically evaluate original research literature. This can be done by enrolling in seminar courses that are designed to investigate topics by utilizing the primary literature. Small class sizes in seminars allow students to present papers and participate in class discussions.

Laboratories are available for study and research in selected areas of biochemistry, neurobiology, immunology, endocrinology, molecular biology, cell biology, genetics, physiology, plant sciences, behavior, and ecology. Controlled-environment rooms, marine and freshwater aquaria, and a greenhouse are among the diversified resources for the experimental work. Fieldwork experience at marine laboratories or other biological stations is encouraged.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Biology

Ten courses, including eight courses in biology numbered 13 or higher (with the exception of Biology 16, 91, 92, 93, 94, and 99), at least six of which must be completed with a grade of C- or better, and either two courses in chemistry (normally chosen from Chem 1, 2, 11, 12, 51, 52) or two courses in physics (normally chosen from Physics 1, 2, 11, 12). At least four of the eight biology courses must be taken at Tufts. (Students are also encouraged to take at least one of the Writing Workshop courses offered in the depart-

ment.) It is recommended that students take at least one seminar course. The eight biology courses must normally include Bio 13, 14 and 41 and at least one course each in the biology of cells (Group A), biology of organisms (Group B), and biology of populations (Group C). The particular group in which a course is categorized for this purpose is indicated at the end of the course description. Absence of such designation indicates that the course cannot be used to fulfill any group of the distribution requirements, although the credits are applicable toward the total required for a major.

At least three courses in biology must include laboratory study. In fulfilling this laboratory requirement, students may choose from among those biology courses for which laboratory is specified in the course description, with the following exceptions: Biology 93, 94, and 187.

Biology 193 or 194 may normally be used as only one of the eight biology courses for completion of the concentration requirements; on approval of a petition to the department, a maximum of two such courses may be applied toward the major. In no case may more than one of these courses be used to fulfill the laboratory requirement.

The foregoing is a minimal program. For many purposes, additional preparation in related sciences and calculus is needed. A course in calculus and laboratory courses in both organic chemistry and physics are strongly advised. A course in statistics should be included when advanced work in ecology, evolution, or genetics is anticipated. Medical schools require a year of general chemistry and a year of organic chemistry—both with laboratory, a year of physics with laboratory, and a year of biology with laboratory. Calculus is recommended. Students planning to enter graduate school or seeking employment in biological research should take more than the minimal number of laboratory courses required for the biology major.

To be eligible for a summa cum laude degree, a student must have done biology research equivalent to Biology 93. Comparable research in related fields will also be considered. Participation in the Thesis Honors Program will entail writing and defending a thesis based on laboratory or field research.

Major in Biochemistry

Chemistry 1, 11, or 16; and Chemistry 2 or 12;

Chemistry 51/53, 52/54, 31, 42, 171, and 172; Biology 13, 41, 50 (or Chemical Engineering 163), and 105. Course work in mathematics (Mathematics 12) and physics (Physics 2 or 12) is required as prerequisite to Chemistry 31. The following sequence of courses is suggested for students concentrating in biochemistry: first year, Chemistry 1 (or 11) and 2 (or 12), Biology 13; second year, Chemistry 51/53, 52/54, Biology 50 (or Chemical Engineering 163); third year, Chemistry 31 and 42, Biology 41 and 105; fourth year, Chemistry 171/172.

Major in Biopsychology

An interdepartmental major for students particularly interested in neurobiology and behavior. Required courses: five in biology and five in psychology. These include the following: Cells and Organisms (Biology 13), General Genetics (Biology 41), Animal Behavior (Biology 130), one course in animal physiology (chosen from among Biology 75, 110, 115, 116, 134), and an elective in biology; Statistics (Psychology 31 or Biology 132), Experimental Psychology (Psychology 32), Brain and Behavior (Psychology 103), plus two electives from among Psychology 26, 27, 29, 40, 41, 46, 48, 49, 104, 112, 123, 127, 128, 129, and 146. Biopsychology majors may not double major in psychology or biology. Majors are encouraged to elect an advanced laboratory course in either department. Consult the departments of either biology or psychology for details about this program.

Course Selection for Undergraduates

For students with an interest in biology or the health sciences and a strong high-school science background, Biology 13 is the most appropriate beginning course, and may be taken concurrently with Chemistry 1 or 11. Biology 13 and 14 are normally prerequisites for more advanced work in biology. A student who earns a grade of B- or better in Biology 3 may use this course instead of Biology 13 as a prerequisite for more advanced courses. Credit cannot be received for both Biology 3 and Biology 13. Please note that Bio 3 does not have an accompanying lab section.

Students interested in biology but not planning to major in the sciences might take Biology 2, 3, 7, 8, or 10. None of these may be counted among the eight courses in biology used to satisfy the concentration requirements. The particular group in which

a course is categorized for this purpose is indicated at the end of the course description. Absence of such designation indicates that the course cannot be used to fulfill any group of the distribution requirements, although the credits are applicable toward the total required for a major.

GRADUATE PROGRAM

Before beginning advanced study in a specialty, all graduate students in biology are expected to have the broad course work and laboratory experience that is equivalent to the requirements for an undergraduate major in this department. The student's entrance committee will determine what courses, if any, should be taken in the first year to fulfill these requirements. Graduate instruction and research opportunities are offered in six areas: 1) ecology, behavior, and evolution; 2) genetics and molecular biology; 3) developmental biology; 4) neurobiology and animal behavior; 5) cell physiology; and 6) conservation and the environment. More information is available at <http://ase.tufts.edu/biology>.

Master of Science

A candidate for the master's degree in biology must complete at least eight different graduate-level courses, of which at least four must be in the Department of Biology. All courses must be approved by the committee appointed to guide the student's work. Courses taken at recognized marine laboratories or field stations may be offered for credit. No more than two credits may be transferred from another institution.

Research Master of Science Degree- A research master of science student must take six courses for letter grades (B- or better) including one required seminar (normally either Biology 243, Topics in Molecular and Cell Biology or Biology 244, Topics in Evolutionary Ecology). No more than one of these six may be guided individual study (Biology 293 or 294). Also required for the research master of science are two research courses (Biology 295 and 296) and preparation and successful defense of an original thesis. A student in a research master's program is normally expected to serve as a teaching assistant for at least one semester.

Course-work Master of Science Degree- A course-work master of science student must take eight courses for letter grades (B- or better)

including one required seminar (normally either Biology 243, Topics in Molecular and Cell Biology or Biology 244, Topics in Evolutionary Ecology).

Students in the B.S.-M.S. combined-degrees program are normally required to prepare an original thesis.

The Department of Urban and Environmental Policy and Planning offers, in cooperation with the Department of Biology, a two-year interdisciplinary master's degree focusing on environmental studies. For more information, see Urban and Environmental Policy and Planning.

Doctor of Philosophy

A candidate for the Doctor of Philosophy degree is expected to plan and undertake a program of advanced study and research in consultation with a faculty committee. The candidate is required to serve as a teaching assistant for at least two semesters.

During the first year, students are expected to complete at least two research rotations (Bio 253/254). Following completion, students must choose and be accepted into the laboratory of a faculty member under whose direction they will carry out their research and prepare their dissertations.

Entry into the Ph.D. degree program is not official until the candidate passes a qualifying procedure. The procedure includes a written examination in the candidate's field of special interest and related areas, and the preparation and defense of a detailed written thesis research proposal.

The Department of Biology and the Department of Chemical and Biological Engineering offer a joint graduate degree program in biology/biotechnology. This program explores biological principles and problems with a chemical engineering perspective. For details, please contact the biology department or the chemical and biological engineering department.

For more detailed information, please visit the Web site <http://ase.tufts.edu/biology>.

Biomedical Engineering

Professor David Kaplan, *Chair; Biopolymer engineering, biomaterials, tissue engineering, regenerative medicine*

Professor Sergio Fantini, *Biomedical optics, near-infrared spectroscopy, diffuse optical imaging*

Professor Mark Cronin-Golomb, *Optical instrumentation, laser tweezers, atomic force microscopy, nonlinear optics*

Associate Professor Irene Georgakoudi, *Biomedical spectroscopic imaging and characterization, in vivo flow cytometry, biomedical instrumentation*

Associate Professor Fiorenzo Omenetto, *Ultrafast nonlinear optics*

Associate Professor Vo Van Toi, *Biomedical instrumentation, vision and ophthalmology, telemedicine*

Assistant Professor Catherine K. Kuo, *Regenerative medicine, tissue engineering, stem cells, biomaterials, developmental biology*

Research Assistant Professor Greg Altman, *Collagen-based matrices, ligament formation, impact of mechanical forces on human adult stem cell differentiation, bioreactor system, in vitro tissue formation and development*

Research Assistant Professor Christopher Cannizzaro, *Microfluidics, automation, bioprocess engineering*

Research Assistant Professor Bruce Panilaitis, *Vaccine development, metabolic engineering*

Research Assistant Professor Angelo Sassaroli, *Infrared spectroscopy, functional brain activation*

Associate Professor Robert Peattie, *Responses of cells and tissues to mechanical challenges*

Adjunct Professor Christoph Börgers (*Department of Mathematics*), *Mathematical neuroscience*

Adjunct Professor John Castellot, (*Tufts University School of Medicine*), *Cellular and molecular biology, vascular systems*

Adjunct Professor Ira Herman, (*Tufts University School of Medicine*), *Cell movements required for cell division, the folding of the embryo, differentiation of the body's organ systems, remodeling of tissues during disease processes*

Adjunct Professor Robert Howe, (*Harvard University*), *Human-machine interfaces, biomechanics, tactile sensing, human and robot manipulation*

Adjunct Professor John Kauer (*Tufts Medical Center*), *Process and integration in brain circuits*

Adjunct Professor Krishna Kumar (*Department of Chemistry*), *Novel methods for the rational design and construction of artificial proteins, molecular enzymes, and self-assembling biomaterials*

Adjunct Professor John Richmond, (*New England Baptist Hospital, Tufts Medical Center*), *Ligament formation, treatment of injuries of the anterior cruciate ligament, regulation and proliferation of growth factor expression in arthrofibrosis*

Adjunct Professor Barry Trimmer (*Department of Biology*), *Central processing of sensory information by*

receptors, second messengers and synaptic networks in an insect model system, neural control of soft-bodied locomotion

Adjunct Professor Gordana Vunjack-Novakovic (Columbia University), Transport phenomena, tissue engineering and bioreactors

Adjunct Professor David Walt (Department of Chemistry), Surface, polymer, and materials chemistry; fluorescence resonance energy transfer; immunosensors, corrosion sensing, neurotransmitter sensing, combinatorial polymer synthesis, high-density arrays, genosensing, micro- and nano-sensors, cell-based biosensors, and sensors based on principles of the olfactory system

Adjunct Associate Professor Peter Bergethon (Boston University School of Medicine/Tufts Medical Center), Computational neurology

Adjunct Associate Professor Luis Dorfmann, (Department of Civil & Environmental Engineering), Mechanical properties and behaviors of materials, couple field phenomena, fracture, cavitation and failure processes, characterization and modeling of soft materials

Adjunct Associate Professor Aurelie Edwards (Department of Chemical and Biological Engineering), Biological transport phenomena involving fluid and solute transport in living tissues, disease origin, and drug delivery

Adjunct Associate Professor James Harden, (University of Ottawa), Biomolecular assemblies, hydrogels, proteins, soft materials, computational biophysics, cell mechanics, complex fluids

Adjunct Associate Professor Andrew Hoffman (Tufts University School of Veterinary Medicine), Noninvasive pulmonary function testing in animals, pathogenesis of airway reactivity, interventions for emphysema, and new paradigms for mechanical ventilation

Adjunct Associate Professor Carl Kirker-Head (Tufts University School of Veterinary Medicine), Bone growth and remodeling, bone repair in response to injury, bone grafting, surgical and other orthopaedic disease models, musculoskeletal vascular disease, bone and soft tissue biomechanics, skeletal tissue engineering, orthopedic device development

Adjunct Associate Professor Michael Levin, (Forsythe Institute), Regenerative and developmental biology

Adjunct Associate Professor Jerry Meldon (Department of Chemical and Biological Engineering), Membrane science and technology, mass transfer with chemical reaction, mathematical modeling of transport phenomena

Adjunct Associate Professor Pam Yelick (Tufts University School of Dental Medicine), Molecular genetic analyses of craniofacial cartilage, bone, and tooth development.

Adjunct Associate Professor Jing Zhao (Agiltron, Inc.),

Advanced complex-oxide optoelectronic material growth and novel photonic device fabrications, development of a variety of world-class photonic materials via a novel chemical film process and bulk ceramics hot-press

Adjunct Assistant Professor Frederick Blaise (McLean Hospital), Magnetic resonance equipment and techniques for the study of psychiatric illness in Alzheimer's disease and substance abuse

Adjunct Assistant Professor Giorgio Bonmassar (Massachusetts General Hospital), Multimodal functional imaging of the brain, electroencephalography (EEG), magnetoencephalography (MEG), functional magnetic resonance imaging (fMRI), diffuse optical tomography (DOT)

Adjunct Assistant Professor Guillermo Castro (Universidad Nacional de Tucuman, Argentina), Emulsan adjuvant activity

Adjunct Associate Professor Caroline Cao (Department of Mechanical Engineering), Endoscopy and surgery, human factors, remote instrumentation, human-machine interface, robotic surgery, surgical training, virtual reality

Adjunct Assistant Professor Michael Henry (McLean Hospital), Brain imaging studies to define the effects of electroconvulsive therapy on regional brain hexose metabolism, changes in regional cerebral blood volume occurring with abrupt discontinuation of short-acting selective serotonin reuptake antidepressant, and pharmacokinetics of psychotropics

Adjunct Assistant Professor Steve Jiang (Massachusetts General Hospital), Development of precision radiotherapy treatment technique for moving tumor using dynamic MLC, application of molecular imaging in IMRT, study of organ motion effect using Monte Carlo simulation

Adjunct Assistant Professor David Lee (Department of Chemistry), Hierarchical self-assembly of intermediate filaments, role in biomaterials to protein hormone assemblies that regulate fatty acid metabolism, relevance to obesity

Adjunct Assistant Professor Charles Lin (Massachusetts General Hospital), Confocal, two-photon, and total internal reflection fluorescence (TIRF) microscopy, selective targeting of cells and subcellular organelles by light-absorbing nanoparticles

Adjunct Assistant Professor Lorenz Meinel (ETH Zurich), Drug delivery interfaces

Adjunct Assistant Professor Jill Platko (Massachusetts General Hospital), DNA sequencing and genotyping for psychiatric disorders

Adjunct Assistant Professor Douglas Vetter (Tufts Medical Center), Molecular, biochemical, and physiological aspects of brain-inner ear interactions

Adjunct Assistant Professor Lawrence Wald, (*Harvard Medical School*), *Development and application of novel MR techniques for the clinical and scientific investigation of brain function*

The biomedical engineer is responsible for design and development of the technology and devices that are at the heart of the far-reaching improvements in human health that have been occurring over the last few decades. These advances include better tools for understanding disease and health, as well as better ways to both treat disease and maintain health. The rapid expansion of the field of biomedical engineering is due to many factors, including 1) scientific and technological advances in the life sciences, materials science, and the engineering disciplines; 2) the increasing recognition of the role of interdisciplinary strategies to solve complex biomedical problems; and 3) the aging of the population leading to increasing healthcare needs and the associated demands and costs.

The vision of the Biomedical Engineering Department is to promote integrative research, education, and entrepreneurship at the forefront of biomedical science and engineering. The mission of the Biomedical Engineering Department is to prepare students to 1) identify, formulate, and solve open-ended biomedical engineering problems by integrating and applying basic principles of biology and engineering/physical sciences; 2) be creative, entrepreneurial, self-learning, and innovative; 3) be qualified to perform, manage, or lead original research at the highest levels in private industry, research laboratories, and academia, and to teach in the field.

UNDERGRADUATE PROGRAMS

Biomedical engineering involves a synergistic combination of the techniques and practices of a number of disciplines (including biology, chemistry, physics, chemical engineering, mechanical engineering, electrical engineering, and computer science), brought together and focused toward the goal of creating more effective tools, applications, and treatments in areas such as regenerative medicine, tissue engineering, medical instrumentation and devices, patient aids, and robustly engineered medical practices. The department offers instruction leading to a bachelor of science in biomedical engineering (B.S.B.M.E.) for students in the School of Engineering. Furthermore, the depart-

ment offers second majors for engineering and liberal arts students that, combined with a traditional major in engineering or liberal arts, prepare students to apply their chosen disciplines in the area of biomedical devices and systems. By careful selection of course work, students who follow these curricula can satisfy admission requirements for professional schools of medicine, dentistry, business, or law. The biomedical engineering program is not accredited by the Accreditation Board for Engineering and Technology (ABET) as it is too new.

Bachelor of Science in Biomedical Engineering

The bachelor of science in biomedical engineering is a *research-oriented* degree program that combines intensive training in research methods, techniques, and practical skills with a solid science and engineering curriculum that provides breadth and depth in the field. A key aspect of biomedical engineering is its interdisciplinary nature; introductory courses in mathematics, biology, chemistry, and physics, and foundation/concentration courses build the basis for creating the synergy among these disciplines that is required in the practice of biomedical engineering.

The curriculum leading to the bachelor of science degree in biomedical engineering is intended to prepare students to continue with graduate study either in biomedical engineering or medicine, or to enter professional practice as an engineer or designer of biomedical systems. The curriculum includes intensive instruction in the sciences and engineering disciplines, as well as a unique integrated research experience covering sophomore to senior years, in which each student participates in an interdisciplinary research team to learn about research techniques; study research problems in biomedical engineering; and propose, implement, and evaluate solutions to these problems.

Those students who are interested in applying for the B.M.E. first major must, by December of their freshman year, fulfill the requirement for Math 11, and take and complete for a grade at Tufts two of the following four courses (Chemistry 1 with lab, Chemistry 2 with lab, Physics 11 with lab, Physics 12 with lab), and submit an application (available at the department) before December 1st of their freshman year. Of the students that will apply to the department, the 15 students obtaining the top cumulative grade point averages during the

first semester of their freshman year will be admitted into the program. The department will notify students of their acceptance into the program during the winter break of their freshman year, after grades are posted for the fall term.

A sample course schedule for the B.S.B.M.E. program (38 credits) is listed below.

First Year

FALL TERM

Mathematics 11

Chemistry 1 (+ lab)

Physics 11 (+ lab)

English 1

Engineering 2 (half credit)

Engineering elective (half credit)

SPRING TERM

Mathematics 12

Physics 12 or **Chemistry 2** (+ lab)

Humanities or social sciences elective

Engineering Science 2

Sophomore Year

FALL TERM

Mathematics 13

Biology 13

Engineering Science 3

Engineering Science 5

Humanities or social sciences elective

Biomedical Engineering 3 (half credit)

SPRING TERM

Mathematics 38

Chemistry 2 or **Physics 12** (+ lab)

Biomedical Engineering 50

Engineering Science 7

Biomedical Engineering 4 (half credit)

Junior Year

FALL TERM

Biology 41

Engineering Science 8

Biomedical Engineering 100

Foundation elective

Humanities or social sciences elective

Biomedical Engineering 5 (half credit)

SPRING TERM

Biology 116

Engineering Science 22

Foundation elective

Biomedical Engineering 62

Biomedical Engineering 101

Humanities or social sciences elective

Biomedical Engineering 6 (half credit)

Senior Year

FALL TERM

Biomedical Engineering 165 or concentration elective

Biology 32

Biomedical Engineering 164

Biomedical Engineering 7

SPRING TERM

Biomedical Engineering 164

Biomedical Engineering 131 or concentration elective

Foundation elective

Concentration elective

UEP 122 or SS Elective

Biomedical Engineering 8

The selection of elective courses described above may be altered for program flexibility. The assignments here reflect one possible way of meeting the requirements for the degree. A list of appropriate foundation and concentration electives is available from the department.

SECOND MAJOR IN BIOMEDICAL ENGINEERING

The second major in biomedical engineering is offered to engineering students. Students must enroll in conjunction with another engineering undergraduate departmental major. For the second major in biomedical engineering, students are required to complete ten courses. No more than five of these courses may be used to fulfill the concentration requirement of the first major. All ten courses must be taken for a letter grade.

The ten credits required for the second major in biomedical engineering as follows:

1. **Biology 13**
2. **Biomedical Engineering 50**
3. **Biomedical Engineering 62**
4. **Biomedical Engineering 100**
5. **Biomedical Engineering 101** or **Biomedical Engineering 131**
6. **Biomedical Engineering 164**
7. One Biomedical Engineering elective course
8. Two concentration elective courses from a list available from the department
9. One elective course approved by the BME Second Major advisor

SECOND MAJOR IN BIOMEDICAL SCIENCES

The second major in biomedical engineering sciences is offered to liberal arts students. Students must enroll in conjunction with another undergraduate departmental major. For the second major in biomedical engineering sciences, students are required to complete ten courses. No more than five of these courses may be used to fulfill the concentration requirement of the first major. All ten courses must be taken for a letter grade.

The ten credits are required for the second major in biomedical engineering are as follows:

1. **Biomedical Engineering 50**
2. **Biomedical Engineering 62**
3. Three Biomedical Engineering elective courses
4. Five elective courses related to biomedical engineering, including independent studies, research, and design projects. These courses may be found on a list available from the department.

MINOR IN BIOLOGICAL ENGINEERING

The department also offers a minor in biomedical engineering, for which five credits are required. The requirements are the following five courses, which must all be taken for a letter grade:

Biomedical Engineering 50 Introduction to Biomedical Engineering

Biomedical Engineering 62/162
Molecular Biotechnology

Biomedical Engineering 101 Introduction to Biomedical Optics

Two Biomedical Engineering elective courses

GRADUATE PROGRAMS

The Department of Biomedical Engineering offers programs leading to the degrees of master of engineering (M.E.) for students seeking an education at an advanced level in biomedical engineering, and master of science (M.S.) and doctor of philosophy (Ph.D.) for students preparing for careers in which research is a central activity. Students can be accepted into either the M.E. program, the M.S. program, or directly into the Ph.D. program. A.M.E. or M.S. degree is not required for students to apply to the Ph.D. program. Ph.D. candidates may obtain an M.E. or M.S. degree during their study if the requirements for the degree are fulfilled. Students who receive the M.E. or M.S. degree and wish to continue their studies toward

the Ph.D. need to be formally accepted into the Ph.D. program at that time.

The M.S. and Ph.D. programs in the Department of Biomedical Engineering are strongly research-oriented, with emphasis on independent research work reflected in the candidate's thesis or dissertation. Because biomedical engineering is a multidisciplinary field, students are expected to work in collaboration with scientists in diverse fields including engineering, health, and life sciences. The required courses consist of foundation courses and elective courses. The purpose of the foundation courses is to provide a broad background in biomedical engineering, and to introduce the research activities in the department. The purpose of the elective courses is to provide in-depth knowledge in specific areas of biomedical engineering as a solid basis for students to excel in their research work. It is advisable that M.S. and Ph.D. students first identify a field of interest and a research adviser, and then select elective courses around the research topic of choice. At the discretion of the research adviser, students who lack suitable preparation may be required to take additional undergraduate-level courses, and students who are already qualified may be exempt from some courses. Transfer of graduate course credits is also possible.

GRE and TOEFL (if applicable) are required for admission into the programs. Prospective students can obtain more admission information, financial-aid information and application forms at <http://gradstudy.tufts.edu/>.

Master of Engineering

The department offers a program leading to the master of engineering (M.E.) degree in biomedical engineering. The M.E. program is aimed at students who desire to acquire broad knowledge in biomedical engineering. The emphasis is on multidisciplinary interfaces in the areas covered by biomedical engineering.

Ten credits are required for the M.E. degree: two foundation courses (2 credits), seven graduate courses (7 credits), research seminars for at least two semesters (no credit), and a project (1 credit).

Master of Science

The department offers a program leading to the master of science (M.S.) degree in biomedical engineering.

Ten credits are required for the M.S. degree: two foundation courses (2 credits), three or more graduate courses—which can include special topics courses (3 to 4 credits), research seminars for at least two semesters (1 to 2 credits), and a thesis (3 credits).

Doctor of Philosophy

The department offers a program leading to the Ph.D. degree in biomedical engineering. Thirty credits are required for a Ph.D. with prior B.S. degree: three foundation courses (3 credits), graduate elective courses—may be special topics courses (at least 5 credits), research seminars for at least four semesters (2 or more credits), and a thesis (up to 20 credits). Twenty credits are required for a Ph.D. with prior M.E. or M.S. degree: three foundation courses (3 credits), graduate elective courses (at least 1 credit), research seminars for at least four semesters (2 or more credits), and a thesis (up to 14 credits).

For more detailed information, please visit the Web site <http://ase.tufts.edu/biomedical/programs/main.asp>.

Biopsychology

(FOR DEGREE REQUIREMENTS, SEE BIOLOGY OR PSYCHOLOGY.)

Biotechnology

FACULTY ADVISER:

Professor David Kaplan, *Chemical and Biological Engineering, Biomedical Engineering*

Biotechnology has applications in a number of diverse fields, including recent growth in applications in gene therapy, protein and tissue engineering, and bioremediation. The tools of biotechnology are now universally applied to both basic research efforts and to large-scale manufacturing processes, and the field is continuing to grow at a rapid pace.

SECOND MAJOR IN BIOTECHNOLOGY

This program is offered as a major only in conjunction with enrollment in a regular undergraduate major, ordinarily excluding interdisciplinary programs. The biotechnology program has been designed with two tracks: a science track for

undergraduate students enrolled in the College of Liberal Arts, and an engineering track for undergraduate students enrolled in the School of Engineering.

Core Curriculum

Biology 1/Engineering Science 11 Introduction to Biology or **Biology 13** Cells and Organisms

Biology 41 Genetics

Biomedical Engineering/Biology/Chemical and

Biological Engineering 62/162 Molecular Biotechnology

One laboratory course from:

Biology 50 Experiments in Biology II

Biomedical Engineering 175 Tissue Engineering Laboratory

Chemical and Biological Engineering 163 Recombinant DNA Techniques

Chemical and Biological Engineering 168 Biotechnology Processing Projects Laboratory

Track curricula

SCIENCE TRACK

Two core courses:

Biology 105 Molecular Biology

Biology 152 Biochemistry and Cellular Metabolism or **Biology/Chemistry 171** Biochemistry I

Four electives from:

Biology 103 Developmental Biology

Biology 104 Immunology

Biology 106 Microbiology

Biology 153 Topics in Biochemistry

Biology 177 Topics in Inflammation

Biology 184 Topics in Developmental Biology

Biomedical Engineering/Biology/Chemical and

Biological Engineering 162 Molecular Biotechnology

Biomedical Engineering 193-04 Drug Delivery

Chemical and Biological Engineering 160 Biochemical Engineering

Chemical and Biological Engineering 161 Protein Purification

Chemical and Biological Engineering 164 Biomaterials and Tissue Engineering

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

Chemical and Biological Engineering 167 Metabolic and Cellular Engineering

Chemistry 135 Biophysical Chemistry

Up to two credits of research may be counted toward electives.

ENGINEERING TRACK

Two core courses:

Chemical and Biological Engineering 161 Protein Purification

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

Four electives from:

Biology 103 Developmental Biology

Biology 104 Immunology

Biology 105 Molecular Biology

Biology 106 Microbiology

Biology 152 Biochemistry and Cellular Metabolism

Biology 153 Topics in Biochemistry

Biology/Chemistry 171 Biochemistry I

Biology 177 Topics in Inflammation

Biology 184 Topics in Developmental Biology

Biomedical Engineering 193-04 Drug Delivery

Chemical and Biological Engineering 160 Biochemical Engineering

Chemical and Biological Engineering 162 Molecular Biotechnology

Chemical and Biological Engineering 164 Biomaterials and Tissue Engineering

Chemical and Biological Engineering 167 Metabolic and Cellular Engineering

Chemistry 135 Biophysical Chemistry

Two credits of research may be counted toward electives.

MINOR IN BIOTECHNOLOGY ENGINEERING

The minor in biotechnology engineering is offered to students in the School of Engineering and the College of Liberal Arts. Five courses are required for this minor.

One course from the following:

Biology 152 Biochemistry and Cellular Metabolism

or **Biology/Chemistry 171** Biochemistry I

Two courses from the following:

Chemical and Biological Engineering 161

Biochemical Separation

Chemical and Biological Engineering/Biology 162

Molecular Biotechnology

Chemical and Biological Engineering 166

Principles of Cell and Microbe Cultivation

One course from the following:

Biology 50 Experiments in Biology II

Biomedical Engineering 175 Tissue Engineering Laboratory

Chemical and Biological Engineering 163

Recombinant DNA Techniques

Chemical and Biological Engineering 168 Biotechnology Processing Projects Laboratory

One course from the following:

Biology 103 Developmental Biology

Biology 104 Immunology

Biology 105 Molecular Biology

Biology 106 Microbiology

Biology 153 Topics in Biochemistry

Biology 177 Topics in Inflammation

Biology 184 Topics in Developmental Biology

Chemistry 135 Biophysical Chemistry

Chemical and Biological Engineering 160

Biochemical Engineering

Chemical and Biological Engineering 164

Biomaterials and Tissue Engineering

GRADUATE PROGRAMS

The Tufts Bioengineering and Biotechnology Center sponsors graduate training in biotechnology through joint programs with the departments of biology, chemical and biological engineering, and chemistry, and the Gordon Institute of Engineering Management. Master's degree programs may be entirely course-based (such as the practice-oriented master of engineering degree) or research-based (thesis). Doctoral degree programs may be pursued part-time with a one-year residency requirement.

For information about the programs, please refer to the cosponsoring department.

Biology/Biotechnology (M.S./Ph.D.)

Degree programs are designed for students whose interests are in molecular biology and the applied aspects of biotechnology, and who prefer a program emphasizing biology rather than engineering (cosponsored by the Department of Biology).

Biotechnology Engineering (M.S./M.E./Ph.D.)

Degree programs are designed for students who are interested in the engineering aspects of biotechnology (sponsored by the Department of Chemical and Biological Engineering).

Chemistry/Biotechnology (M.S./Ph.D.)

Degree programs are designed for students with interests in chemistry and the applied aspects of biotechnology, and who prefer a program emphasizing the chemical aspects of biotechnology (cosponsored by the Department of Chemistry).

Engineering Management with Specialization in Biotechnology (M.S.)

The master's degree program is designed for working professionals in management or desiring to move into management positions. The program emphasizes a project approach to learning (cosponsored by the Gordon Institute of Engineering Management).

CERTIFICATE PROGRAMS

Tufts Bioengineering and Biotechnology Center offers three graduate-level certificate programs to qualified students through the Office of Graduate Studies, and in conjunction with the departments of biology, chemical and biological engineering, and chemistry. The certificate programs can be completed on a part-time, nondegree basis by students who are seeking professional training in the field or preparing for a degree program. In most cases, courses taken as a certificate student can be transferred into a related master's degree program. The programs are open to students who have already earned a bachelor's degree. Four courses are required for each certificate.

Certificate Program in Biotechnology

Emphasizes molecular biology practices and state-of-the-art cloning and expression techniques to explore aspects of biotechnology.

Two core courses from the following:

Biology 105 Molecular Biology

Biology 152 Biochemistry and Cellular Metabolism

Biology 153 Topics in Biochemistry

Biology/Chemistry 171 Biochemistry I

Biology/Chemistry 172 Biochemistry II

Chemical and Biological Engineering 161 Protein Purification

Chemical and Biological Engineering 162 Molecular Biotechnology

Biomedical Engineering 164 Biomaterials and Tissue Engineering

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

One of these three laboratory courses:

Biomedical Engineering 175 Tissue Engineering Laboratory

Chemical and Biological Engineering 163 Recombinant DNA Techniques

Chemical and Biological Engineering 168 Biotechnology Processing Projects Laboratory

One elective course in biology, chemical and biological engineering, or chemistry that is relevant to biotechnology.

Certificate Program in Biotechnology Engineering

Emphasizes state-of-the-art bioprocessing principles, utilizing industry-based projects and case studies.

Two core courses:

Chemical and Biological Engineering 161 Protein Purification

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

One laboratory course:

Chemical and Biological Engineering 163

Recombinant DNA Techniques

or **Chemical and Biological Engineering 168**

Biotechnology Processing Projects Laboratory or

Biomedical Engineering 175 Tissue Engineering Laboratory

One elective course in biology, chemical and biological engineering, or chemistry that is relevant to biotechnology.

For more detailed information, please visit the Web site <http://ase.tufts.edu/chemical>.

Biotechnology and Biotechnology Engineering Certificate Program

Faculty adviser: Professor David L. Kaplan, *Biomedical Engineering / Chemical and Biological Engineering*

The field of biotechnology is vibrant, with constant new developments and advances that are generating opportunities for scientific exploration and employment. New biotechnology-derived pharmaceutical products are gaining FDA approval, the sequencing of the human genome will lead to tremendous new opportunities in disease prevention, and transgenic plants and animals are offering new options in large-scale production of products. The ability to manipulate the genetic content of microbial, insect, animal, and plant cells has led to a variety of commercial applications in medicine, nutrition, materials science, and the environment.

Through industry-based projects and case stud-

ies, the certificate courses cover the fundamentals and practical considerations in the field, including construction of recombinant DNA and the production of enzymes, therapeutic proteins, vaccines and small-molecule primary and secondary metabolites. The curriculum features modern techniques for separation and purification of small and large biomolecules, including techniques specially designed for today's biotechnology products. In addition, production and separation case studies emphasize process economics, GMP, and QA/QC.

The program is open to students with a bachelor's degree and a background in biology, chemistry, or engineering. Students who lack the necessary biology or engineering background can take primer courses during the summer.

Two certificate programs are available. Each certificate requires four courses.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

Chemical and Biological Engineering

Professor Nak-Ho Sung, *Chair; Polymers and composites, interface science, polymer diffusion, surface modification*

Professor Linda Abriola, *Groundwater hydrology, contaminant fate and transport*

Professor Maria Flytzani-Stephanopoulos, *Environmental catalysis, clean energy technologies, nanostructured oxides, fuel cells*

Professor Christos Georgakis, *Modeling, optimization and process control, batch processing*

Professor David L. Kaplan, *Biotechnology, biomaterials, tissue engineering*

Emeritus Professor Gregory Botsaris, *Crystallization, nucleation, applied surface science*

Emeritus Professor Kenneth A. Van Wormer, Jr., *Optimization, nucleation, reaction kinetics, VLSI fabrication*

Associate Professor Jerry H. Meldon, *Mass transfer, membrane processes, reaction-separation coupling*

Associate Professor Daniel F. Ryder, *Polymer and ceramic materials processing, inorganic/organic nanocomposite materials*

Assistant Professor Kyongbum Lee, *Metabolic engineering, tissue engineering, systems biology*

Assistant Professor Blaine Pfeifer, *Biotechnology, cellular engineering, natural product biosynthesis and development*

Assistant Professor Hyunmin Yi, *Nanobiofabrication,*

Smart Biopolymers, BioMEMS

Research Professor Howard Saltsburg, *Catalysis, materials science*

Research Associate Professor Aurelie Edwards, *Physiological modeling*

Adjunct Professor Walter Juda, *Electrochemistry and chemical reaction engineering*

Adjunct Associate Professor Navin Patel, *Process Design and Simulation, Applied Thermodynamics, Properties of Fluids*

Chemical engineering builds on the sciences, especially Chemistry and now Biology, to design good processes and products useful for society. Chemical engineers tend to be the broadest of all engineers and thus are employed in a wide range of industries. Besides being well-trained in sciences they appreciate the central role of economics as they are often concerned with the production of products that will be sold and bought at an affordable price. Their professional skills are required wherever engineering and chemistry or biology intersect. This occurs not only in the chemical industry but also in the biological, environmental, health, legal, and medical fields. Chemical engineers are researchers, designers, producers, and managers. Petroleum, paints, plastics, paper, detergents, pharmaceuticals, vaccines, microchips, drugs, processed foods, fertilizers, conventional and nuclear fuels, insecticides, rocket propellants, synthetic fibers, and rubber are among the many products they help create.

The student who majors in chemical engineering has considerable flexibility in choosing a program and is assisted in doing so by a departmental adviser. A student may choose a curriculum leading to the professional degree of Bachelor of Science in chemical engineering or a curriculum leading to the more general Bachelor of Science in engineering. The professional degree curriculum is accredited by the Accreditation Board for Engineering and Technology (ABET) and prepares its recipients for professional practice or graduate study. Most of the recipients of this degree follow various engineering careers. The degree is not restrictive, however, and many students use the professional degree curriculum as preparation for further study in medicine, law, business, or science.

The general engineering degree curriculum is similar to that of a science major in the College of Liberal Arts. It allows more electives than the professional degree curriculum, as well as more courses

in the humanities and social sciences. The curriculum is for students who want an understanding of engineering fundamentals, but who will make their careers in related fields such as medicine, business, and law. The degree has not been submitted to ABET for accreditation.

Undergraduates are encouraged to participate in the department's research programs and independent study for degree credit.

UNDERGRADUATE PROGRAM

Bachelor of Science in Chemical Engineering

The mission of the BSChE degree program offered by the Chemical and Biological Engineering Department is to provide its undergraduate students:

- A strong foundation in the pure sciences including biology, chemistry, mathematics and physics.
- A solid understanding of the fundamental chemical engineering sciences, coupled with quantitative skills, so as to provide a basis for a successful professional career within the technology fields.
- Training of communication skills consistent with the requirements of both the technical professions and the broader community in which they live.
- A capacity and desire for the pursuit of lifelong learning.

The faculty is committed to accomplishing this mission through the integration of teaching and research.

The goals of the B.S.Ch.E. program are to:

- Provide students a sound technical foundation in both the traditional and emerging areas of chemical engineering. In particular, the Tufts B.S.Ch.E. program emphasizes the incorporation of the biological sciences into the technical foundation throughout the curricula.
- Provide quality instruction emphasizing the logical identification and solution of problems; the solution of complex quantitative problems using computational methods; and the application of engineering analysis to the chemical and biological sciences.
- Offer a high-quality instruction that encompasses not only the technical content but also

makes students aware of the societal implications of technology.

d) Provide students the opportunity to formulate, analyze, and solve engineering problems within a team structure; and to communicate their findings in both written and oral forms.

e) Encourage and provide opportunities to sample specialized areas through elective courses, minor programs, industrial internships, and independent research; and as such, to foster an appreciation for lifelong education.

A suggested program of required courses and free electives for the bachelor of science degree in chemical engineering (accredited program) follows.

First-Year Program

The program is similar for all engineering students with the additional requirement that two courses in introductory chemistry and also Physics 11 be completed.

FALL TERM

Engineering 2 (half credit)

Engineering—Introductory elective (half credit)

Mathematics 11 Calculus I

Chemistry 1 or 11 (with laboratory) Chemical Foundations

English 1 Expository Writing

SPRING TERM

Engineering Science 2

Mathematics 12 Calculus II

Chemistry 2 or 12 (with laboratory) Chemical Principles

Physics 11 (with laboratory) General Physics I

Humanities or social sciences elective

Sophomore Year

FALL TERM

Chemistry 31 and 33 Beginning Physical Chemistry (with laboratory)

Mathematics 13 Calculus III

Engineering Science 10 Structure and Strength of Materials

Chemical and Biological Engineering 10 Chemical and Biological Thermodynamics and Process Calculations I

Engineering Science 11 Introduction to Biology

SPRING TERM

Chemical and Biological Engineering 11 Chemical and Biological Thermodynamics and Process Calculations II

Mathematics 38 Differential Equations

Advanced Science or CHBE elective

Humanities or social sciences elective

Junior Year

FALL TERM

Chemical and Biological Engineering 20 (Unit operations and Transport Phenomena I)

Chemical and Biological Engineering 21

Chemical and Biological Engineering 21 (Unit operations and Transport Phenomena II)

Chemical and Biological Engineering 39 Applied Mathematics and Software for Chemical Engineers

Chemistry 51 and 53 Organic Chemistry Laboratory

Engineering Science 3 Introduction to Electrical Engineering

Humanities or social sciences elective

SPRING TERM

Biology 152 Biochemistry and Cellular Metabolism

Chemical and Biological Engineering 22

(Unit Operations and Transport Phenomena III)

Chemical and Biological Engineering 102

Reactor Design

Advanced chemistry elective

Chemical and biological engineering elective

Senior Year

FALL TERM

Chemical and Biological Engineering 23

(Unit Operations and Transport Phenomena IV)

Chemical and Biological Engineering 24A

Chemical Engineering Projects Laboratory

Chemical and Biological Engineering 109

Process Dynamics and Control

Chemical and biological engineering elective or undergraduate research

Advanced humanities or social science elective

SPRING TERM

Chemical and Biological Engineering 24B (Chemical Engineering Projects Laboratory)

Chemical and Biological Engineering 60 Chemical Process Design

Chemical and biological engineering elective

Advanced chemistry elective (1 cr)

Free elective

Approved Advanced Chemistry Elective Courses

Two advanced chemistry electives are required and are to be chosen from the following list (exceptions must be approved by the department).

Biology 153 Topics in Biochemistry

Chemical and Biological Engineering 121 Principles of

Polymerization

Chemical and Biological Engineering 122 Physical Chemistry of Polymers

Chemical and Biological Engineering 140 Surface and Colloid Chemistry

Chemistry 42 Analytical Chemistry

Chemistry 52 Organic Chemistry

Chemistry 55 Advanced Synthesis Laboratory

Chemistry 61 Inorganic Chemistry

Chemistry 132 Chemical Kinetics

Chemistry 133 Quantum Mechanics

Chemistry 135 Biophysical Chemistry

Chemistry 136 Spectroscopy and Molecular Structure

Chemistry 141 Instrumental Analysis

Chemistry 150 Intermediate Organic Chemistry

Chemistry 151 Physical Organic Chemistry

Chemistry 152 Advanced Organic Synthesis

Chemistry 161 Advanced Inorganic Chemistry

Chemistry 162 Chemistry of Transition Metals

Chemistry 163 Diffraction Methods of Structure Determination

One advanced chemistry elective may be substituted by an advanced natural science elective from the following list.

Biology 41 General Genetics

Biology 46 Cell Biology

Biology 104 Immunology

Biology 105 Molecular Biology

Biology 106 Microbiology

Biology 134 Neurobiology

Physics beyond Physics 12

Combined Bachelor's and Master's Degrees Program

This program is conducted jointly by the Department of Chemical and Biological Engineering and the Graduate School of Arts and Sciences. Exceptional students may combine undergraduate and graduate courses and are simultaneously enrolled in bachelor's and master's degree programs. Both degrees are awarded only on completion of the entire program; a student may not receive one degree earlier, even if the requirements for that degree have been met. Combined-degrees students must pay four years of undergraduate tuition and the entire tuition for the master's degree.

The combined-degrees program is one way of recognizing the fact that an increasing number of undergraduates are entering college with exceptional preparation in certain areas and that many are capable of doing graduate work in their upper-class years.

Students seeking admission to the program should consult their undergraduate advisor and their prospective graduate advisers before applying to the graduate school. Combined-degrees students are expected to fulfill all the requirements of the undergraduate and graduate programs. No courses offered in fulfillment of one set of requirements may be used for the other.

Admission to the program occurs during the junior year. Only in exceptional cases will an application be accepted after the junior year. Therefore, students interested in the program should contact their advisers early in their academic career to facilitate program planning. A student may elect to withdraw from the program at any time by filing the appropriate petition.

Bachelor of Science in Engineering

This general engineering degree program combines liberal arts with basic engineering education in a four-year non-accredited program. It is for the individual who may not wish to function as a professional engineer, but who wants a basic science and technology background as preparation for a career in a related field such as medicine, law, or business.

Flexibility is built into the program so that students can pursue their own interests to a greater extent than is possible in the accredited engineering programs. The thirty-eight courses required for the completion of the program fall into the four categories listed below.

Foundation requirements - ten course credits:
Mathematics 11, 12, 13, and 38; Physics 1 or 11;
Chemistry 1, 2, 32, 33, 50 (or 51), and 53.

Engineering science - eleven courses: four courses in engineering science and seven electives in science, mathematics, or engineering.

Chemical and biological engineering - six courses, including Chemical Engineering 10 and 11.

Free electives - eleven courses, including at least six in the humanities and social sciences.

Premedical, Predental, and Preveterinary Preparation via the Chemical Engineering Curriculum

Students interested in entering medical, dental, or veterinary school after graduation can satisfy professional school entrance requirements while working toward a bachelor's degree in the

Department of Chemical and Biological Engineering.

Modern medical practice and research is increasingly dependent on engineering methods and devices. Automatic instruments now monitor and assist body function. New synthetic materials repair and even replace body tissue. Mathematical equations that describe the flow of fluids in pipes apply to the flow of blood in veins. The kidney, lung, and heart functions have analogies in chemical engineering process equipment.

Computers are used in diagnosis and research. Given these important areas in medicine, there is a need for students to combine undergraduate engineering with graduate medical training.

Two kinds of preparatory programs are suggested by the department. The first is the professional degree program in chemical engineering; a student choosing this program must complete all the requirements for the accredited bachelor of science degree in chemical engineering. Courses required for entrance into medical, dental, or veterinary school are met through selection of electives, summer school, or an increase in course load.

The second program has greater flexibility and leads to the non-accredited Bachelor of Science degree in engineering, described above. This program gives students a foundation in engineering fundamentals and the possibility of satisfying professional school entrance requirements and pursuing individual interests in other fields through selection of electives.

UNDERGRADUATE MINOR PROGRAMS

In addition to completing the courses for the concentration requirement, an undergraduate may elect to enroll in a minor program in a different, although possibly related field. All courses used in fulfillment of the minor program must be taken for a grade. No more than two courses used to fulfill a foundation or concentration requirement may be counted toward fulfillment of the minor. Students may not complete both a minor and a concentration in the same discipline.

Biotechnology Engineering Minor

Five courses are required to obtain this minor. Biology 152 or Chemistry 156; two courses from the following: Chemical and Biological Engineering 62, 161, or 166; one course from the following: Biology 50, Chemical and Biological Engineering

163 or 168; and an elective chosen from an approved list. No more than two courses used to fulfill a foundation, distribution, or concentration requirement may be counted toward the minor.

Chemical Engineering Minor

Five courses are required: Chemical and Biological Engineering 10, 11, 39, 102; and a chemical engineering elective approved by the minor committee. All courses must be taken for a grade. No more than two courses used to fulfill a foundation, distribution, or concentration requirement may be counted toward the minor.

SECOND MAJOR IN BIOTECHNOLOGY

This program is offered as a major only in conjunction with enrollment in a regular undergraduate major, ordinarily excluding interdisciplinary programs. The biotechnology program has been designed with two tracks: a science track for undergraduate students enrolled in the College of Liberal Arts, and an engineering track for undergraduate students enrolled in the School of Engineering.

Core Curriculum

Biology 1/Engineering Science 11 Introduction to Biology

or **Biology 13** Cells and Organisms

Biology 41 Genetics

Chemical and Biological Engineering/Biology 62

Introduction to Biotechnology

One laboratory course from:

Biology 50 Experiments in Biology II

Chemical and Biological Engineering 163

Recombinant DNA Techniques

Chemical and Biological Engineering 168

Biotechnology Processing Projects Laboratory

Track curricula

SCIENCE TRACK

Two core courses:

Biology 105 Molecular Biology

Biology 152 Biochemistry and Cellular Metabolism

or **Chemistry 156** Biochemistry

Four electives from an approved list provided by the department. Up to two credits of research may be counted toward electives.

ENGINEERING TRACK

Two core courses:

Chemical and Biological Engineering 161 Biochemical Separations

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

Four electives from an approved list provided by the department. One credit of research may be counted toward electives.

CERTIFICATE PROGRAMS

The Chemical & Biological Engineering Department offers three graduate-level certificate programs to qualified students through the Office of Graduate Studies. The certificate programs, Biotechnology, Biotechnology Engineering and Bioengineering can be completed on a part-time, non-degree basis by students who are seeking professional training in the field or preparing for a degree program. In most cases, courses taken as a certificate student can be transferred into a related master's degree program. The programs are open to students who have already earned a bachelor's degree. Four courses are required for each certificate.

A certificate builds on the strength of existing Tufts courses and programs. As a certificate student, you have the flexibility to choose courses that were created exclusively for a certificate program, as well as the traditional Tufts graduate and undergraduate courses. In order to accommodate working professionals' schedules, most certificate courses are offered in the late afternoon and evening.

Certificate students may apply later for a related master's or doctoral program at Tufts. Once you have been accepted, you are permitted to transfer four applicable certificate courses into a graduate program.

GRADUATE PROGRAM

The Department of Chemical and Biological Engineering offers instruction leading to the degrees of master of science, master of engineering, and doctor of philosophy. General GRE test scores are required of applicants to all graduate degree programs.

Master of Science or Master of Engineering with Major in Chemical Engineering

Candidates for the master's degree programs in chemical engineering usually hold a bachelor of science degree in chemical engineering or in chemistry, with a suitable background in engineering subjects. A strong background in mathematics, biology, chemistry, and physics is essential. Students with degrees in physical science or other engineering disciplines may become candidates upon satisfactory completion of certain upper-level undergraduate courses. A highly recommended alternative to formal enrollment in academic-year, undergraduate chemical engineering courses is the intensive two-course summer sequence of Chemical and Biological Engineering 1 and 2. Successful completion of these courses qualifies a student to apply to the master's degree programs.

Students enrolled in the Master of Science degree program must take seven courses for letter grades. No more than one of these seven may be guided individual study. Generally, at least five credits are from a list of chemical engineering courses; the remaining courses may be in allied fields. A thesis (three credits) is also required along with an oral examination covering the field of the student's thesis. Only students in the Master of Science degree program may apply for financial assistance.

Students enrolled in the Master of Engineering degree program must take ten courses for letter grades. Generally, at least eight credits are from a list of chemical engineering courses; the remaining courses may be in allied fields.

Master of Science or Master of Engineering with Major in Biotechnology Engineering

Candidates for the master's degree programs in biotechnology engineering usually hold a bachelor of science degree in chemical engineering with a suitable background in biological sciences. A strong background in mathematics, chemistry, and physics is essential. Students with degrees in physical science or other engineering disciplines who have no background in biology may become candidates upon satisfactory completion of certain undergraduate courses. For students without undergraduate chemical engineering degrees, a highly recommended alternative to formal enrollment in academic-year undergraduate chemical

engineering courses, is the intensive two-course summer sequence of Chemical and Biological Engineering 1 and 2. Successful completion of these courses qualifies a student to apply for the master's program.

Students enrolled in the Master of Science degree program must take seven courses for letter grades. No more than one of these seven may be guided individual study. Generally, at least four credits are from a list of Chemical and Biological Engineering courses and three are graduate biology/chemistry courses selected from a list. A thesis (three credits) is also required for the degree. Only students in the Master of Science degree program may apply for financial assistance.

Students enrolled in the Master of Engineering degree program must take ten courses for letter grades. Generally, at least six credits are from a list of Chemical and Biological Engineering courses and four are graduate biology/chemistry courses selected from a list. No more than one of the ten courses may be guided individual study.

Doctor of Philosophy

Doctoral degrees are offered in Chemical Engineering and in Biotechnology Engineering. Candidates for the Doctor of Philosophy degree, except when otherwise recommended by the department, will have completed the seven courses required for the Master of Science degree. A qualifying examination must be satisfactorily completed. This examination is usually taken after one full year of residence.

In addition to satisfying the university requirements for the Doctor of Philosophy degree, a candidate must satisfactorily complete a program of courses (established by the candidate's committee) and write a doctoral dissertation. The doctoral dissertation is considered the candidate's major task. It must represent a significant contribution to the field and contain material worthy of publication in a recognized professional journal.

For more detailed information, please visit the Web site <http://ase.tufts.edu/chemical>.

Chemical Physics

(FOR DEGREE REQUIREMENTS, SEE CHEMISTRY OR PHYSICS.)

Chemistry

Professor Krishna Kumar, *Chair; Organic and bioorganic chemistry*

Professor Robert R. Dewald, *Physical chemistry*

Professor Terry E. Haas, *Physical inorganic and materials chemistry*

Professor Jonathan E. Kenny, *Physical and environmental chemistry*

Professor Mary Jane Shultz, *Surface chemistry, environmental and materials chemistry*

Professor Robert D. Stolow, *Organic chemistry, conformational studies*

Professor David R. Walt, *Robinson Professorship in Chemistry; Bioorganic and materials chemistry*

Associate Professor Marc d'Alarcao, *Organic and biomedical chemistry*

Associate Professor Samuel P. Kounaves, *Analytical, environmental, and materials chemistry*

Associate Professor Albert Robbat Jr., *Analytical chemistry*

Associate Professor Elena Rybak-Akimova, *Inorganic and bioinorganic chemistry*

Associate Professor Arthur L. Utz, *Physical and materials chemistry*

Assistant Professor David H. Lee, *Organic and bioorganic chemistry*

Assistant Professor Charles Sykes, *Physical chemistry*

Lecturer Sergiy Kryatov, *Inorganic chemistry and chemical education*

Chemistry, the central science, offers exciting challenges to professionals who seek a fundamental understanding of the world we live in, and creative solutions to the problems confronting the global community. Chemistry offers more than hope in our attempts to feed, clothe, and house our burgeoning populations: It offers possibilities. In the search for renewable substitutes for scarce energy sources and minerals, chemistry provides the basic framework for materials scientists. As the medical community fights to conquer new and old diseases and improve the health of our populations, chemical principles guide the paths of investigators, sug-

gesting correlations in results, and pointing the way toward ultimate solutions.

On a national level, chemistry provides the key to the future. In monitoring, cleaning up, and protecting our environment, chemistry can and must be wisely applied. In ensuring a healthy economy, chemistry now plays a vital role, as the U.S. chemical industry employs more than one million people and provides the second-largest positive international trade balance of all commodity groups. From community health to economic well-being, chemistry can be expected to maintain its preeminent role in shaping and protecting our nation's future.

The study of chemistry is appropriate to many different career goals, including medicine, law, physical and social sciences, engineering, and public policy. The Department of Chemistry at Tufts is well equipped to provide basic and advanced chemistry education to undergraduates. It offers a wide variety of courses, newly expanded and improved facilities, an active teaching and research faculty, and a favorable faculty-to-student ratio. Students who participate in research receive a great deal of personal attention from their faculty adviser, and have excellent opportunities for undertaking senior projects and honors theses. They may choose from a broad range of research projects, because the faculty is involved in all the traditional areas of chemical research, as well as many of the exciting new interdisciplinary endeavors.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The chemistry department offers four majors: 1) an American Chemical Society (ACS)-certified major, 2) a chemistry major, 3) a chemical physics major, and 4) a biochemistry major. Each of these four majors must be completed with a minimum GPA of 2.00 for the courses applied to the major. Additionally, no more than one course (of any credit value) with a grade below a C- may be applied to any of these majors. The ACS-certified degree includes a certificate issued by the American Chemical Society and is recommended for those whose career goals include employment as a professional chemist or scientist, involvement in research, or graduate school in chemistry. Courses leading to a certified major include research that offers students an opportunity to work closely with members

of the department's renowned research faculty.

The major in chemical physics also carries American Chemical Society certification and is intended for those students who desire a more theoretical, physics-oriented education. The biochemistry major is recommended for those students with an interest in biologically oriented chemistry. The chemistry major offers greater flexibility in course selection.

Students with interest in any of these majors should acquire a copy of the chemistry department undergraduate handbook, available from the department office located in Pearson 110 or on the department's Web site at <http://chem.tufts.edu>.

ACS-Certified Major in Chemistry

Foundation: Chemistry 1, 11 or 16; and Chemistry 2 or 12. Core courses: Chemistry 31, 32, 33, 34, 42, 51, 52, 53, 54, 61, 63 and 141. Research: Chemistry 91 and 92. The following sequence of courses is suggested: first year, Chemistry 1 (or 11) and 2 (or 12); second year, Chemistry 51/53, 52/54; third year, Chemistry 31/33, 32/34 and 42; fourth year, Chemistry 91/92, 61, 63 and 141. The following alternative sequence is recommended for students with greater interest in physical or materials chemistry: first year, Chemistry 1 (or 11) and 2 (or 12); second year, Chemistry 31/33, 32/34, and 42; third year, Chemistry 51/53, and 52/54; fourth year Chemistry 61, 63, 91/92 and 141.

Major in Chemistry

Foundation: Chemistry 1, 11, or 16; and Chemistry 2 or 12; Intermediate: Chemistry 31, 33, 42, 51, 53; three additional courses in intermediate or advanced chemistry, excluding Chemistry 34 and 54; and two approved courses in related fields. Full credit chemistry courses with numbers higher than 16 (except 91) may be used to fulfill the related fields courses. Because of the importance of taking intermediate and advanced formal courses in chemistry, such as Chemistry 32, 34, 52, 54, and 61, only one course of undergraduate research, specifically Chemistry 92, Research II, may be counted toward the three additional courses in intermediate or advanced chemistry.

Work in mathematics and physics is required as a prerequisite to Chemistry 31 and 32. Additional work in biology, mathematics, and/or physics is also desirable. A student contemplating concentration in chemistry is advised to take courses in mathematics and physics as well as chemistry dur-

ing the first year. Students majoring in chemistry should complete Chemistry 31, 32, 33, 42, 52, and 54 before the end of the junior year.

Major in Chemical Physics

Ten courses are required as follows. Foundation: Chemistry 1, 11, or 16; and Chemistry 2 or 12; four more advanced courses in chemistry; two courses in mathematics more advanced than Mathematics 13; and four courses in physics more advanced than Physics 2 or 12. Either Physics 64 or Chemistry 34 must be included. With the exception of these, one physics course and one chemistry course may be replaced by approved courses in related fields.

Faculty advisers in the chemistry and physics departments are available for consultation about the chemical physics program.

Major in Biochemistry

Chemistry 1, 11, or 16; and Chemistry 2 or 12; Chemistry 51/53, 52/54, 31, 42, 171, and 172; Biology 13, 41, 50 (or Chemical Engineering 163), and 105. Course work in mathematics (Mathematics 12) and physics (Physics 2 or 12) is required as prerequisite to Chemistry 31. The following sequence of courses is suggested for students concentrating in biochemistry: first year, Chemistry 1 (or 11) and 2 (or 12), Biology 13; second year, Chemistry 51/53, 52/54; third year, Chemistry 31 and 42, Biology 41 and 105; fourth year, Chemistry 171/172, Biology 50 (or Chemical Engineering 163).

GRADUATE PROGRAM

The Department of Chemistry offers M.S. and Ph.D. degrees in chemistry as well as in chemistry/biotechnology. Students interested in the joint chemistry/biotechnology program should obtain the booklet *Academic Requirements and Procedure for the Chemistry/Biotechnology Graduate Program*, available in the chemistry department office.

In the first year of graduate study, entering students meet with the department's graduate committee and are placed into a series of core courses in each of the traditional areas of chemistry: analytical, inorganic, organic, and physical. These courses are intended to ensure that by the end of the first year the student has an adequate grounding in the fundamentals of chemistry. Each student then takes additional advanced courses in his/her area of specialization.

Master of Science

A candidate for the master of science degree in chemistry is expected to have a satisfactory background in physics, mathematics, and chemistry.

All master's degree candidates are required to pass (B- or better) eight formal classroom graduate courses in chemistry or approved, related fields. Four of these courses must be in chemistry. Two may be approved independent study (293, 294). Alternatively, a student may elect to take six formal classroom courses and two credits of research (295, 296). The courses must be chosen in consultation with the graduate committee. Students may also elect to prepare a master's thesis which they must then present and defend before their research committee.

Doctor of Philosophy

The doctorate in chemistry is awarded to students who have demonstrated a broad familiarity with the science of chemistry, a thorough knowledge of their specialized field, and who have displayed competence in planning and conducting chemical research.

By the end of the third semester, each graduate student must pass (with a B- or higher) one formal classroom course in each of the four traditional areas of chemistry. At least six formal graduate courses in chemistry (exclusive of research) are required for the degree and must be completed satisfactorily by the end of the fourth semester. Additional courses in chemistry or related fields may be required by individual research supervisors.

Selection of a research supervisor is usually made during the first year on the basis of common interest. The student and research supervisor nominate two faculty members to serve on the student's doctoral committee. The doctoral committee (in conjunction with the student's research adviser) takes over the advisory function from the graduate committee and guides the student's research to promote his/her development as an independent investigator.

Doctoral students must also satisfy the following requirements:

- 1) Service as a teaching assistant
- 2) Presentation of two independent study topics during the second year. One study topic is to be presented as a departmental seminar
- 3) By the end of the eighth semester in residence, the student must successfully defend an original

research proposal that will be judged on the basis of novelty and proposed methodology

- 4) Completion of a dissertation reporting significant work of publishable quality

The department is actively engaged in research in the areas of organic, inorganic, physical, and analytical chemistry, as well as the interdisciplinary areas of bioorganic, environmental, and materials chemistry. For more information concerning research interests, facilities, and financial aid, please see the booklet Graduate Program in Chemistry, available by request from the Department of Chemistry.

For more detailed information, please visit the Web site <http://chem.tufts.edu>.

Child Development

ELIOT-PEARSON DEPARTMENT OF CHILD DEVELOPMENT

Associate Professor Ellen E. Pinderhughes, *Chair*;

Influences on family socialization processes among families with children at risk for problematic outcomes; adoption and foster care

Professor M. Ann Easterbrooks, *Family development, social and emotional development, infancy*

Professor David Elkind, *Cognitive development, perceptual development, Piaget*

Professor David Henry Feldman, *Cognitive development, developmental and educational theory, creativity*

Professor Richard M. Lerner, *Bergstrom Chair in Applied Research in Youth Development; Director, Institute for Applied Research in Youth Development, Application of developmental science across the life span, personality and social development in adolescence, university-community collaboration and outreach scholarship*

Professor Fred Rothbaum, *Parent-child relationships, family and culture, child-clinical psychology, research dissemination*

Professor Donald Wertlieb, *Clinical aspects of family and child development, pediatric and health psychology, stress and coping*

Professor Maryanne Wolf, *John DiBiaggio Chair in Citizenship and Public Service; Director, Center for Reading and Language Research; Dyslexia, cognitive neurosciences, cognition, developmental psycholinguistics, reading development and intervention*

Emerita Professor Sylvia G. Feinburg, *Teacher education, early childhood education, child art*

Associate Professor Kathleen A. Camara, *Family relationships, social development, research methodology*

Associate Professor Calvin Gidney III, *Linguistics, literacy,*

sociolinguistic development, language of African-American children, language in children's television, development of children's language attitudes

Associate Professor Francine Jacobs, *Child and family policy, program evaluation*

Associate Professor Jayanthi J. Mistry, *Sociocultural perspectives on development, cultural issues in educational practice*

Associate Professor Rebecca Staples New, *Early childhood education, teacher education, sociocultural perspectives on child development, teaching and learning process*

Assistant Professor Marina Bers, *Math, Science and Technology/Engineering Initiative; Educational technology, impact of new technologies for personal, social and moral development, use of technology in hospitals, museums, schools and communities*

Assistant Professor W. George Scarlett, *Deputy chair; Children's play; Religious and spiritual development; Approaches to managing children's problem behavior; Organized youth sports*

Assistant Professor (part-time) Martha Julia Garcia-Sellers, *Cross-cultural studies, parent-child interaction, preventive intervention, school adaptation*

Lecturer Betty Allen, *Coordinator of Field Placement and Student Teacher Placement; Inclusion in regular education classrooms, antibias education, teacher training*

Lecturer Gretchen Biesecker, *Social and personality development*

Lecturer Terrell Clark, *Sign language, deaf studies*

Lecturer Margery Davies, *Child and family policy*

Lecturer Julie Dobrow, *Coordinator of Family and Media Initiative; Effects of media on children, ethnic and gender representations in media*

Lecturer Mary Eisenberg, *Director, Evelyn G. Pitcher Curriculum Resource Laboratory, Teacher education, early childhood curriculum development, tools for supporting and understanding teacher and children thinking, the arts in child development and learning*

Lecturer Heidi Given, *Early Childhood Education, Head teacher, Eliot-Pearson Children's School, Diversity and equity in education, teacher development*

Lecturer Deborah Lee-Keenan, *Director, Eliot-Pearson Children's School; Multicultural and antibias education, curriculum development and implementation, special needs*

Lecturer Jim Lipsky, *Sign language*

Lecturer Roberta Pasternack, *Creative movement*

Lecturer Martha Pott, *Coordinator of Capstone Internships for M.A. Applied Program; Education, personal-social development*

Lecturer Marion Reynolds, *Children's literature,*

elementary curriculum development and teacher education, professional development of elementary teachers, children's understanding of the content and concepts of elementary subject matter

Lecturer Janet Zeller, *Director, Tufts Educational Day Care Center; Teacher education, special education, school-home community relations*

Adjunct Associate Professor Lynn Meltzer, *Learning disabilities and assessment*

Research Professor Lawrence Gianinno, *Socialization of economic understanding and practices of children of immigrants; Influence of cultural belief system on child development*

Research Professor Erin Phelps, *Quantitative and qualitative methods for developmental research, longitudinal analysis, social responsibility and civic engagement, positive youth development in diverse contexts*

The Eliot-Pearson Department of Child Development provides students with a solid grounding in research and theory about the intellectual, emotional, social, linguistic, and physical development of children. Course material is complemented with observations and work with children in a wide range of applied settings. These settings include schools, hospitals, clinics, day care centers, educational television studios, museums, and juvenile courts. These practicum experiences are an essential part of a concentration in child development, where the integration of theory, research, and practice is an abiding goal.

Undergraduates who major in child development may choose to follow any of several programs of study. One major orientation is the field of child development as a behavioral science. Students who choose this orientation generally view their study of child development as a natural forerunner to graduate work in child developmental psychology, child clinical psychology, pediatric psychology, law, public policy, and other disciplines that have the health, education, and welfare of children as a primary goal. In addition, Eliot-Pearson offers students a foundation in applied developmental science, an emerging interdisciplinary field that generates and uses theory and research about human development to improve the lives of children, youth, and families around the world.

A second program of study within the department is that of child development as a preparation for careers in education. This program places dual emphasis on contemporary child development the-

ory and research, as well as the role of collaborative inquiry in early childhood teacher education. Embedded throughout course work and practical experiences is a commitment to preparing teachers to work with all young children and their families, including those with special needs. Students who choose this program may seek Massachusetts licensure as an early childhood teacher (Pre-K to grade 2). This program has been approved by the Massachusetts Department of Education, and the certificate is reciprocated in the majority of states. In collaboration with Tufts Department of Education, undergraduate and graduate students may choose to enroll in a program that leads to licensure in Massachusetts as an elementary teacher of grades 1 through 6.

A third orientation takes child development as a starting point for a career in human services or work with children in clinical, pediatric, or other community settings, including educational practice with children with special needs. A particular emphasis of the department is the promotion of positive child development.

DEPARTMENT FACILITIES

Eliot-Pearson Children's School

Architecturally attached to the Department of Child Development, the Eliot-Pearson Children's School is a laboratory school serving eighty children ages 2.9 to 8 (preschool through second grade). Classrooms are fully integrated, including children with special needs and children and families from diverse cultural and economic backgrounds. The school is an exemplary early-childhood program, modeling innovative developmental education and curricula. Observation facilities and practicum sites provide exceptional training and research opportunities for Tufts undergraduate and graduate students and early-childhood professionals from across New England. The children's school also offers a range of programming for parents and families. For more information, visit <http://ase.tufts.edu/epcs/>.

Tufts Educational Day Care Center

The center is an associated facility that offers an innovative, year-round, full-day educational preschool and kindergarten program for approximately eighty-five children from within the Tufts community and its surrounding cities. The center is a direct service and laboratory school housing four

classrooms. It serves an ethnically diverse, international population of youngsters and eagerly seeks to serve children with a wide variety of special needs. Tufts students and faculty, particularly within the Department of Child Development, can observe, conduct research, and participate in a variety of practice teaching experiences. The Special Friends Program, jointly sponsored and supervised by the center and the university's Leonard Carmichael Society, offers an opportunity for any interested undergraduate to form a close one-to-one relationship with a preschool or kindergarten child. Parents are encouraged to participate in a program tailored to the needs of working families. For more information, visit <http://ase.tufts.edu/tedcc>.

Evelyn G. Pitcher Curriculum Resource Laboratory

Adjoining the department and the children's school is the Evelyn G. Pitcher Curriculum Resource Laboratory, with studio, shop, and audiovisual spaces. The laboratory allows space for the department's multidisciplinary work with mathematics, science, and technology education—a new initiative that involves the Eliot-Pearson Department of Child Development as well as computer science, engineering, and education departments. Within the curriculum laboratory, child development majors can study and develop materials that are then used with young children in a wide range of settings, including classrooms, museums, libraries, clinics, and others. For more information, visit <http://ase.tufts.edu/clab>.

Institute for Applied Research in Youth Development

The institute creates programs and projects that use the framework of applied developmental science to promote healthy, positive development among diverse children, adolescents, families, and communities. For more information, visit <http://ase.tufts.edu/iaryd>.

Center for Applied Child Development (CACD)

The center provides an extensive array of resources and services as well as educational opportunities to the larger community. For more information, visit http://ase.tufts.edu/cacd_outreach.

Center for Reading and Language Research

The center offers a variety of research, teaching, and internship opportunities to students and faculty and a range of services to the surrounding

communities. For more information, visit <http://ase.tufts.edu/crlr>.

Tufts University Center for Children (TUCC)

The center catalyzes and facilitates interdisciplinary research, service, education, training, and social action to advance the well-being of children, their families, and their communities. For more information, visit <http://www.tucc.tufts.edu>.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Child Development

Ten courses, including Child Development 1, and two of the following: Child Development 51 or 151, 61 or 161, and 155. Two courses can be from outside the department, either from the approved list of related fields courses, or with departmental approval. Introductory courses in other departments may not substitute for Child Development 1. Please see the Child Development handbook or Web site for complete information on requirements.

Early Childhood Teacher (Pre-K to Grade 2)

This program, designed for students who plan to teach in public and private early childhood settings, is approved by the Massachusetts State Department of Education and leads to teacher licensure that is reciprocal in the majority of states. A specific course of study is required for completion of the program. The program is also beneficial to those who anticipate entering such fields as guidance counseling, school psychology, technology, museum education, school administration, mental health, social welfare, and child advocacy.

Students interested in becoming licensed as teachers in Massachusetts are required to complete a two-stage licensure process. The requirements for completing the first stage, leading to initial licensure, may be satisfied by completing an undergraduate degree with a major in child development and by completing all teacher licensure program requirements. Initial licensure allows the recipient to be employed by the public schools as an early childhood teacher, pre-K to grade 2.

Elementary Teacher (Grades 1 to 6)

Through a joint program offered with the Department of Education at Tufts, students may also complete a program leading to initial licensure as elementary teacher, grades 1 to 6. Graduates

holding initial licensure are eligible to begin work leading to professional licensure as a teacher in Massachusetts by completing additional course work and the option of completing a master of arts degree. Undergraduates interested in pursuing careers in teaching and who desire professional licensure may apply for acceptance into the graduate program as early as their sophomore year.

UNDERGRADUATE MINOR PROGRAM

The Department of Child Development offers a minor in child development. Five courses are required, two of which are to be chosen from Child Development 1, 51 or 151, 61 or 161, and 155. Three additional electives are to be chosen from other course offerings from within the department.

AMERICAN SIGN LANGUAGE (ASL)

The department offers three levels of American Sign Language. Undergraduates completing all three can have ASL fulfill Part II of the foreign language (foundation) requirement.

GRADUATE PROGRAM

The Department of Child Development offers the master of arts degree, a joint master of arts degree with the Department of Urban and Environmental Policy and Planning, the master of arts in teaching (M.A.T.) degree, and the Ph.D. degree. Along with the standard material sent to the graduate school, applicants for admission to these graduate programs must include a statement of two to three typewritten pages describing their motivation for applying for graduate work in child development and the ways in which they envision using the education received at Tufts. Scores from the Graduate Record Examination are required. The deadline for applications is January 15, although applications received after that time are considered, based on the availability of places.

At both the master's and doctoral levels, students may choose to concentrate in one of six areas of study: clinical developmental psychology, cognitive development, early childhood education, family studies, language and literacy, and children with special needs. At the core of all concentrations is a firm foundation in child development theory and research, and the integration of basic and applied knowledge.

Master of Arts (M.A.)

The master of arts degree requires the satisfactory completion of a ten-credit course of study. Students interested in engaging in child development research conclude the program by writing a thesis; students interested in the more applied, practical aspects of child development conclude the program with an intensive supervised internship. Each route offers a combination of required and elective courses. The master of arts program offers two options for completion of degree requirements. For students who wish to conduct research, the program entails four required courses and six additional elective courses. Students must also complete a thesis.

The M.A. degree program serves child development students with a broad range of professional and intellectual interests. Graduates enter positions in human services agencies, research organizations, schools and early childhood programs, advocacy groups, and institutions of higher education. A significant percentage of graduates continue their studies in law schools, medical schools, Ph.D. programs in developmental or clinical psychology, or public policy. Provisionally certified teachers wishing to obtain standard certification may enroll in the master of arts program, which includes a 400-hour apprenticeship in the schools.

Master of Arts (M.A.) Program with Urban and Environmental Policy and Planning

The master of arts degree offered jointly by the Department of Child Development and the Department of Urban and Environmental Policy and Planning is a fourteen-credit graduate program in child and family policy. Students matriculate in two nationally renowned departments at Tufts and fulfill the general requirements for each, including courses in developmental psychology, policy planning and analysis, and research methods and statistics. In addition, they follow a specific course of study in child and family policy, culminating in a master's thesis. Contact either department for more information.

Master of Arts in Teaching (M.A.T.) Early Childhood and Elementary

The degree of master of arts in teaching is offered for students who seek Massachusetts State Department of Education initial licensure as an early

childhood teacher (pre-K to grade 2), or as an elementary teacher (grades 1 to 6). The elementary 1-6 program is offered in conjunction with the Department of Education at Tufts.

Doctor of Philosophy (Ph.D.)

The doctoral program in child development prepares individuals for either academic or applied settings involving children and their families. Such settings include schools, hospitals, social service agencies, the arts and media, courts, clinical research centers, and policy organizations, as well as colleges and universities. Accordingly, intensive training in theory and research methodology is involved, as well as extensive field experience. Applicants should have strong preparation in the behavioral sciences.

Course work during the first two years emphasizes the major theoretical orientations of the field and research methods and statistics. The remaining courses are selected in accordance with the student's academic plan, which is decided by the student and his or her advisers.

On completion of course work and an internship, students are required to undergo a qualifying review. Two major papers related to theory and research in child development are submitted and the student's progress and course of study in the doctoral program are reviewed. Successful completion of this review is a prerequisite to further doctoral study.

Internships are selected according to the participant's career interests, with students serving as supervised trainees in the service and research functions of the particular setting. The remainder of the program is devoted to participation in research and the completion and defense of a dissertation.

For more detailed information, please visit the Web site <http://www.ase.tufts.edu/epcd>.

Chinese

(FOR DEGREE REQUIREMENTS, SEE GERMAN, RUSSIAN, AND ASIAN LANGUAGES AND LITERATURES.)

Civil and Environmental Engineering

Professor Masoud Sanayei, *Chair; Structural engineering, finite element analysis, structural dynamics*

Professor Linda Abriola, *Groundwater hydrology, mathematical modeling of multiphase flow and transport in porous media*

Professor Lawrence Bacow, *Environmental economics*

Professor Stephen C. Chapra, *Louis Berger Chair; Water quality modeling and advanced computer applications in environmental engineering*

Professor Lewis Edgers, *Geotechnical and geo-environmental engineering*

Professor Shafiqul Islam, *Bernard M. Gordon Senior Fellow in Engineering, Hydroclimatology and hydrometeorology, remote sensing, scale issues*

Professor Richard M. Vogel, *Water resources, environmental statistics, hydrology and hydraulics*

Associate Professor Laurie G. Baise, *Geotechnical engineering, geotechnical earthquake engineering*

Associate Professor Wayne Chudyk, *Drinking water quality and toxic materials, groundwater monitoring*

Associate Professor A. Luis Dorfmann, *Structural engineering and solid mechanics*

Associate Professor John L. Durant, *Chemical fate and transport, water quality, environmental engineering*

Associate Professor David M. Gute, *Environmental and occupational epidemiology*

Associate Professor Stephen H. Levine, *Mathematical and computer modeling of systems*

Associate Professor Christopher Swan, *Geotechnical and geoenvironmental engineering*

Assistant Professor Babak Moaveni, *Structural health monitoring, experimental modal analysis, structural dynamics, uncertainty quantification*

Assistant Professor C. Andrew Ramsburg, *Innovative technologies for site remediation, subsurface fate and transport of contaminants*

Senior Lecturer Lee R. Minardi, *Computer-aided design, geometric modeling, applied mechanics*

Senior Lecturer Mark Woodin, *Environmental and occupational epidemiology*

Lecturer Anne Marie Desmarais, *Environmental health*

Research Professor Paul Kirshen, *Water resources systems, planning and policy; water resources engineering*

Professor of the Practice Brian Brenner, *Bridge design, structural engineering*

Professor of the Practice Eric Hines, *Structural engineering*

Adjunct Assistant Professor G. Kim Knox, *Applied mechanics*

Adjunct Professor Grant Garven, *Groundwater geology and hydrology*

PART-TIME FACULTY:

Lecturer Po-Shang Chen, *Structural Engineering*

Lecturer Larry Cohen, *Hazardous waste treatment technologies*

Lecturer David Hatem, *Legal issues*

Lecturer Amy Hirschfeld, *Technical writing*

Lecturer Masoud Oliia, *Applied mechanics*

Lecturer Michael Paster, *Geotechnical engineering*

Lecturer Diane Silverman, *Environmental toxicology*

Civil engineering, the oldest branch of nonmilitary engineering, is one of the most diverse engineering disciplines. Civil and environmental engineers are responsible for the planning, design, construction, and operation of the physical structures and facilities that are essential to the environment and infrastructure of modern society. Traditionally these structures have included buildings, highways, water and waste treatment plants, tunnels, airports, harbors, railroads, channels, bridges, and dams. The present-day civil and environmental engineer is also involved in research and development in a wide variety of physical and natural systems that add to the convenience of society, the protection of the environment, and the safety of the public health. These activities include the development of new construction materials, the building and rebuilding of the infrastructure, the management of watersheds and water resource systems, the use of mathematical models for forecasting the impact of human activity on environmental quality, and protection against natural hazards such as earthquakes and floods.

UNDERGRADUATE PROGRAM

The practice of civil and environmental engineering is divided into a number of functional areas. The department offers instruction leading to the bachelor of science in civil and environmental engineering degree (BSCE) with specialty options in four of those areas: environmental engineering, geotechnical engineering, structural engineering, and water resources engineering. The department also offers a bachelor of science in environmental engineering (BSEVE) which allows more concentrated study of environmental engineering than the BSCE.

Environmental engineers strive to improve

society's well-being through the planning and design of various environmental systems. These systems include air and water pollution control facilities, the treatment and disposal of hazardous wastes, and the improvement of safety and health in the living, work, and recreational environments.

Geotechnical engineers specialize in the study of soil and rock mechanics and in the analysis of problems of soil response to applied loads, groundwater flow, and geohazards such as earthquakes and landslides. Geotechnical engineers design a variety of earth structures such as dams, embankments, and containment structures for hazardous waste sites, as well as foundations for bridges, buildings, and offshore platforms.

Structural engineers are involved the planning and design of buildings, bridges, dams, frames for all kinds of vehicles, and special structures such as transmission towers. The structural engineer's activity ranges from analysis and design of basic structural components such as beams and columns to the study of material properties and research in engineering mechanics.

Water resource engineers are concerned with the design, planning, operation, and management of water resource systems and the restoration of rivers and watersheds. Water resource engineers are involved in projects ranging from the design and operation of flood control works, hydropower stations, water supply systems, and storm-water systems, to the management of both the quality and quantity of natural water resources such as rivers, lakes, estuaries, and watersheds.

The BSCE and BSEVE degree programs are certified by the Accreditation Board for Engineering and Technology (ABET) and qualify the student for the Fundamentals of Engineering (FE) examination, which is the first step toward registration as a licensed professional engineer.

Bachelor of Science in Civil Engineering

The bachelor of science in civil engineering (BSCE) program prepares students for a professional career in civil and environmental engineering. Students completing this program are also well qualified for graduate study in engineering, construction, dentistry, medicine, business, management, and law. Program objectives are achieved by developing a broad understanding of civil and environmental engineering, its relationship to the fun-

damental engineering sciences, and its interaction with the humanities, arts, and social sciences. The curriculum emphasizes the application of basic science, computing, and mathematics to the particular needs of the engineer.

The mission of the BSCE program offered by the Department of Civil and Environmental Engineering is to provide students with undergraduate educational experiences that give them a sound basis for professional practice in civil engineering and a career of life-long learning. Its fundamental goal is for students to learn the fundamental principles of civil engineering, to master engineering methods for solving challenging problems, and to communicate these solutions to the technical and non-technical community. The faculty is dedicated to accomplishing this mission through the integration of teaching, research, and professional practice.

The specific degree requirements follow the guidelines for degrees from the School of Engineering. Twelve courses form the department concentration. Five courses form the core program and consist of Civil and Environmental Engineering 10, 11, 12, 22, and 42. Four courses are required to fulfill the civil engineering focus area sequence and may be selected from structural engineering, water resources engineering, environmental engineering, geotechnical engineering, or general civil and environmental engineering design. The program options for the focus areas are obtained by making appropriate selections of the science, engineering science, and civil and environmental engineering electives within the thirty-eight-course degree requirement. In addition, students are required to take a civil engineering capstone design course (Civil and Environmental Engineering 81) and a professional issues in engineering practice course (Civil and Environmental Engineering 84), and one concentration elective from approved engineering, math, or science courses.

The first-year curriculum is listed under School of Engineering Information. It is recommended that students interested in civil and environmental engineering take introductory courses in chemistry and physics during the first year. A list of appropriate mathematics, basic sciences, foundation, and concentration electives is available from the department.

Sophomore Year**FALL TERM****Mathematics 13** Calculus III**Engineering Science 5** Applied Mechanics—Statics and Dynamics**Engineering Science 56** Probability and Statistics**Physics 12** or **Chemistry 1** or **2**

Humanities or social sciences elective

SPRING TERM**Mathematics 38** Differential Equations**Civil and Environmental Engineering 10** Introduction to Civil Engineering**Civil and Environmental Engineering 11** Introduction to Environmental Engineering**Engineering Science 9** Applied Mechanics—Strength of Materials

Humanities or social sciences elective

Junior Year**FALL TERM****Engineering Science 8** Fluid Mechanics**Civil and Environmental Engineering 22** Structural Analysis**Civil and Environmental Engineering 42** Introduction to Geotechnical Engineering**Civil and Environmental Engineering 55** Numerical Methods for Engineers or **Civil and Environmental Engineering 53** Engineering Economy

Humanities or social sciences elective

SPRING TERM**Civil and Environmental Engineering 12** Introduction to Hydraulic Engineering

Department foundation elective

Department foundation elective

Department concentration elective from focus area

Humanities or social sciences elective

Senior Year**FALL TERM****Civil and Environmental Engineering 84** Issues in Professional Engineering Practice

Department foundation elective

Department concentration elective from focus area

Department concentration elective from focus area

Free elective

SPRING TERM**Civil and Environmental Engineering 81** (capstone)

Department concentration elective from focus area

Department concentration elective

Free elective

Bachelor of Science in Environmental Engineering

The Department of Civil and Environmental Engineering offers a bachelor of science in environmental engineering (BSEVE) for students interested in concentrated study in this subject. The BSEVE curriculum is designed so that students learn the fundamental principles of environmental engineering, become proficient in the use of engineering methods to solve challenging problems, and gain facility in communicating engineered solutions to technical and non-technical audiences. Emphasis is placed on helping students develop in-depth understanding of environmental engineering processes with applications to water and wastewater treatment, water resources engineering, environmental restoration, and public health engineering. The mission of the BSEVE program is to provide students with undergraduate educational experiences that give them a sound basis for professional practice in environmental engineering as well as preparation for advanced study at the graduate level. The faculty is dedicated to accomplishing this mission through the integration of teaching, research, and professional practice.

DEGREE REQUIREMENTS

The specific degree requirements follow the guidelines for degrees from the School of Engineering. Twelve courses form the department concentration. Five courses form the core program and consist of Civil and Environmental Engineering 12, 27, 30, 32 and 132. Two courses are required to fulfill the design sequence. These courses are selected from the following: Civil and Environmental Engineering 112 (Water Resources Engineering), 133 (Water and Wastewater Plant Design), 143 (Site Remediation), and 136 (Air Pollution). In addition, students are required to take a civil engineering capstone design course (Civil and Environmental Engineering 81), and four concentration electives from approved engineering, math, or science courses.

The first-year curriculum is listed with requirements for degrees from the School of Engineering. It is recommended that students interested in civil and environmental engineering take an introductory course in chemistry and in physics during the first year. A list of appropriate foundation and concentration electives is available from the department.

Sophomore Year

FALL TERM

Mathematics 13 Calculus III

Engineering Science 5 Intro to Mechanics—
Statics and Dynamics

Engineering Science 51 Technical Writing

Chemistry 31 Physical Chemistry
Humanities, social sciences, or arts elective

SPRING TERM

Mathematics 38 Differential Equations

Civil and Environmental Engineering 27 Public Health
Engineering

Civil and Environmental Engineering 32 Environmental
Engineering Principles

Engineering Science 11 Fundamentals of Biological Sys-
tems (or **Biology 13** Cells and Organisms with lab)

Geology 2 Environmental Geology

Junior Year

FALL TERM

Engineering Science 8 Fluid Mechanics

Civil and Environmental Engineering 30
Environmental Chemistry

Engineering Science 56 Probability and Statistics
Foundation elective

Humanities, social sciences, or arts elective

SPRING TERM

Civil and Environmental Engineering 12

Introduction to Hydraulic Engineering

Civil and Environmental Engineering 132

Environmental Engineering Processes

Foundation elective

Concentration elective

Humanities, social sciences, or arts elective

Senior Year

FALL TERM

Concentration elective

Concentration elective

Concentration elective

Humanities, social sciences, or arts elective

Free elective

SPRING TERM

Civil and Environmental Engineering 81 (Civil

Engineering Design - capstone)

Concentration elective

Concentration elective

Free elective

Bachelor of Science in Engineering

The civil and environmental engineering department administers several programs of study that lead to the bachelor of science in engineering degree (B.S.E.). These curricula are not accredited by the professional engineering societies (ABET) but offer the student an engineering program that departs somewhat from the traditional concentration requirements in civil and environmental engineering.

B.S.E. Degree Program in Architectural Studies

A bachelor of science in engineering with a program in architectural studies is available for students interested in a professional career in architecture or in the historical, aesthetic, and engineering aspects of buildings and other structures. This program, offered jointly by the Department of Civil and Environmental Engineering and the Department of Art and Art History, provides a solid foundation in both the technical aspects of structural systems and the aesthetic and functional characteristics of buildings from an architectural and art history point of view. The flexibility of the BSE degree allows greater concentrations in both art history and studio courses than would otherwise be possible, while providing a coherent basis for graduate work in architecture or design. The faculty adviser for this program is Professor Masoud Sanayei.

DEGREE REQUIREMENTS

A minimum of thirty-eight courses is required, to be distributed in the following categories:

- 1) The eleven introductory courses required for the professional degrees in engineering (see School of Engineering Information)
- 2) Engineering science: four courses, including Engineering Science 5, 9, 88, and an engineering science elective
- 3) Civil engineering: six courses, including Civil and Environmental Engineering 10, 22, 42; plus three of the following: Civil and Environmental Engineering 24, 25, 81, 123, 124, 125, 146, 149, and 188
- 4) Architectural studies: seven courses, including Art History 1, 8, 98, 198; two studio courses,

including architectural design (FAM 22) and either FAM 20, 26, or 63; one elective (selected from disciplinary areas A, B, C listed in Architectural Studies section of this bulletin)

- 5) Humanities and social sciences: five courses (see School of Engineering Information)
- 6) Free electives: five courses

BSE Degree Programs in Environmental Studies and Environmental Health

A bachelor of science in engineering with a program in environmental studies is offered by the department for students who wish to pursue professional careers in environmental science, management, law, or medicine. The broad-based curriculum allows selection of course work in biology, chemistry, and environmental health to complement the foundation in engineering science and mathematics. For more information, see Environmental Studies Program.

For students wishing to pursue a professional career in public health or the health sciences, the department offers a bachelor of science in engineering with a program in environmental health.

For more information, see Environmental Health Program.

The specific requirements for the BSE degrees in environmental studies or environmental health are developed on an individual basis with the student's adviser.

DEGREE REQUIREMENTS

A minimum of thirty-eight courses is required, to be distributed in the following categories:

- 1) The eleven introductory courses required for the professional degrees in engineering (see School of Engineering Information)
- 2) Engineering science: four courses, to include a minimum of two courses from Engineering Science 3-9, and a maximum of one course from Engineering Science 11-30
- 3) Humanities and social sciences: five courses (see School of Engineering Information)
- 4) Civil engineering: six courses
- 5) Electives: twelve courses to be selected from the above categories to form a coherent program

A fifth year of study will provide the opportunity for a student to qualify for a bachelor of science degree in civil engineering, or a master of science degree with emphasis in environmental health or environmental engineering.

Bachelor of Science

The bachelor of science degree program provides a broad liberal education within the School of Engineering, but a less technical one than either the bachelor of science in civil engineering (BSCE) or the bachelor of science in engineering (BSE). Students working toward this degree normally place a heavier emphasis on the humanities and social sciences than students working in the other programs. This degree program, along with the bachelor of science in engineering, recognizes the unique value of engineering as preprofessional education for architecture, business administration, city planning, dentistry, medicine, law, public health, and other professions, as well as for the student who wishes to combine engineering with nonengineering disciplines. Faculty from the Department of Civil and Environmental Engineering will supervise, with consent, programs of study in their areas of expertise. For details, see School of Engineering Information.

UNDERGRADUATE MINOR PROGRAMS

Architectural Engineering Minor

The Department of Civil and Environmental Engineering offers a minor in architectural engineering for students in the College of Liberal Arts. The faculty adviser for this minor is Professor Masoud Sanayei.

Of the five course credits that are required for this minor, three are designated:

Engineering Science 5 Applied Mechanics (Statics and Dynamics)

Engineering Science 9 Applied Mechanics (Strength of Materials)

Engineering Science 88 CAD for Engineers

Two additional course credits must be selected from the following:

Engineering 2 Engineering Graphics (half credit)

Engineering 5-CEE Skyscrapers (half credit)

Engineering 23-CEE Building Big: Infrastructure Engineering (half credit)

Engineering 24-CEE Earthquake Engineering (half credit)

Engineering 39-CEE Bridge Design (half credit)

Engineering Science 2 Introduction to Computers in Engineering

Civil and Environmental Engineering 10

Introduction to Civil Engineering

Civil and Environmental Engineering 22

Structural Analysis

Civil and Environmental Engineering 24

Design of Steel Structures

Civil and Environmental Engineering 25

Design of Reinforced Concrete Structures

Civil and Environmental Engineering 42

Introduction to Geotechnical Engineering

Civil and Environmental Engineering 188

Engineering Design with CAD

Prerequisites for the above course work are Mathematics 11 and Art History 8, in addition to one studio course in architectural design (FAM 22).

Architectural Studies Minor

The Department of Art and Art History offers a minor in architectural studies that is open to students from both the School of Engineering and the College of Liberal Arts. For details, see full description under Architectural Studies.

Geoengineering Minor

The Civil and Environmental Engineering Department offers a geoengineering minor that is available to all non-CEE majors. The faculty adviser for this minor is Professor Lewis Edgers.

Five courses are required:

Engineering Science 5 Applied Mechanics (Statics and Dynamics)

Engineering Science 9 Applied Mechanics (Strength of Materials)

Civil and Environmental Engineering 12

Introduction to Hydraulic Engineering

Civil and Environmental Engineering 42

Introduction to Geotechnical Engineering

One elective selected from the following:

Civil and Environmental Engineering 112

Hydrology and Water Resource Engineering

Civil and Environmental Engineering 113

Groundwater Hydrology

Civil and Environmental Engineering 146

Foundation Engineering

Civil and Environmental Engineering 149

Earth Support Systems

Prerequisites for the above courses are Mathematics 12 and Physics 12.

Geology Minor

The Department of Geology offers a minor in geology available to students in the School of Engineering. The faculty adviser for this minor is Professor Anne Gardulski.

Five courses are required for the minor. They normally include:

Geology 1 The Dynamic Earth

Geology 2 Environmental Geology

Geology 22 Structural Geology

Geology 32 Geomorphology

One elective selected from the following:

Geology 35 Sedimentology

Geology 36 Stratigraphy

Geology 115 Quaternary and Glacial Geology

Geology 131 Groundwater

All of the geology courses numbered higher than Geology 2 are offered in alternate years, and have either Geology 1 or Geology 2 as prerequisites.

GRADUATE PROGRAMS

Master of Science (M.S.)

Instruction leading to the master of science degree is offered with concentrations in environmental and water resources, environmental health, geotechnical and geoenvironmental, infrastructure, and structural engineering. A candidate for the master's degree program in environmental, infrastructure, geotechnical and geoenvironmental, and structural engineering is expected to have an adequate background in science, mathematics, and engineering science.

Candidates for the master's degree program in environmental health should have a background in the biological and health sciences. The department strongly recommends that graduate applicants submit Graduate Record Examination scores.

Of the ten courses required for the degree, at least seven must be earned in civil and environmental engineering subjects, with the remainder in allied fields. Students who lack an adequate undergraduate preparation in an allied field, such as biology for environmental engineering, mathematics for structural engineering, or fluid mechanics for water resources engineering, may be required to take such course work in addition to their graduate program. Students may petition to count for degree credit a maximum of two courses in allied fields with numbers less than 100. Normally, based on requirements of degree, a master's thesis or report, or a design project, will be required and constitute a maximum of two of the seven courses required in civil and environmental engineering.

The master's candidate must pass an oral examination on the thesis. There is no foreign language requirement. For information on the civil and environmental engineering graduate program in environmental health, see Environmental Health Program.

For graduate students who are interested in urban and environmental policy, the Department of Civil and Environmental Engineering participates in a special program offered in association with the Department of Urban and Environmental Policy and Planning.

Master of Engineering (M.E.)

The master of engineering degree program provides a practice-oriented alternative to the master of science programs offered by the Department of Civil and Environmental Engineering. The master of engineering degree is offered in infrastructure engineering, geotechnical and geoenvironmental engineering, structural engineering, and water resources engineering, and may require a project. It responds to the need to provide engineering practitioners with advanced-level expertise in a civil engineering specialty, some technical breadth in a related civil engineering specialty, familiarity with business and/or legal issues in engineering practice, and a substantial engineering project experience. The program is designed for individuals with an accredited BSE degree who plan to enter--or are currently in--engineering practice in the private or public sectors. Continuing education by engineering practitioners on a part-time basis is strongly encouraged by the department.

Doctor of Philosophy

Students entering the doctoral program in civil and environmental engineering are expected to meet the general admission requirements of the graduate school, gain acceptance by the civil and environmental engineering faculty, and hold a master of science or bachelor of science degree in civil engineering or a related discipline.

PROGRAM OF STUDY

Students are required to complete the equivalent of a three-year program of full-time graduate study for the doctoral degree. Generally the first two years will be devoted to course work; a minimum of fifteen courses beyond the baccalaureate level must be completed. Students who enter the pro-

gram with a master of science degree from Tufts or another institution may complete a reduced course load, depending on the master's degree field of study.

Each individual in the doctoral program will select a minor subject of study which consists of a sequence of three courses in an area that is considered necessary background in the student's overall program of study.

QUALIFYING EXAMINATION

For admission to doctoral candidacy, the individual will successfully complete a two-part qualifying examination. Normally this examination will be taken after the student has completed the major part of the required course work. The examination may be either written or oral. The first part of the exam will test the student's overall knowledge of the field, based on the individual's course work preparation. The second portion of the qualifying examination investigates the student's proposed doctoral research project, focusing on its overall merits in the field of civil and environmental engineering and the ability of the student to complete successfully the requisite research work.

DISSERTATION

The final requirement for the doctorate is the dissertation. The dissertation demonstrates the candidate's ability to perform independent research of high quality and indicates considerable experience in using a variety of research techniques. Competence in scholarly exposition must be demonstrated by preparing a thesis on a topic that represents a significant contribution to the field. The doctoral candidate must orally defend the contents and conclusions of the dissertation before a committee that includes an invited external examiner who is an authority in the particular line of research.

For more detailed information, please visit the website <http://ase.tufts.edu/cee>.

Certificate Program in Environmental Management

A five-course graduate-level certificate program in Environmental Management is designed for students with a bachelor's degree and two years of work experience. Additionally, students should have some knowledge of current environmental issues,

and should have undergraduate coursework in natural or physical science, math, or engineering. The certificate programs can be completed on a part-time, nondegree basis by students who are seeking professional training in the field or preparing for a degree program. In most cases, courses taken as a certificate student can be transferred into a related master's degree program.

Certificate students must complete five graduate course credits from the clusters listed below. Students must take at least one course from each cluster.

Environmental Technology

- CEE 103** Water Quality Modeling
 - CEE 113** Groundwater Hydrology
 - CEE 136** Air Pollution Control
 - CEE 138** Hazardous Waste Treatment Technology
 - CEE 139** Bioremediation
 - CEE 143** Site Remediation
 - CEE 172** Fate and Transport of Environmental Contaminants
 - CEE 184** Issues in Professional Engineering Practice
 - CEE 193G** Geographic Information Systems (GIS)
 - CEE 202** Environmental Statistics
- Environmental Law, Management, and Policy**
- CEE 201** Land Use Planning and Policy
 - CEE 207** Environmental Law
 - CEE 264** Hazardous Materials Management and Policy
 - CEE 265** Corporate Management of Environmental Issues
 - CEE 267** Methods in Environmental Impact Assessment Health, Safety, and the Environment
 - CEE 154** Principles of Epidemiology
 - CEE 158** Occupational and Environmental Health
 - CEE 164** Epidemiological Methods
 - CEE 167** Environmental Toxicology
 - CEE 168** Exposure Assessment
 - CEE 173** Health Effects and Risk Assessment
 - CEE 175** Hazardous Materials Safety

(Students may substitute other Tufts graduate courses, subject to the approval of the certificate faculty adviser.)

For more detailed information, please visit the Web site <http://ase.tufts.edu/cee>.

Certificate Program in Epidemiology

Offered in collaboration with Tufts' School of Medicine, the Friedman School of Nutrition Science and Policy, and the Department of Civil and Environmental Engineering, this interdisciplinary program is designed to help students understand, integrate, and apply epidemiologic methods and

research. The program is especially appropriate for clinicians, professionals in public health and human service agencies, lawyers, industrial hygienists, pharmaceutical or biotechnology professionals, environmental engineers or scientists, and individuals involved in citizen activist groups focusing on human health issues. It's also useful for individuals who are considering a career in epidemiology and/or public health but are not yet ready to commit to a full Master's degree program. Open to individuals with a Bachelor's degree, the certificate requires the completion of five courses as follows:

Two required foundation courses:

- CEE 154** Principles of Epidemiology
- CEE 164** Epidemiologic Methods (certain courses may be substituted for 164 with the Program Director's approval)

One course in biostatistics (may be exempted by prior coursework):

- BIO 132** Biostatistics
- MPH 205** Principles of Biostatistics
- MPH 259** Fundamentals of Biostatistics

Two elective courses in your area of interest or expertise. Some examples include:

- MPH 204** Occupational and Environmental Health
- MPH 209** Applications in Epidemiology
- MPH 220** Cardiovascular Epidemiology
- MPH 222** Survey Research Methods and Data Management
- MPH 224** Infectious Disease Epidemiology
- MPH 226** Cancer Epidemiology
- MPH 240** Environmental Epidemiology
- CEE 137** Public Health
- CEE 158** Occupational and Environmental Health
- CEE 167** Environmental Toxicology
- CEE 173** Health Effects and Risk Assessment
- CEE 241** Biology of Water and Health
- UEP 281** Chemicals, Health and the Environment

Other courses may be selected with the approval of the Program Director. Also, an optional internship is available to students desiring a professional experience in the use of epidemiology. The internship would count as one elective and be started after all other coursework is completed.

For more information, please visit the Epidemiology Graduate Certificate webpage at: http://gs.as.tufts.edu/1176473070088/GSAS-Page-gsas2ws_1176473070399.html

Classics

Professor R. Bruce Hitchner, *Chair; Roman history and archaeology, international relations*

Professor Gregory R. Crane, *Winnick Family Chair in Technology and Entrepreneurship; Greek literature, computers and classics*

Professor Peter L. D. Reid, *Latin and Greek literatures, medieval Latin*

Associate Professor Steven W. Hirsch, *Greek, Roman, and Near Eastern history*

Associate Professor Joanne H. Phillips, *Latin and Greek literatures, Greek and Roman medicine*

Assistant Professor Emma Blake, *Greek archaeology*

Lecturer Peter Der Manuelian, *Egyptian history and archaeology, hieroglyphs*

Lecturer Betsy J. Halpern, *Latin and Greek literatures*

Lecturer Anne Mahoney, *Latin and Greek literatures*

Lecturer Regina Merzlak, *Latin and Greek literatures*

Lecturer Susan Setnik, *Greek and Latin language*

The Department of Classics is dedicated to the study of Greek and Roman culture and to clarifying and assessing its continuing impact on contemporary life. Classics is more than the study of the Greek and Latin languages; it can liberate the student from the parochialisms of both time and place. The role of the contemporary individual in relation to society can be examined through the history, archaeology, art, architecture, science, philosophy, religion, mythology, and especially through the literatures of Greece and Rome.

Classics constitutes an interdisciplinary study of the cultures of the ancient Mediterranean, Near East, and Europe. Despite the period of antiquity in which it concentrates, the field of classics is constantly changing in light of new discoveries, new methodologies, new interpretations, and new relationships with other areas of study. In many ways, classics offers the undergraduate student an ideal educational opportunity to integrate different fields and methodologies, and to study intrinsically interesting and time-tested topics in the literature, mythology, art, archaeology, history, and science of Greece and Rome.

UNDERGRADUATE

CONCENTRATION REQUIREMENTS

Majors in the Department of Classics meet the requirements of four classes of students: 1) those who have no professional interest in classics but who wish to bring together disparate distribution

and foundation requirements for a coherent liberal arts major; 2) those who want a combined major in Latin, Greek, or Classical Studies and one of the natural sciences, social sciences, or humanities; 3) those who want an intensive study of Greek or Latin preparatory to postgraduate study in another field, such as law, theology, medicine, philosophy, history, English, or modern languages; 4) those who are professionally interested in the classics and who plan to do postgraduate study in the field and then teach or engage in research or museum work.

Major in Classical Studies

Ten courses are required, usually distributed as follows: Classics 31 and 32; two courses from either Classics 37, 38, or Classics 27, 164, 168; two additional classics courses numbered above 100; two other courses offered by the Department of Classics (strongly recommended are Latin 3 and above, and Greek language courses); and two courses that may be in related fields.

Major in Greek

Ten courses: four courses in Greek, one of which may be Greek 7 (intermediate level), depending on a student's prior level of preparation, and at least three at the 100 level; Classics 31 (Classics of Greece); Classics 37 (History of Greece); and four other courses in the department, of which at least two must be at the 100 level.

Major in Latin

Ten courses: five in Latin above the intermediate level, including at least three at the 100 level; plus Classics 32 (Classics of Rome); Classics 38 (History of Rome); and three other courses in the department, of which two must be at the 100 level.

Major in Greek and Latin

Ten courses: six courses in Greek and Latin above the intermediate level, of which four must be at the 100 level; four other courses offered by the department.

Interdisciplinary Major in Archaeology

A detailed description of this major can be found in the alphabetical listings in this bulletin under Archaeology.

PLACEMENT FOR ENTERING UNDERGRADUATE STUDENTS

Students with two years of secondary school preparation in Latin are placed in Latin 3. Students with three or four years of preparation in Latin are placed in Latin 3, or 21, 22, depending on CEEB examination or previous records, together with placement examination and individual consultation. In Latin as in other languages, the student is urged not to prejudge his or her college courses on the basis of secondary school experience. Students who place above Latin 3 may complete the language requirement in any one of the three available options, including classical studies (see information concerning foundation requirements). Students with scores of four or five on the Advanced Placement Examination or with an Achievement Test score of 720 or above will be given advanced placement into Latin 21 or above and acceleration credit of one course. With a score of three, students will be placed into Latin 21 or above; with a score of two, into Latin 3. During orientation every student is encouraged to discuss any unusual placement problem with members of the department so that in every case the student is placed in the appropriate course.

UNDERGRADUATE MINOR PROGRAM

The Department of Classics offers minors in Latin, Greek, Greek archaeology, Roman archaeology, Greek civilization, and Roman civilization. Details are available from the departmental office.

GRADUATE PROGRAM

Master of Arts in Classics

The master's program in classics at Tufts is designed for students who wish to go beyond the bachelor's level to attain a broader and deeper knowledge of the classics for one or more of the following purposes: teaching background, further graduate study, or cultural enrichment. With its strong language component; faculty strength in literature, history, and archaeology; and access to computer applications, this program particularly suits those who want either to consolidate and improve their language, research, and teaching skills in preparation for a Ph.D. degree at another institution or to teach classics at the secondary level.

REQUIREMENTS

- 1) Applicants will usually have completed the equivalent of an undergraduate Latin or Greek major. If not, additional courses will be required for completion of the master's degree.
- 2) Candidates must successfully complete eight graduate courses, of which a minimum of two must be in Latin and a minimum of two must be in Greek. Candidates who are in-service teachers, and they alone, may meet the Greek requirement in two undergraduate courses above Greek 1, 2; however, only courses in Greek at the graduate level may be counted toward the eight courses required for the degree.
- 3) A candidate for the master's degree must be in residence for the equivalent of one academic year. The master's degree may be earned on a part-time basis through courses offered by the department during the regular academic year and by summer school courses. No degree is granted on the basis of summer school work only.
- 4) Reading knowledge of Latin or Greek and one modern foreign language (usually German or French) is tested by examination.
- 5) To demonstrate research and presentation the candidate may submit for evaluation by a faculty committee either two papers (written for courses at Tufts and revised as necessary after completion of the course) or a thesis. The thesis normally counts as two of the required eight courses.
- 6) A comprehensive written examination integrating course work with a general knowledge of Greek and Latin literatures. An oral examination based primarily on the papers or thesis. Candidates accepting assistantships (i.e., work in the department) should anticipate a more extended time schedule; furthermore, students usually find that writing a thesis takes a full term of uninterrupted work.

Master of Arts in Classical Archaeology

The master's program in classical archaeology provides students with the artistic, cultural, social, and historical context for the materials of classical antiquity and has successfully prepared students for work toward a doctorate, or for fieldwork or museum work.

REQUIREMENTS

- 1) Applicants will usually have completed the equivalent of an undergraduate classics major or ancient art or archaeology major with intermediate

levels in Latin or Greek or in both languages.

2) The candidate must successfully complete nine graduate courses, as follows: three graduate courses in Latin or Greek; three graduate courses in art and archaeology; one graduate course in ancient history; and a two-credit thesis. In addition, both fieldwork and laboratory work are requirements, either as documented past experience or to be fulfilled during completion of the master's degree.

3) Reading knowledge of either Latin or Greek and one modern foreign language (French, German, or Italian) is tested by examination.

4) To demonstrate research and presentation, a thesis, counting for two course credits, with subject chosen in consultation with the student's adviser, must be submitted for approval and evaluation to a faculty committee.

5) A comprehensive written examination integrating course work with a general knowledge of classical archaeology is required, as well as an oral examination based primarily on the thesis.

6) Residency for the equivalent of one academic year is required. The degree may be earned on a part-time basis through courses offered by the department during the regular academic year and through summer school courses. No degree is granted on the basis of summer school work only.

For more detailed information, please visit the Web site <http://www.ase.tufts.edu/classics>.

Clinical Psychology

(FOR DEGREE REQUIREMENTS, SEE PSYCHOLOGY.)

Cognitive Science

(FOR MAJOR IN COGNITIVE AND BRAIN PSYCHOLOGY, SEE PSYCHOLOGY)

(FOR MINOR IN COGNITIVE AND BRAIN SCIENCES, SEE PHILOSOPHY)

Communications and Media Studies

DIRECTOR:

Julie Dobrow, *Child Development*

ASSOCIATE DIRECTOR:

Susan Eisenhauer, *Communications and Media Studies*

CORE FACULTY:

Professor John Conklin, *Sociology*

Professor Lee Edelman, *English*

Professor James Glaser, *Dean of Undergraduate Education, Political Science*

Professor Vida Johnson, *German, Russian, and Asian Languages and Literatures*

Professor Joseph Litvak, *English*

Professor Susan Napier, *German, Russian, and Asian Languages and Literatures*

Professor Christiane Zehl Romero, *German, Russian, and Asian Languages and Literatures*

Professor Fred Rothbaum, *Child Development*

Professor Laurence Senelick, *Drama and Dance*

Emeritus Professor Martin Sherwin, *History*

Professor Judith Wechsler, *Art and Art History*

Associate Professor Nancy Bauer, *Philosophy*

Associate Professor Downing Cless, *Drama and Dance*

Associate Professor Alva Couch, *Computer Science*

Associate Professor James Ennis, *Sociology*

Associate Professor Calvin Gidney III, *Child Development*

Associate Professor Barbara Grossman, *Drama and Dance*

Associate Professor David Guss, *Anthropology*

Associate Professor Deborah Pacini Hernandez, *Anthropology*

Associate Professor Hosea Hirata, *German, Russian, and Asian Languages and Literatures*

Associate Professor Charles Inouye, *German, Russian, and Asian Languages and Literatures*

Associate Professor Brigitte Lane, *Romance Languages*

Associate Professor David Locke, *Music*

Associate Professor Karen Panetta, *Electrical and Computer Engineering*

Associate Professor Joel Rosenberg, *German, Russian, and Asian Languages and Literatures*

Associate Professor Xueping Zhong, *German, Russian, and Asian Languages and Literatures*

Assistant Professor Marina Bers, *Child Development*

Assistant Professor Sarah Sobieraj, *Sociology*

Senior Lecturer Jeanne Dillon, *American Studies*

Lecturer Susan Kouguell, *Drama and Dance*

Lecturer Paul Lehrman, *Music*

Lecturer Elizabeth Lemons, *Religion*

Lecturer Nan Levinson, *English*

Lecturer Neil Miller, *English*

Communications and Media Studies is an interdisciplinary program that educates students about mass media and communications. In our contemporary world, the omnipresence of mass communications demands a basic understanding of its workings and effects by every citizen. The mission of the Communications and Media Studies program is to provide students with the necessary critical tools to participate actively and knowledgeably as informed world citizens and to give them a background in media literacy to make them more careful and critical consumers and producers of media. This program is designed to aid all students in acquiring this knowledge, while also providing interested students with the opportunity to make communications and media studies a major part of their academic career at Tufts.

Each semester the program offers courses of its own through the Experimental College and lists all media-related courses available in the College of Liberal Arts. The program also offers three interdisciplinary minors: Mass Communications and Media Studies, Film Studies, and Multimedia Arts. It also registers, supervises, and grants credit for internships in all fields of communications and mass media. Special events and lectures are organized annually and are open to the entire university community.

For more information, contact the program office at 95 Talbot Avenue, 617-627-2007, CMS@tufts.edu.

INTERDISCIPLINARY MINOR IN MASS COMMUNICATIONS AND MEDIA STUDIES

Students pursuing the interdisciplinary minor in Mass Communications and Media Studies must take Media and Society (Sociology 40) and four courses from the program's approved elective courses list. In addition, during their senior year CMS students must either complete a senior project (Experimental College 194C) or take an additional media course from the CMS list (the CMS course option).

The four elective courses mentioned above must be from at least three departments, and they must include at least one course in the disciplinary area

of social sciences and at least one course in the disciplinary area of humanities and the arts. Except with the written consent of the director, only one of the four electives may be a media practice course or credited internship where students learn skills in media production (e.g., photography, journalism, video, film, multimedia, graphic design, advertising copy). With the exception of the internship (Experimental College 99C) and the senior colloquium (Experimental College 190C), all courses taken for the MCMS minor must be taken for a letter grade. In accordance with Tufts policies, students cannot double count a course for fulfillment of a foundation requirement and for the MCMS minor, and they may use a maximum of two credits from the minor to count also toward a major, another minor, or distribution requirements.

The senior project (Experimental College 194C) is a substantial work, which can include the use of one or more forms of media (e.g., print, film, video, recorded sound, live performance, CD-ROM). The project may take the form of either a more traditional written thesis or an audiovisual project with a written component. The focus of the work will be a critical exploration of mass communications in the past, present, and/or future. Either one-half credit or one credit will be given, at the discretion of the faculty advisers. Students doing a project must take the CMS senior colloquium (Experimental College 190C), a half-year, one-half credit, pass-fail course that assists them in developing their senior projects through group study and analysis of each student's work in progress.

The CMS course option to the senior project is an additional CMS-approved media-related course taken in the senior year. Students completing the course option must submit a paper (minimum 15 pages) focusing on a media- or film-related topic written in conjunction with that course. The paper must be approved, advised, and graded by the course instructor. Students pursuing this option must also get approval from the CMS director.

Students are strongly encouraged to take at least one media-related internship.

INTERDISCIPLINARY MINOR IN FILM STUDIES

Students pursuing the interdisciplinary minor in Film Studies must take Introduction to Film Studies (ILVS/Drama 50) and four film-related courses from the program's approved elective

courses list. In addition, during their senior year CMS students must either complete a senior project or take an additional film-related course from the CMS list (the course option).

The four elective courses must be from at least three departments. Except with the written consent of the CMS director, only one of the four electives may be a film practice course or credited internship where students learn skills in film production or practice. With the exception of the internship (Experimental College 99C), all classes taken for the film studies minor must be taken for a letter grade. In accordance with Tufts policies, students cannot double count a course for fulfillment of a foundation requirement and for the film studies minor, and they may use a maximum of two credits from the minor to count also toward a major, another minor, or distribution requirements.

The senior project (Experimental College 194C) is a substantial work which may take the form of either a more traditional written thesis or a practice-based project (e.g., screenplay, film, video) with a written component. Either one-half or one credit will be given at the discretion of the faculty advisers. Students doing a project must also take the CMS senior colloquium (Experimental College 190C), a half-year, one-half credit, pass-fail course that assists them in developing their senior projects through group study and analyses of each student's work in progress.

The CMS course option to the senior project is an additional CMS-approved film-related course taken in the senior year. Students completing the course option must submit a paper (minimum 15 pages) focusing on a film-related topic written in conjunction with that course. The paper must be approved, advised, and graded by the course instructor. Students pursuing this option must also get prior approval from the CMS director.

Students are strongly encouraged to take at least one film-related internship.

INTERDISCIPLINARY MINOR IN MULTIMEDIA ARTS

The multimedia arts program provides a framework for the analysis of and practical training in emerging digital media. The minor includes—and often mixes—work in animation, filmmaking, photography, music, text, drawing, collage, graphic design, software development, Web site

construction, user interface strategies, and human factors theory. Through course work and collaboration on the part of students in liberal arts and students in technical disciplines, the minor aims to foster the development of a body of shared knowledge and ideas and, in so doing, to break down barriers that have traditionally hindered such cross-fertilization.

The interdisciplinary minor in multimedia arts requires a minimum of five courses within the guidelines noted below. Students pursuing the minor must take the Communications and Media Studies senior colloquium and complete a senior project. Prior to that, they need two multimedia practice courses (selected from the program's approved courses list) which introduce students to the tools, methods, and theories current in the field, and two electives selected from courses offered by the supporting departments—Art and Art History, Drama and Dance, Music, Electrical and Computer Engineering—or those listed and approved by the program (e.g., Experimental College courses). Except for the senior colloquium, all courses taken as part of the multimedia arts minor must be taken for a letter grade and may not be used toward fulfillment of the foundation requirement. (See Interdisciplinary Minor Program for details.)

For specific information about the policies governing requirements and electives, visit <http://www.excollege.tufts.edu/mma>.

COMMUNICATIONS INTERNSHIP PROGRAM

The internship program grants academic credit for internships in communications (Experimental College 99C). Students can arrange to work at newspapers, magazines, film companies, advertising and public relations firms, television stations, radio stations, and publishing houses. Interns are required to work a minimum of 150 hours (approximately 12 to 15 hours each week), complete a writing requirement, and meet regularly with the faculty adviser. Contact CMS Associate Director Susan Eisenhauer (susan.eisenhauer@tufts.edu) for eligibility and course requirements.

For more detailed information, please visit the Web site <http://ase.tufts.edu/cms>.

Community Environmental Studies

FACULTY ADVISER:

Lecturer Rusty Russell, *Urban and Environmental Policy and Planning*

Environmentalists and concerned citizens alike face the challenge of keeping pace with politically and technically complex issues. The growing sophistication of the environmental movement brings new demands to link conservation and preservation, environmental justice, and safety and health in the workplace and community.

The certificate in Community Environmental Studies (CES) provides professional training for careers in today's rapidly evolving environmental field. CES's interdisciplinary curriculum is designed to clarify career goals for those who may be considering environmental work, as well as to enhance the skills of professionals already in the field. The certificate is offered in collaboration with the Department of Urban and Environmental Policy and Planning and the Office of Graduate Studies.

The certificate requires the completion of four courses in such varied subjects as land planning, environmental policy, mediation, law, and economics.

The program is open to individuals with a bachelor's degree and is especially appropriate for people in community and environmental organizations who want to increase their expertise about issues and methods, midcareer professionals who want to apply their skills to environmental work, and business people working with communities around environmental issues.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

Community Health

DIRECTOR:

Senior Lecturer Edith D. Balbach, *Community Health*

POLICY BOARD:

Carol Baffi-Dugan, *Associate Dean for Undergraduate Education, Director of Health Professions Advising*

Professor Donald Wertlieb, *Child Development*

Associate Professor Harry Bernheim, *Biology*

Associate Professor David Gute, *Civil and Environmental Engineering*

Associate Professor Joanne Phillips, *Classics*

Associate Professor Rosemary C. R. Taylor, *Sociology/Community Health*

Assistant Professor Richard Glickman-Simon,
Tufts University School of Medicine

Assistant Professor Raymond Hyatt, *Friedman School of Nutrition, Science, and Policy Research*

Lecturer Linda Sprague Martinez, *Internship Coordinator*

Lecturer Gary McKissick, *Community Health*

Lecturer Alissa Spielbert, *Community Health*

Pamela Schoenberg Reider, *Program administrator*

The Community Health Program (CHP), established in 1975, is one of the oldest multidisciplinary programs within the university. CHP touches on diverse aspects of health and society and encourages students to explore health issues from a variety of perspectives.

Courses approved to satisfy the CHP major span many disciplines, including anthropology, nutrition, classics, sociology, biology, psychology, history, economics, engineering, philosophy, political science, and public health. Through courses and fieldwork, CHP students analyze: 1) the factors that determine health and illness, 2) how communities define and try to resolve health-related problems, 3) the formation of health care policy in the United States with a comparative look at other countries, and 4) the institutions that plan, regulate, and deliver health care services.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Second Major in Community Health

The major in Community Health offers undergraduates an opportunity to explore issues surrounding health, health care, community and society. In addition to a broad academic experience encompassing nine courses, students complete an 180-hour internship for which they receive one academic credit. The major in Community Health is a second major, which means students complete it in addition to completing their primary major.

All courses submitted for credit in the major must be passed with a C- or better, with the exception of the internship. The internship (Community Health 180) must be passed with a B- or better. In

completing an internship, a Tufts student is representing Tufts University to an outside agency and is helping to provide a service to Boston area communities. Students are expected to take their placement seriously, to represent CHP effectively, and to render a valuable service. For these reasons, credit for the internship is contingent on the student receiving at least a B-. No course submitted for credit in the major may be taken on a pass-fail basis.

CORE REQUIREMENTS

To pursue a second major in community health, students complete ten courses that encourage a breadth and depth of learning.

There are five required courses:

Community Health 1 Introduction to Community Health

Community Health 2 Health Care in America: Policies and Politics

Community Health/Civil Engineering 54 Fundamentals of Epidemiology

Community Health 180 Internship

Community Health 181 Internship Seminar

The five remaining electives are selected from a diverse mix of courses. All CHP majors are required to take five electives across three clusters: Science of Health, Frameworks for Understanding Health, and Health/Health Care Policy. Students must at least complete one course in each cluster (see below). At least one of these five courses must be approved as a Research course and at least one must be approved as a Comparative / Cross-cultural Course. Courses approved for the Research and/or Cross-cultural requirements are listed following the description of the clusters.

1. SCIENCE OF HEALTH

One course in the Science of Health cluster. The sciences have a particular lens for looking at health issues that focuses on the biological or technological causes and cures for disease. Although health and health care result from a complex mix of biological, social, political, and cultural phenomena, anyone claiming a thorough knowledge of health issues must have some basic knowledge of the scientific/technological framework for looking at them.

2. FRAMEWORKS FOR UNDERSTANDING HEALTH

One course in the Frameworks for Understanding Health cluster. In Community Health 1 and 2 students are introduced to a broad range of health concepts and health areas. By taking at least one course in this cluster, students will have an opportunity to explore one area in greater depth.

3. HEALTH / HEALTH CARE POLICY

One course in the Health/Health Care Policy cluster. The policy environment controls how resources are distributed and helps to determine how communities perceive their options. Students need to understand current U.S. and/or international policy and have the opportunity to learn methods for developing further understanding.

CROSS-CULTURAL OR COMPARATIVE VIEWS OF HEALTH

CHP majors are required to take at least one course with a cross-cultural or comparative focus that encourages understanding health in different cultures or communities. Courses approved for this requirement fall into two broad categories: within the United States and outside of the United States (International).

RESEARCH

All CHP majors must complete a major research paper or project. This requirement can be satisfied by taking a course with a research component, by completing a research-based fieldwork or independent study focused on health, or by completing a thesis focused on health issues.

Students may petition to have an independent study (conducted under Community Health 193) or a fieldwork experience (conducted under Community Health 199) count toward the Research requirement if the student's project has a substantial research component. Such a course will be assigned to a cluster depending on the topic. Work completed in Sociology 102, Civil and Environmental Engineering 164, or Community Health 197/198 will similarly be assigned to a cluster based on the topic of the research.

Students may petition to have honors theses or independent studies from their primary major count toward the Research requirement if the project involves research in a health area and a member of the CHP faculty is on the student's committee. Permission to count such a course must be

obtained in advance. In accordance with university rules, students may not double count more than half of their primary major credits with their second major.

Students may petition courses taken abroad for major credit but no more than three courses taken at other institutions may count toward the major. Students may petition a course to count for major credit when they have a course syllabus, which is typically after they return. This process is a separate one from that of transferring the credit to Tufts, which students do through the on-line system. The CH Transfer of Credit representative will advise them on what will likely count for CH credit.

EXPERIENTIAL LEARNING: INTERNSHIP

The internship is an integral part of the CHP. For many students, the 180-hour internship proves to be one of the most valuable learning experiences in the program, establishing a link between theory and practice. CHP assists students in finding an internship, and students have considerable latitude in selecting a placement. Placements have included the Greater Boston Elderly Legal Services, the Boston Childhood Lead Poisoning Prevention Program, the Dana-Farber Cancer Institute, the Massachusetts Coalition for Occupational Safety and Health, Children's Hospital, neighborhood health centers, Public Health AIDS Services, and the Five City Tobacco Collaborative. In addition to evaluating the progress of students, site supervisors maintain contact with the CHP internship coordinator. During the same semester of the internship, students enroll in a seminar with the Community Health Internship Coordinator. Students must complete CH 1 and CH 2 before the Internship and Seminar. This seminar meets on the Medford campus.

More information may be obtained from the program office at 112 Packard Avenue or by calling 617-627-3233, or by e-mail (chp@tufts.edu). Visit our Web site at <http://ase.tufts.edu/commhealth>.

Computer Engineering

(FOR DEGREE REQUIREMENTS, SEE ELECTRICAL AND COMPUTER ENGINEERING.)

Computer Science

Professor Diane L. Souvaine, *Chair; Computational geometry, algorithm design and analysis*

Professor Carla Brodley, *Artificial intelligence, machine learning*

Professor Sarah Frisken, *Computer graphics and modeling*

Professor Robert J. K. Jacob, *Human-computer interaction*

Associate Professor Anselm C. Blumer, *Artificial intelligence, machine learning, computational biology*

Associate Professor Alva Couch, *Network and system administration, scientific computing and visualization*

Associate Professor Lenore J. Cowen, *Computational biology, theory of computation, algorithm design and analysis*

Associate Professor Soha Hassoun, *CAD, VLSI design*

Associate Professor Roni Khardon, *Machine learning, artificial intelligence, computational learning theory*

Emeritus Associate Professor David Krumme, *Parallel and grid computing*

Associate Professor Norman Ramsey, *Programming languages and systems, functional programming*

Associate Professor Donna Slonim, *Computational biology, artificial intelligence, machine learning*

Assistant Professor Samuel Z. Guyer, *Compilers, programming languages*

Senior Lecturer/Research Assistant Professor Judith A. Stafford, *Software engineering*

Lecturer Benjamin Hescott, *Computational complexity, approximation and parallel algorithms, computational biology*

Lecturer Bruce Molay, *Software design*

SECONDARY APPOINTMENTS:

Professor Bruce Boghosian, *Mathematics; Quantum computing, scientific and distributed computing*

Professor Christoph Börgers, *Mathematics; Applied mathematics and computing*

Professor Misha Kilmer, *Mathematics; Numerical linear algebra, linear algebra, scientific computing and visualization*

Professor Eric L. Miller, *Electrical and Computer Engineering; Signal and image processing*

Professor Douglas Preis, *Electrical and Computer Engineering; Scientific computing, visualization*

Associate Professor Karen Panetta, *Electrical and Computer Engineering; Human-computer interaction, multimedia studies*

Assistant Professor Marina Bers, *Child Development; Human-computer interaction, collaborative learning systems, virtual communities*

The department offers undergraduate programs in computer science for both liberal arts and engineering students, M.S. and Ph.D. degree programs, and several non-degree graduate programs. The department offers undergraduate programs in both the School of Arts and Sciences and the School of Engineering. Both the Arts and Sciences and Engineering programs are included in the general accreditation conferred on the University by NEASC. In addition, the BSCS program offered through the School of Engineering is accredited by the Computing Accreditation Commission (CAC) of the Accreditation Board for Engineering and Technology (ABET).

UNDERGRADUATE CONCENTRATION REQUIREMENTS— COLLEGE OF LIBERAL ARTS

Major in Computer Science

Ten courses: eight courses in computer science and two courses in related fields. The computer science courses must be more advanced than Computer Science 11 and must include Computer Science 15, 40, 80, 160, and 170. The related fields' courses are Mathematics 12 or 17 and Mathematics 22 (Computer Science 22 may be substituted for Mathematics 22). The introductory courses Computer Science 10 and 11 as well as Mathematics 4, 5, 6, and 11, do not count toward the major. No more than one Directed Study (193, 194) may be counted toward the major. All ten courses must be completed with a grade of C- or better. The above are minimal requirements for the concentration. For students who desire a stronger program, the following courses are recommended: Computer Science 111,180,181,190; Mathematics 46, 145, 161.

For an ABET/CAC accredited program, see the BSCS in the School of Engineering, described below.

UNDERGRADUATE CONCENTRATION REQUIREMENTS— SCHOOL OF ENGINEERING

Bachelor of Science in Computer Science

The mission of the Computer Science in Engineering (BSCS) program is to provide graduates with the durable knowledge necessary to become future leaders in the rapidly evolving discipline of Computer Science as well as in other computer-related fields. We aim to give each graduate a solid founda-

tion in both Computer Science theory and programming practice, and to prepare each graduate for further advanced study in Computer Science and related fields. We aim to expose each graduate to the challenges and research problems involved in creating new kinds of computer software. We aim to give graduates the skills and commitment to life-long learning necessary to prepare them to be effective employees or graduate students in computer-related fields. The faculty is dedicated to accomplishing this mission through integration of teaching and research.

The Bachelor of Science in Computer Science (BSCS) offered through the School of Engineering is accredited by the Computing Accreditation Commission (CAC) of the Accreditation Board for Engineering and Technology (ABET).

Objectives of the BSCS program:

1. Graduates should be prepared to pursue a professional career in or related to computing or software.
2. Top graduates should be prepared to succeed in graduate study in computer science.
3. Graduates should be prepared to become technology leaders in industry and academia.

Outcomes of the BSCS program:

1. Graduates should be able to utilize theoretical computer science to analyze algorithms and predict performance.
2. Graduates should have the ability to apply computer science and software engineering principles to solve real-world problems.
3. Graduates should be proficient in interacting with interdisciplinary teams.

The Bachelor of Science in Computer Science (BSCS) requires thirty-eight courses including introductory, foundation, breadth, and concentration courses. Introductory courses (11 credits) include En2 and Es2; one half-credit EN course; Math 11,12,13, and 22 (Computer Science 22 may be substituted for Mathematics 22); and Physics 11, Chemistry 1, Physics 12 or Chemistry 2, and a fourth science elective. The science elective may be one of Astronomy 21 or 22; Biology 1 or 13; Chemistry 2; Geology 1, 2, or 5; Physics 12, 13, or 31; or any course in any of these departments with one of these courses as a prerequisite. The foundation requirement (5 courses) includes Computer

COMPUTER SCIENCE >

Science 11 and 15, Engineering Science 3 and 4, and a statistics course chosen from Engineering Science 56, Electrical Engineering 104, Mathematics 162, Biology 132, or Physics 153. The breadth requirement (10 courses) includes English 1; one course in ethics and social context chosen from Civil and Environmental Engineering 84 and Philosophy 24; five courses in Humanities, Arts, or Social Sciences, and three courses chosen either from Humanities, Arts, and Social Sciences, or from selected courses covering the broader context of engineering. Allowable courses in Humanities, Arts, and Social Sciences are those listed as fulfilling the distribution requirement in those categories in the School of Liberal Arts. A list of selected courses appropriate for the last three credits of the breadth requirement is available from the department, and includes courses in Humanities, Arts, Social Science, Engineering Science, Engineering Management, Engineering Psychology, and introductory courses in selected School of Engineering departments. The concentration requirement (11 courses) includes Computer Science 40, 80, 160, 170, and 180; five elective courses in computer science, three of which must be numbered above 100; and a one-credit senior project approved by the department. Normally the senior project is completed by enrollment in Comp190 (Software Engineering Project).

The following sample program is one way of satisfying the above requirements; further information regarding options and procedures is available from the department.

First Year

FALL TERM

Mathematics 11

Physics 11

English 1

Engineering 2 (half credit)

Half-credit (EN) course in engineering

SPRING TERM

Mathematics 12

Computer Science 11 Introduction to Computer Science

Chemistry 1 or **16**

Engineering Science 2

Sophomore Year

FALL TERM

Mathematics 13 Calculus III

Computer Science 15 Data Structures

Engineering Science 3 Introduction to Electrical Engineering
Science elective

Physics 12 or **Chemistry 2**

Breadth elective (humanities, social sciences, arts, or engineering)

SPRING TERM

Mathematics 22 or **Computer Science 22** Discrete Mathematics

Computer Science 80 Programming Languages

Engineering Science 4 Introduction to Digital Logic Circuits

Science elective

Breadth elective (humanities, social sciences, arts, or engineering)

Junior Year

FALL TERM

Computer Science 40 Computer Architecture

Computer Science 160 Algorithms

Civil Engineering 102 Statistics

Humanities, social sciences, or arts elective

Breadth elective (humanities, social sciences, arts, or engineering)

SPRING TERM

Computer Science 170 Theory of Computation

Computer science elective

Computer science elective

Humanities, social sciences, or arts elective

Philosophy 24 (Ethics)

Senior Year

FALL TERM

Computer Science 180 Software Engineering

Computer science elective

Computer science elective

Humanities, social sciences, or arts elective

Free elective

SPRING TERM

Computer Science 190 Senior Design Project

Computer science elective

Humanities, social sciences, or arts elective

Humanities, social sciences, or arts elective

Free elective

UNDERGRADUATE MINOR PROGRAM

Minor in Computer Science

The undergraduate minor in Computer Science consists of five courses, including Computer Science 15; two courses chosen from Computer Science 40, 80, 160, and 170; one course in computer science numbered 100 or above; and either Mathematics 22 or Computer Science 22 or one additional course in computer science numbered above 15.

POSTBACCALAUREATE PROGRAM IN COMPUTER SCIENCE

The postbaccalaureate program in computer science offers the student with a bachelor's degree, but few computer science courses, the opportunity to earn the equivalent of an undergraduate minor in computer science by completing the requirements for the minor. It is designed to give the student with a nontechnical, liberal arts degree the introductory knowledge base to enter the technology field or continue on for graduate study in computer science. For more information, contact the Office of Graduate Studies at 617-627-3395 or visit the Web site

<http://gradstudy.tufts.edu/>.

The program requires five Tufts courses.

Required:

COMP 15 Data Structures, plus

Choose two:

COMP 40 Computer Architecture and Assembly Language Programming

COMP 80 Programming Languages

COMP 160 Algorithms**

COMP 170 Theory of Computation**

Choose one:

MATH 22 or **COMP 22** Discrete Math or

COMP elective numbered higher than

COMP 15

One elective:

One computer science elective 100-level or above**

*Prerequisite course **COMP 11**: Introduction to Computer Science is available for individuals without a previous programming course.

**Courses numbered above 100 award graduate credit, and are transferable into the Tufts Master of Science in Computer Science program upon acceptance to the program.

CERTIFICATE PROGRAMS

Certificate Program in Computer Science

The four-course, graduate-level certificate program in computer science is for the student with a bachelor's degree in computer science or a closely related field with approved work experience. The program is designed for those who wish to update their skills and broaden their knowledge to meet the challenges of and opportunities available in today's rapid-pace technology field. For more information, contact the Office of Graduate Studies at 617-627-3395 or visit

<http://gradstudy.tufts.edu/>.

The certificate requires four graduate-level courses in Computer Science. This flexible program allows the student to cluster course electives around a particular interest or specialty area. Course may be chosen from our regular department offerings or from our COMP 150 Special Topics offerings, which are offered in particularly "hot" area of interest, or in a unique specialty area of Tufts faculty.

CERTIFICATE PROGRAM IN HUMAN-COMPUTER INTERACTION

In an interdisciplinary collaboration between the Department of Psychology, the Department of Computer Science, and the Department of Occupational Therapy at Tufts, this four-course, graduate-level certificate is designed to train the next generation of computer professionals for tomorrow's complex challenges. The program is open to individuals with a bachelor's degree, and is designed to be pursued on a part-time basis by computer programmers, Web designers, human factors professionals, software engineers, and user-interface designers who wish to develop or enhance their user-interface design and implementation skills. For more information, see Human-Computer Interaction, or contact the Office of Graduate Studies at 617-627-3395, or visit

<http://gradstudy.tufts.edu/>.

The certificate requires four courses.

1. Two foundation courses:

COMP 171 Human-Computer Interaction

PSY 53/ENP 61 Engineering Psychology

2. One or more of the following:

COMP 106 Object Oriented Programming for GUIs

ENP 161 Human Factors in Product Design

ENP 162 Man-Machine System Design

ENP 166 Applied Design of Software User Interfaces

PSY 130 Advanced Engineering Psychology

3. Electives

COMP 20 Multimedia Programming

COMP 175 Computer Graphics

EE 120 Computer Animation for Technical Communications

OTS 105 Assistive Technology

(Students may substitute other Tufts graduate courses, subject to the approval of the certificate advisor.)

GRADUATE PROGRAMS

Master of Science

The Master of Science degree requires ten course credits at the 100 level or above. At least eight credits must be earned by taking approved courses. The remaining two credits may be earned in several ways, including taking approved courses, completing a master's thesis, or participating in an independent study or research experience. At least four of the courses must be in computer science, and at least two of the courses must include a serious programming component. To use courses offered outside the Department of Computer Science, the student must obtain the approval of the department. Students must also demonstrate competency in the material covered in Mathematics 22 and Computer Science 40, 80, 160, and 170. The last two courses, 160 and 170, can be taken as part of the master's degree program. Each student must complete a master's project or thesis demonstrating mastery of computer science research and/or software development skills. The project requirement includes a written report which must be approved by a member of the faculty. Substantial projects, typically involving research, can count up to one-credit through the courses Computer Science 293 and 294. The project requirement may also be satisfied by a written master's thesis, defended orally, counted as between one and two credits, through the courses Computer Science 295 and 296.

Doctor of Philosophy

Students must have a master's degree in computer science or a related field to be admitted to the Ph.D. program. Applicants to the Ph.D. program who do not have a master's degree will instead be considered for admission to the M.S./Ph.D. program. Doctoral study consists of preliminary coursework and study, qualifying exams, and cre-

ative research culminating in a written dissertation. Areas available for dissertations in computer science include algorithm design and analysis, artificial intelligence and machine learning, CAD and VLSI design, compilers, computational biology, computational geometry, computer graphics and modeling, human-computer interaction, network and system administration, programming languages, software engineering, theory of computation, and visualization. Detailed requirements and procedures for the Ph.D. program are outlined on the department Web pages at <http://www.cs.tufts.edu>.

For more detailed information, please visit the website <http://www.cs.tufts.edu>.

Computer Science Certificate Program

Faculty adviser:

Associate Professor Anselm C. Blumer

With technology advancing at a rapid pace, opportunities for advanced applications of computer science are limitless. Professionals with experience and knowledge of the "hottest" topics in computer science — databases, Linux, object-oriented programming, software engineering, network and systems administration, parallel and distributed computing — are rapidly advancing in salary and opportunity. This four-course graduate-level program will update your skills and broaden your knowledge in computer science, through a "design your own specialty certificate" taught by Tufts' renowned faculty in computer science. Completion of the certificate requires grades of B- or better in all courses. Courses are transferable into the Tufts M.S. program upon acceptance to that program.

The program is open to individuals with at least a bachelor's degree in computer science, or a closely related field with approved work experience. Individuals completing the Post-Bac Computer Science Minor Program are also encouraged to apply.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

Dance

Associate Professor Alice E. Trexler, *Director of dance studies*

Associate Professor David Locke (*Music*), *West African dance*

Lecturer Daniel McCusker, *Dance technique and repertory*

Part-time Lecturer Gretchen Hayden, *North Indian classical dance*

The Department of Drama and Dance offers dance courses that are appropriate for the general student body and for those with dance experience. The objectives of this nonconservatory program are to expose students to basic concepts of human movement, to foster the development of creative resources and techniques, to introduce performance analysis, and to contextualize dance as an element of culture. This liberal arts approach encourages students to create integrative links with other disciplines. Students may elect an all-dance version of the departmental minor (See Drama), and dance courses may be used toward the drama major or the combined drama-dance minor. Dance performances choreographed by faculty and students are presented in the Jackson Dance Lab and other spaces on campus each semester. More information about dance may be obtained at the department office or at www.ase.tufts.edu/drama-dance/dance.

Drama and Dance

(FOR DANCE INFORMATION, SEE DANCE.)

Associate Professor Barbara W. Grossman, *Chair; Theatre history, dramatic literature and criticism, directing*

Professor Laurence Senelick, *Fletcher Professor of Oratory; Director of graduate studies in drama; Dramatic literature and theory, theatre and film history*

Associate Professor Downing Cless, *Directing, sociology of the theatre, dramatic literature and theory*

Associate Professor Alice E. Trexler, *Director of dance; Dance studies*

Assistant Professor Claire Conceison, *Dramatic literature and theory, theatre history, Asian studies*

Assistant Professor Don Weingust, *Shakespeare studies, dramatic literature and theory, theatre history, acting*

Lecturer Daniel McCusker, *Dance*

Lecturer Linda Rose, *Costume Designer*

Lecturer Ted Simpson, *Head of Design*

Lecturer Jesse Smith, *Technical director*

Lecturer Sheriden Thomas, *Acting and directing*

PART-TIME FACULTY:

Senior Lecturer Neal Hirsig, *Multimedia*

Lecturer Thomas Connolly, *Theatre history, dramatic literature and criticism*

Lecturer Deborah Cooney, *Voice and speech*

Lecturer Gretchen Hayden, *Dance*

Lecturer Susan Kouguell, *Screenwriting*

The Department of Drama and Dance provides a strong liberal arts approach to the creative, historical, and aesthetic dimensions of performance. The curriculum fosters critical thinking and imaginative challenges, whether through experiences with literature and history or participation in performance.

The department offers a variety of courses, complemented by an active season of productions. Students have the opportunity to apply the artistic and analytical skills they develop in class to the demands of live performance. Courses and productions are open to all Tufts students, regardless of major. Whether in the classroom, the dance lab, or the theatre, every course in the department fulfills the arts distribution requirement.

PERFORMANCE ACTIVITIES

Each year the department produces a full and varied season of performances in the Balch Arena Theater, a flexible theatre-in-the-round. The season consists of three faculty-directed productions, as well as a number of student-directed shows. Several student groups are active throughout the year in the theatre and other spaces on campus. These include Pen, Paint, and Pretzels (3Ps), the student theatre group—which is Tufts' oldest student organization and has been active for more than ninety years—and Torn Ticket II, which is dedicated to musical theatre. There are other performance opportunities with Cheap Sox (improvisational comedy), HYPE! (mime), Traveling Treasure Trunk (children's theatre), Sarabande Dance Ensemble, and Tufts Dance Collective.

The production program allows students to explore all areas of theatre and dance outside the classroom. They are involved in every aspect of production, from backstage work as stage managers and crew members, to directing and/or choreographing shows, designing, performing, even producing. They experience the joys and

challenges of live performance, as well as the satisfaction of working as part of a creative ensemble on a project for a significant period of time.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Drama

The major in drama provides a balanced mix of study and practice, understanding and process, thinking and doing. It demands much of and gives much to students in the development of creativity, adaptability, and analytical thinking. With its emphasis on effective communication and imaginative exploration, a drama major is one of the best preparations for a variety of careers, as well as for graduate professional training and work in a theatre arts specialization. Drama majors often complete double majors in combination with many other departments and programs.

The drama major consists of eleven course credits and related requirements, including:

- 1) Five course credits in history, literature, and/or theory of drama, four of which are required: Drama 1 (Comedy and Tragedy), 4 (Modern Drama), 137 (Theatre and Society I: Prehistory through the Renaissance), 138 (Theatre and Society II: The Early Modern Period). The fifth is an elective from an approved list.
- 2) Drama 17 (Theatre Technology).
- 3) A design course chosen from the following offerings: DR 18 (Lighting Design), DR 125 (Scene Design), or DR 126 (Costume Design).
- 4) Two course credits in acting/directing/movement or studio dance/voice (excluding Drama 80).
- 5) Two electives in the student's specific area of interest, at least one of which must be an upper-level course. A maximum of two one-half course credits of Drama 80 and/or 81 may be used to fulfill the requirements for the major.
- 6) A noncredit run crew on a faculty-directed major production (assistant stage manager, light board operator, sound board operator, costume crew, deck crew, house management).
- 7) A noncredit prep crew on a faculty-directed major production consisting of thirty hours of production-related preparatory work in a given semester.
- 8) Each drama major is expected to gain experience

in the creative aspects of drama and/or dance through involvement in the production program of the university. Graduating magna cum laude or summa cum laude with a drama major is contingent not only on scholastic achievement, but on significant participation in productions.

Students considering a drama major will find it advantageous to complete Drama 1, the crew requirement, and an introductory-level course in either studio dance/acting or design/technology by the end of the sophomore year. This will allow greater flexibility in scheduling course work and more opportunities for advanced-level production responsibilities later on.

We strongly recommend that students who plan to pursue professional training or graduate school take more than the eleven-course credit minimum, especially in an area of specialization.

UNDERGRADUATE MINOR PROGRAMS

Minor in Drama or Dance

The minor consists of a minimum of five course credits taken in the department (or 4.5 if dance), in a plan approved by the designated minor adviser. Two courses must be taken in literature/history (selected from Drama 1, 4, 137, 138; Dance 70, 195), or one course of literature/history and one credit of dance theory (Dance 117 with a prerequisite of Dance 51 or consent), or selected special topics courses. Only one studio dance repeat can be applied to the minor.

Interdisciplinary Minor in Film Studies

This interdisciplinary minor is offered through the Communications and Media Studies program. For more information, see Communications and Media Studies.

Interdisciplinary Minor in Multimedia Arts

This is an interdisciplinary minor of the Departments of Art and Art History, Drama and Dance, Electrical and Computer Engineering, and Music. For more information, see Multimedia Arts.

GRADUATE PROGRAM

For admission to graduate work in drama, a prospective student must present a completed undergraduate record of high scholastic proficiency with a firm grounding in drama and theatre arts. Other desirable foundation subjects include cultural studies, art history, music, philosophy, psychology,

sociology, history, and literature.

The program of study leading to the doctor of philosophy or master of arts degree in drama embraces dramatic literature, dramatic theory and criticism, and theatre history and research. It is expected that applicants for admission will already have attained a level of proficiency in the creative and/or performance aspects of theatre.

Courses of study for the satisfaction of the residence requirement do not include theatrical practice or stage performance. Dramaturgy for a faculty-directed play may be used for credit once.

Depending on the individual student's educational background, intellectual capabilities, and professional aims, certain courses in other disciplines—anthropology, art history, Chinese, classics, English, French, German, history, Italian, Japanese, music, philosophy, Russian, sociology, and Spanish—may be taken for credit toward advanced degrees in drama, upon consent of the graduate adviser of the Department of Drama and Dance.

Master of Arts

In general, the student is expected to offer for admission the equivalent of a Tufts bachelor of arts degree with a major in drama. A student whose undergraduate preparation is not equivalent may be admitted provisionally and may be required to complete more than the minimum eight courses or make up deficiencies at no degree credit.

REQUIREMENTS AND RESIDENCE

A minimum of eight courses of graduate-level work in residence is required for the degree. Additionally, the student must satisfy the following requirements to qualify for the master of arts degree in drama:

- 1) The student must demonstrate a reading knowledge of a foreign language by passing an examination or an approved course no later than the end of the first year. A student whose undergraduate record indicates successful performance in a language course at the advanced level may be exempt.
- 2) Understanding of the basic principles and practices of design and technical theatre is to be demonstrated in the student's prior experience or by satisfactory completion of Drama 17 or 19, taken without credit during the first year of residence.
- 3) The student must demonstrate an understanding of the principal theories and methods of acting.

This requirement may be fulfilled either by satisfactory completion of Drama 10, taken without credit during the first semester of residence, or by presentation of evidence of study and experience in acting.

4) Unless a student's undergraduate record indicates completion of two courses or their equivalent in history of the theatre, Drama 137 and 138 must be taken for credit.

5) The student must take a minimum of four courses in graduate seminars selected from the following: Drama 220, 231, 235, 236, 240, 244, 248, 249, 251, 252, 254, 255, 258, 259, 261, 262, or 263. Also, certain related courses in other departments may be credited toward the master of arts degree in drama (not more than one in a semester), with prior consent of the adviser.

6) The student must demonstrate an ability to deal with the concepts and problems of a particular area of scholarly specialization at a level of distinction. The student must satisfy this requirement by completing a scholarly thesis (one semester of Drama 295 or 296).

POLICY ON INCOMPLETE GRADES

Any graduate student with more than one incomplete grade at the end of a term's study will receive warning that his or her status in the program is in jeopardy. Any student on financial aid or assistantship who has more than one incomplete grade at the end of a term's study will have his or her appointment withdrawn.

All incomplete grades must be completed no later than six weeks after the end of the semester or summer session in which the incomplete was awarded or the student will be required to withdraw from the program.

The above stipulations may be waived only by petition of the student, duly supported, and the voting consent of the graduate faculty.

Doctor of Philosophy

For admission to the program the applicant is generally expected to offer the equivalent of a Tufts master of arts degree in drama and to give evidence of experience in theatrical production in the resume. A student whose prior preparation is not equivalent may be admitted provisionally and required to take additional courses achieving a grade not lower than B- to make up deficiencies at no degree credit.

REQUIREMENTS AND RESIDENCE

Course work extending approximately three academic years beyond the B.A. degree, normally 18 courses (including two courses for dissertation research), is required. Part-time study or less than full-time residence in the Ph.D. program is discouraged. Eight seminars within the department are required of all Ph.D. students, including two seminars in dramatic or performance theory and Drama 220: Introduction to Research Methods and Materials (to be taken on entering). With prior consent of the adviser, certain advanced courses outside the department may be credited toward the Ph.D. degree (not more than one course in a semester).

Students with a master's degree may be credited toward the doctorate with up to six courses in their previous graduate study that satisfy course requirements for the Tufts doctorate in drama. However, acceptance into candidacy for the doctoral degree ordinarily depends on the quality of work done in the student's first year of residence at Tufts. Transfer of courses is not automatic, and each case is judged on its individual merit by the graduate faculty. A student may apply for transfer of courses earned through graduate work in other schools only after the satisfactory completion of at least one semester of residence at Tufts.

POLICY ON INCOMPLETE GRADES

Doctoral candidates should note the restrictions on incomplete grades stated in the section on the master's degree.

FOREIGN LANGUAGE

A student must demonstrate a reading knowledge of two foreign languages. Because a significant amount of material in this program can be read only in primary sources, the student is expected to satisfy the language requirements by passing an examination or accepted course in one language no later than the end of the first year of residence, and the other language prior to taking the comprehensive examinations. A student whose undergraduate record indicates successful performance in a language course at the advanced level may be exempt.

COMPREHENSIVE EXAMINATIONS

After the last semester of courses, the student will complete comprehensive examinations to establish his or her candidacy for the doctoral degree. These examinations will be both written and oral.

DISSERTATION

The candidate for the doctoral degree must prove competence in independent research by preparing and completing a dissertation on a subject chosen and planned with the approval of the department's graduate faculty and written under the supervision of an adviser. Ordinarily the student will complete the dissertation while in residence, although for special reasons he or she may be permitted to finish it elsewhere within the time limit established by the graduate school.

COURSES AVAILABLE IN THE DOCTORAL DEGREE PROGRAM

Although each course is not offered every year, the student may expect to find all of them available during the period of residence. A doctoral candidate is expected, as part of the course load, to enroll in two seminars each semester (200-level courses).

For more detailed information, please visit the Web site <http://ase.tufts.edu/drama-dance>.

Economics

Professor Enrico Spolaore, *Chair; Political economics, international economics, macroeconomics, public finance*

Professor Lawrence S. Bacow, *Environmental economics*

Professor Yannis Ioannides, *Max and Herta Neubauer Chair in Economics; Macroeconomics, growth, urban economics, housing*

Professor Gilbert E. Metcalf, *Public finance, applied microeconomics*

Professor George Norman, *William and Joyce Cummings Family Chair in Entrepreneurship and Business Economics; Industrial organization, spatial economics, microeconomics*

Professor Lynne Pepall, *Industrial organization, applied microeconomics*

Professor Daniel Richards, *Industrial Organization, macroeconomics*

Associate Professor Marcelo Bianconi, *Director of Graduate Studies, Macroeconomics, international economics*

Associate Professor Drusilla Brown, *International trade theory and policy*

Associate Professor David Dapice, *Economic development, macroeconomics, public finance*

Associate Professor Rajeev Dehejia, *Applied economics, labor economics, econometrics, development economics*

Associate Professor Thomas Downes, *Director of Undergraduate Studies, Public finance, economics of education*

Associate Professor David Garman, *Applied econometrics*

Associate Professor Edward Kutsoati, *Money and financial markets, applied microeconomics*

Associate Professor Linda Datcher Loury, *Labor, income distribution*

Associate Professor Margaret McMillan, *Development*

Associate Professor Sharun Mukand, *Political economy, international economics*

Associate Professor (part-time) Winifred Rothenberg, *Economic history*

Associate Professor Jeffrey Zabel, *Econometrics, labor economics*

Assistant Professor Andreea Balan Cohen, *Health Economics, public economics*

Assistant Professor Joshua Fischman, *Law and Economics*

Assistant Professor Henry Sunghyun Kim, *Open economy macroeconomics*

Assistant Professor Jay P. Shimshack, *Environmental economics, applied microeconomics*

Assistant Professor Chih Ming Tan, *Macroeconomics, growth*

Lecturer John Straub, *Public economics, applied econometrics*

The mission of the department is to teach students to be critical thinkers and to use the discipline of economics to analyze and solve problems associated with important economic, political and social issues. These issues range from international economic relations, economic development, growth, income inequality, environment, education, housing and competition policy. The courses that we offer along with our continuing interaction with other scholars at Tufts and elsewhere help prepare our students to be leaders in the community at large after they leave the university.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Courses that can be offered to meet the concentration requirement in economics must satisfy the department's policies as outlined in the Economics Department Handbook, available from the department or on the department's Web site at

<http://ase.tufts.edu/econ/>. The handbook contains information on grading standards, acceptability of courses taken at Tufts and elsewhere, and other details of the concentration requirements.

There are two options available for the student who wishes to concentrate in economics. Option I, the major in economics, is less structured and allows more flexibility in the choice of courses. Option II, the major in quantitative economics, is designed for students with an interest in mathematics and statistical methods. This option is best for those who are contemplating graduate study in economics or the more quantitative areas of business and finance.

Each economics major must complete three levels of courses: mathematics courses, normally completed by the end of the sophomore year; core courses, which cover the elements of economic theory and method; and elective courses. Elective courses are selected by the student but must meet criteria summarized below and detailed in the handbook. Normally, students should satisfy the prerequisite prior to enrolling in any core course, and should complete the core courses prior to taking elective courses. A minimum grade of C- is required for all core and elective courses used to satisfy these concentration requirements.

Both Option I and Option II place restrictions on the student's choice of electives; these restrictions are summarized below.

Option I: Major in Economics

PREREQUISITE

Principles of Economics (Economics 5) or equivalent.

MATHEMATICS COURSE(S)

Mathematics 11, or any higher-level mathematics course approved by the department. Students can waive all or part of this requirement by showing adequate prior preparation as determined by the Departments of Economics or Mathematics (for example, through the Advanced Placement tests). Students may substitute Mathematics 5 and 6 for Mathematics 11. Students who make this substitution and who complete a second concentration must keep in mind that, for purposes of determining the number of courses that can overlap between the economics concentration and the second concentration, the economics concentration requires ten courses.

CORE COURSES

Four core courses are required: Statistics (Economics 13), Intermediate Microeconomics (Economics 11), Intermediate Macroeconomics (Economics 12), and Basic Econometrics (Economics 15).

These courses serve as prerequisites for most upper-level economics courses. In place of Economics 13, students can take Mathematics 162, Civil Engineering 102, or Economics 201. Courses in other Tufts departments are normally not accepted as substitutes for Economics 13. In place of Economics 15, students can take Economics 107 or Economics 202. In place of Economics 18, students can take Economics 205

ELECTIVE COURSES

Majors must successfully complete five upper-level economics courses numbered Economics 20 or above. At least three of these five courses must be suitable courses numbered at the 100 level or above. See the handbook for details.

Option II: Major in Quantitative Economics

PREREQUISITE

Principles of Economics (Economics 5) or equivalent.

BASIC MATHEMATICS COURSES

Mathematics 11 and 12. Students can waive all or part of this requirement by showing adequate prior preparation as determined by the Departments of Economics or Mathematics. Students should be aware that Mathematics 17 and 18 can be offered as substitutes for Mathematics 11, 12, and 13.

CORE COURSES

For students in the classes of 2008 and 2009, four core economics courses are required: Statistics (Economics 13 or 201, or Mathematics 162, or Civil Engineering 102), Econometrics (Economics 107 or 202), Microeconomics (Economics 16 or 203), and Macroeconomics (Economics 18 or 205). One core mathematics course or its equivalent must also be completed: Mathematics 46 or Economics 105. No course offered as a core course can also be used as an elective course.

Beginning with the class of 2010, five core courses are required: Statistics (Economics 13),

Intermediate Microeconomics (Economics 11), Quantitative Intermediate Microeconomics (Economics 16 or 203), Quantitative Intermediate Macroeconomics (Economics 18 or 205), and Econometrics (Economics 107 or 202). Students must complete Economics 11 before taking either Economics 16 or Economics 203. One core mathematics course is also required: Mathematics 46. No course offered as a core course can also be used as an elective course. Students in the classes of 2008 and 2009 who have not completed Economics 16 are strongly encouraged to pursue this option when completing their major.

ELECTIVE COURSES

Quantitative economics majors must complete four additional upper-level economics courses numbered Economics 20 or above. There are three restrictions on choice. First, at least three of these four courses must be suitable courses at the 100 level or higher. Second, at least one of the four elective courses must be a 100-level economics course with a research paper, or a senior thesis credit. Third, at least one elective course must be open only to students who have completed the relevant quantitative prerequisite course (Ec 16, 18, or 107) or its equivalent.

Recommendations for Honors

To receive the department's recommendation for summa or magna cum laude, eligible candidates must demonstrate outstanding intellectual force. Included in the ways the department judges this attribute are: active contribution in classes; superior performance in the core courses of intermediate micro and macro theory, statistics, and econometrics; quality of projects pursued, especially class and seminar papers; and quality of a written thesis and its defense. Students wishing to be reviewed for magna or summa honors must complete at least one economics course in which a research paper or project is required, and which has Economics 11/16, 12/18, or 13 as a prerequisite.

UNDERGRADUATE MINOR PROGRAM

Minor in Economics

The minor in economics is designed for students who have done substantial work in economics but who do not choose to complete all the requirements for a concentration. The structure of the

minor is similar to that of the concentration in economics. The basic course provides a foundation for the treatment of theory and method that are used in the core courses, and these core courses are prerequisites for most elective courses. This hierarchy of courses makes it difficult to complete the minor in fewer than three semesters. The five-course requirement for the minor is given below.

Please note that no more than one course can be transferred to meet the minor requirements. Second, all courses used in fulfillment of the minor must be taken for a grade. A grade of C- or better must be obtained in the basic, core and elective courses. Finally, a maximum of two courses used in the fulfillment of a foundation, distribution, or concentration requirement can be used for fulfillment of requirements for a minor.

BASIC COURSE

Principles of Economics (Economics 5) or equivalent

CORE COURSES

Intermediate Microeconomic Theory (Economics 11 or 16 or 203); and either
Intermediate Macroeconomics (Economics 12 or 18 or 205); or
Statistics (Economics 13 or 201, or Mathematics 162, or Civil Engineering 102)

ELECTIVE COURSES

Minors must successfully complete two elective courses in economics. These two elective courses must include one from Economics 12 or above and one from Economics 100 or above. Exceptions will be made for those who wish to use both Economics 86 and Economics 87 as electives and for those who wish to use Economics 15 as their upper-level (above Economics 100) elective. Courses offered to complete the core may not be counted as electives.

GRADUATE PROGRAM

Master of Arts

Candidates normally will have completed the work required for a baccalaureate degree. Although concentration in economics is not required, some exposure to the subject is preferred, especially in the areas of intermediate theory and statistics. Students lacking this minimum training, but possessing a good background in a related discipline, may be admitted with the understanding that remedial

work will be required. All applicants except Tufts undergraduates in arts and sciences must submit the results of the Graduate Record Examination (GRE) with their application.

RESIDENCE

A minimum of eight semester courses is required for the master's degree, two of which may be satisfied by the successful completion of the thesis requirement. (See Thesis Option below.)

PROGRAM OF STUDY

Candidates are expected to take four courses per semester. This includes the statistics/econometrics sequence, the microeconomic theory sequence, and the macroeconomic theory sequence. The department offers several elective seminar classes to round out a student's program. In addition, classes in other graduate programs at Tufts such as those offered by the Fletcher School and the Department of Urban and Environmental Policy and Planning may be used to satisfy the degree requirement pending departmental approval.

MATHEMATICS REQUIREMENT

Students must demonstrate satisfactory proficiency in the application of mathematical techniques to economic analysis. Students may meet this requirement by passing an exemption examination given at the beginning of both the fall and spring semesters. Alternatively, students may enroll in Economics 105 for credit and demonstrate proficiency by earning a grade of B- or better.

THESIS OPTION

If this option is selected, each candidate must present, and successfully defend by oral examination, a thesis that shows competence in independent investigation and that demonstrates critical power as well as ability in expression. Students are urged to keep their master's theses within manageable proportions and should realistically plan to have them completed before the beginning of the second school year.

TEACHING ASSISTANTSHIPS

A limited number of teaching assistantships are available. Application must be made through the department. The department considers all teaching and research experience to be an integral part of its program.

For more detailed information, please visit the Web site <http://ase.tufts.edu/econ/>.

Education

Professor Analúcia Dias Schliemann, *Chair; Cognitive development, mathematics education, culture and learning*

Professor Kathleen Weiler, *Foundations of education, gender and education*

Visiting Professor Judah Schwartz, *Science and mathematics education*

Associate Professor Bárbara M. Brizuela, *Cognitive development, mathematics education*

Assistant Professor Hee-Sun Lee, *Science education*

Assistant Professor Steven Luz-Alterman, *School psychology*

Assistant Professor Sabina Elena Vaught, *Urban education*

Lecturer/Director Linda Beardsley, *Teacher education and school partnerships*

Lecturer/Director Patricia Bode, *Art education*

Lecturer Steve Cohen, *History and Political Science/Political Philosophy education*

Lecturer Silas Pinto, *School Psychology*

Lecturer Marion Reynolds, *Elementary education, children's literature*

Lecturer Cynthia Robinson, *Museum Education*

Lecturer Laura Rogers, *School Psychology*

Lecturer Martha Trudeau Tucker, *English education, middle and secondary education*

Research Professor Eric J. Chaisson, *Director, Wright Center for Science Education*

Research Professor Ronald K. Thornton, *Director, Center for Science and Mathematics Teaching*

PART-TIME FACULTY:

Lecturer Susan Barahal, *Art education*

Lecturer Gabrielle Cayton, *Learning and Development, Statistics*

Lecturer Winfried Feneberg, *School psychology*

Lecturer Diana Finer, *School psychology*

Lecturer Jayne Gordon, *Museum Education*

Lecturer Lynn Heroux, *School psychology*

Lecturer Laura Howick, *Museum Education*

Lecturer Desiree Ivey, *Director of teacher training, Shady Hill; Middle school education*

Lecturer Luke Jorgenson, *Improvisation, children's theatre, drama in education*

Lecturer Nancy Kassabian, *Foreign language education*

Lecturer Louis Kruger, *School psychology*

Lecturer Susanna Lara-Roth, *Learning and Development*

Lecturer James Olson, *Museum Education*

Lecturer Erin Seaton, *Learning and Development*

Lecturer Saskia Stoessel, *Coordinator of German language courses*

Lecturer Robert Trant, *School Psychology*

Lecturer Yoko Yamamoto, *Learning and Development*

The Department of Education offers courses in educational theory, practice, and research. Courses explore how students of all ages learn in different content areas, examine the institutions that serve children and youth, and study the cultural, historical, and philosophical influences that shape educational theory and effective professional service. Course offerings are complemented with opportunities for students to observe and work in a variety of educational settings as teachers, school psychologists, museum educators, curriculum developers and researchers. Opportunities to participate in curriculum development and research are provided by faculty in the department and by the H. Dudley Wright Center for Innovative Science Education, the Center for Science and Mathematical Teaching, and the Center for Engineering Educational Outreach. Through applied experiences, an essential part of the programs in education, students learn to integrate theory and research into their practice.

The department does not have an undergraduate major, but offers a number of courses for undergraduate students interested in exploring the field of education. The department offers undergraduate licensure in only two programs: art education and elementary education.

The department's graduate programs prepare candidates for Massachusetts Department of Education licensure as elementary school teachers and as middle and high school teachers of English, political science/political philosophy, history, mathematics, general science, earth science, biology, chemistry, physics, French, Spanish, German, Japanese, Latin and the classical humanities, and visual art. The department also offers a graduate-degree program in preparation for state licensure and national certification as school psychologists. These licenses for teaching and school psychology are recognized by the majority of states.

The M.A. in educational studies provides an opportunity for graduate students to pursue an individual course of study. The M.A. in museum education prepares students for careers in museum settings. The M.S. and Ph.D. programs in mathematics, science, technology, and engineering education prepare students for careers in higher education and research institutions through the development of original research about teaching and learning in these areas.

DEPARTMENT FACILITIES AND AFFILIATED PROGRAMS

Curriculum Resource Center

The Curriculum Resource Center provides students with information and hands-on experience with state-of-the-art curricula, technological tools, and other educational materials.

Educator Licensure

The Department of Education offers students in Tufts' professional licensure programs the opportunity to apply for initial licensure as teachers and school psychologists in Massachusetts. Students who complete these programs must take the appropriate Massachusetts Tests for Educator Licensure and submit their applications to Tufts' institutional representative for licensure.

Placement Service

Students interested in teaching and related positions should become acquainted with the departmental placement service, which offers a variety of services and information on the process of finding employment in the field of education.

Center for Science and Mathematics Teaching

The center is an associated facility of the department located in the Science and Technology Center at 4 Colby Street on the Medford campus. The center is involved in evaluating and developing new methods and materials for the teaching of science and mathematics, particularly in the area of micro-computer-based instruction. Research Professor Ronald Thornton is the director of the center. For more information on the center's activities, call 617-627-2825 or visit <http://ase.tufts.edu/csmt/>.

H. Dudley Wright Center for Innovative Science Education

The purpose of the Wright Center is to identify

and develop innovations in science and mathematics education, to provide fellowships to Tufts for talented high school mathematics and science teachers, and to train high school teachers in the use of creative teaching techniques in science and mathematics education. Graduate students are encouraged to participate in the colloquia, research, and professional activities of the center, located at 4 Colby Street. Research Professor Eric Chaisson is the director of the center.

For more information, call 617-627-5394 or visit http://www.tufts.edu/as/wright_center.

UNDERGRADUATE PROGRAM

Undergraduates at Tufts can explore the broad field of education through many courses. These include Education 1, 11, 99, 130, 161, 162, 163, 164, 165, 182, 186, and 187. Various opportunities are available for working as interns in educational settings, including schools, libraries, museums, and government and community centers.

Undergraduates who wish to complete the educator licensure programs in art education or elementary education must begin taking the required courses by the spring semester of their sophomore year. They should seek advice from their adviser before enrolling in specific courses.

For more information on the program, call the Department of Education at 617-627-3244 or visit the Web site <http://ase.tufts.edu/education>.

GRADUATE PROGRAMS

The department offers the following programs leading to the degrees of master of arts (M.A.), master of arts in teaching (M.A.T.), master of science (M.S.), certificate of advanced graduate study (C.A.G.S.), and doctor of philosophy (Ph.D.). Degree programs may be completed on a part- or full-time basis. To accommodate employed teachers who must conduct advanced work on a part-time basis, a considerable portion of the department's graduate instruction is offered during late afternoon, evening, and summer sessions.

Admission Requirements

All applicants must provide three letters of recommendation. At least two of the letters should be from the applicant's former college professors. For M.A.T. candidates, these two letters should be from college or university professors representing

the subject area in which the candidate seeks licensure. GRE general test scores are required of all applicants except Tufts current undergraduates and art education candidates. Art education applicants must submit a portfolio to the School of the Museum of Fine Arts. Applicants seeking licensure as teachers of French, German, Spanish, or other languages must also submit a writing sample in the language of specialization, and must also complete an interview in that language. School psychology candidates must have completed course work in personality or developmental psychology, abnormal psychology, and statistics and should have experience in a human services setting or with children and adolescents in other settings. Ph.D. applicants must submit, besides a personal statement, a pre-proposal for the research they would like to develop toward their dissertation.

Massachusetts Tests for Educator Licensure

Students who plan to teach in Massachusetts must pass the Massachusetts Tests for Educator Licensure (MTEL) that is required for the area in which they wish to be licensed. Students who wish to be licensed as school psychologists in Massachusetts must pass the communication and literacy portion of the MTEL. Tufts degree candidates who took the MTEL in 2004-2005 demonstrated an aggregate pass rate of 94% on the communication literacy reading and writing tests and a 93% pass rate in the academic content areas. Complete testing information has been submitted and validated by the Title II program. During the fall semester, information sessions are scheduled to help students know what to expect on these tests. Written materials and study guides are provided. Tutoring or additional preparation sessions are offered as needed through consultation with the student's adviser.

Master of Arts in Teaching (M.A.T.) Degree

Offered to students seeking teacher licensure, the department's state-approved M.A.T. degree program prepares candidates to teach in academic fields at the elementary, middle, and secondary school levels. At the completion of their program, students may apply for initial licensure in Massachusetts. Students interested in urban education may participate in the Fenway Pilot High School/Boston Arts Academy Program. This collaborative program focuses on preparing teachers to work in innovative urban high schools. Success-

ful applicants work as interns in either of the two sites throughout the entire school year.

Master of Arts (M.A.) in German with Teaching Licensure

Tufts University offers a master of arts degree in German with initial teaching licensure. It requires two academic years plus one summer and is offered in conjunction with the Department of German, Russian, and Asian Languages and Literatures. Students take six credits in German (four of the six credits may be taken in Tübingen, Germany), two credits in the methods and practices of teaching foreign language (Education/German 114 and 124), and six credits in education—including a one-semester teaching practicum. For details, students should contact Professor Bernhard Martin, faculty adviser in the Department of German, Russian, and Asian Languages and Literatures.

Master of Arts (M.A.) Degree: Tufts/Shady Hill Cooperative Program

In this program, participants work and study as apprentices at the Shady Hill School in Cambridge throughout the entire school year. Shady Hill apprentices are eligible to apply for Massachusetts licensure for grades 5 to 8. Apprentices who wish to be licensed for grades 8 through 12 must complete at least 150 hours of additional student teaching.

Master of Arts in Teaching (M.A.T.) degree: Newton Teacher Training Institute (NTTI)

This collaboration makes it possible for NTTI candidates to complete an MAT degree at Tufts after completing their practicum in Newton Public Schools (see <http://ntti.org>).

Master of Arts (M.A.) Degree/C.A.G.S. in School Psychology

This three-year program offers advanced course work integrated with a specific sequence of field-based training and supervision in core competency areas of assessment, consultation, counseling, and intervention. Students are exposed to a broad spectrum of assessment and intervention techniques from various theoretical perspectives and are challenged to develop their own perspectives and models of assessment and intervention. Assessment and intervention strategies are anchored in a

developmental perspective that stresses the social, intellectual, and emotional growth of the individual from childhood through the early adult years. A core feature of the program is the emphasis on scientific problem solving as the main model for approaching, understanding, and proposing solutions to problems in educational settings. Students in this program complete a minimum of a 150-hour pre-practicum during the first year and a 600-hour practicum in school psychology during the second year. During the third year, students complete a 1,200-hour advanced internship, 600 hours of which must be in a school setting, which is accompanied by a supervision seminar. Attendance during the summer between the first and second years is required. The three-year program of study culminating in the M.A. degree/C.A.G.S. leads to initial licensure as a school psychologist and eligibility for national certification.

Master of Arts in Teaching (M.A.T.) Degree in Art Education

Offered in affiliation with the School of the Museum of Fine Arts, Boston, this program leads to licensure as a teacher of visual art for grades pre-K to 8, or 5 to 12.

Master of Arts (M.A.) Degree: Educational Studies

This individualized program allows students to explore a variety of areas in education. Graduates of the program have found careers in such settings as independent schools, educational research groups, nonprofit organizations, and curriculum development; others have entered doctoral programs upon completion of this degree. Possible fields of study include urban education; gender studies in education; science, mathematics, and engineering education; and cognitive, cultural, and social analysis of learning.

Master of Arts (M.A.) Degree: Museum Education

A program for candidates interested in careers as education directors or education coordinators in museum settings. This program prepares students for work in museums in a variety of areas.

Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in Mathematics, Science, Technology, and Engineering Education (M.S.T.E. Education)

The graduate program in MSTE education at Tufts grants M.S. and Ph.D. degrees in three areas: mathematics education, science education,

and engineering education. At the M.S. level, students are prepared to work in research, curriculum development, and teacher development in school districts, research institutions, and other educational settings. The Ph.D. in MSTE education prepares researchers and educators who will contribute to MSTE Education through research and university teaching. The program involves the collaboration of faculty from Tufts University Departments of Education, Child Development, Mechanical Engineering, Computer Science, Biology, Chemistry, Mathematics, and Physics and Astronomy, and the Center for Engineering Educational Outreach, the Center for Science and Mathematics Teaching, and the Dudley Wright Center for Innovative Science Education. Participants in the program are committed to theoretically sound research in MSTE education that is directly relevant to the practice of education and aim at the effective promotion of diversity and equity in MSTE education.

Master of Arts (M.A.) in Science Education

This strand of the graduate program in Mathematics, Science, Technology, and Engineering education is aimed at students whose primary interest lies in classroom instruction. The program is designed for currently practicing K-8 classroom teachers with a minimum of two years teaching experience and with Initial Teacher Licensure at Pre-K-2, 1-6 levels, or 5-8 level in math/sciences. The program is of particular interest to those teachers who are seeking a graduate degree to fulfill requirements for Massachusetts Professional Licensure as they continue to teach. For more detailed information, please visit the Web site <http://ase.tufts.edu/education>.

Electrical and Computer Engineering

Professor Joseph P. Noonan, *Chair; Communications, coding and information theory, digital processing*

Emeritus Professor Ronald B. Goldner, *Applied optics, optoelectronic materials and devices, solar energy conservation, conversion, and storage*

Emeritus Professor Robert A. Gonsalves, *Digital image processing, phase retrieval and diversity*

Professor Mohammed Nurul Afsar, *Microwaves, design and measurements*

Professor Jeffrey A. Hopwood, *Microelectronics, plasma*
Professor Eric L. Miller, *Signal Processing, image processing*

Professor Douglas Preis, *Electromagnetics, signal processing, audio engineering*

Associate Professor Chorgh Hwa Chang, *Computer engineering, communication networks*

Associate Professor Denis W. Fermental, *Control engineering, analog electronics*

Associate Professor Karen Panetta, *Simulation, multimedia*

Assistant Professor Valencia Joyner, *High-speed/low-noise integrated circuits for optical RF communications, optoelectronic VLSI, radiation effects in integrated circuits*

Assistant Professor Sameer Sonkusale, *Mixed-signal VLSI design, sensor electronics*

Lecturer Steven Best, *Antennas, engineering design, wireless communications*

Lecturer Ronald Lasser, *Product development professional, innovation management*

Lecturer Paul McCormack, *Software-defined radio, FPGA-based computing*

Lecturer James Rob Reid, *Microwave switches, circuits, antenna beam-formers*

Lecturer Igor Tkachov, *Microwave circuits*

Lecturer David Wunsch, *Antennas, complex variables*

Lecturer Mohamed Zatet, *Circuit theory*

Research Professor Arthur Winston, *Instrumentation and measurement*

Research Associate Konstantine Korolev, *Study of complex dielectric permittivity and magnetic permeability of solid, liquid, and powdered substances in millimeter wavelengths; magnetic properties of ferrimagnet materials in millimeter waves*

Research Associate Mahmut Obol, *Microwave millimeter, submillimeter wave and terahertz spectroscopy; microwave millimeter measurements*

Adjunct Professor Sergio Fantini, *Biomedical instrumentation, medical optics, near infrared imaging of the brain, optical mammography, muscle hemodynamics, diffuse optical tomography*

Adjunct Professor Edward T. Lewis, *Microelectronics, VLSI, semiconductor physics*

Adjunct Professor Robert J. Mailloux, *Antennas*

Adjunct Professor David Marquis, *Radar*

Adjunct Professor Albert Paradis, *Control theory*

Adjunct Associate Professor Alva Couch, *Parallel computing, computer graphics*

Adjunct Associate Professor Mark Cronin-Golomb, *Optical instrumentation, laser tweezers, atomic force microscopy, nonlinear optics*

Adjunct Associate Professor Soha Hassoun, *CAD, VLSI design*

Adjunct Research Professor Paul Kelley, *Nonlinear optics, lasers, optical communication*

The Electrical and Computer Engineering Department educates tomorrow's technical leaders. Our students invent and design the high tech devices, mathematical algorithms and communications networks used by our society.

The department offers degree programs in electrical engineering and computer engineering for students in the School of Engineering. Minors in biomedical engineering, computer science, and multimedia arts are also available.

The electrical engineer applies concepts from physics and mathematics to create useful electrical devices and systems. Some examples of engineered electrical systems include communications systems, power generation, integrated circuits and electronics, fiber optic data transmission, medical image processing, and radar.

The computer engineer designs devices and systems for the management of information in digital form, such as audio and video systems, microprocessor control systems, digital communications, and computer networks. Because software is as crucial to robust design as hardware, the computer engineer is also a knowledgeable programmer.

The department teaches courses in computer programming and data structures, software engineering, operating systems, digital circuits and systems, very large-scale integration, computer architecture, linear circuits and systems, signal processing, microwaves and microwave devices, electro-optics, communications, and automatic control. Design is integral to all of our engineering degree programs, each of which culminates in a senior design project.

By careful selection of course work, students who follow the standard curricula listed below may also satisfy admission requirements for professional schools of medicine, dentistry, business, or law.

UNDERGRADUATE PROGRAMS

The mission of the Department of Electrical and Computer Engineering is to provide our students with educational experiences which give them a sound basis for professional practice, advanced education, and lifelong learning. At its core is the

goal that students not only learn the fundamental principles of electrical and computer engineering, but also master engineering methods used to solve challenging and diverse problems. Further, the department strives to have each student develop the leadership and communications skills necessary to effectively explain these solutions to both technical and nontechnical communities. The faculty is dedicated to accomplishing this mission through balanced integration of teaching and research.

Bachelor of Science in Electrical Engineering

The objectives of the Electrical Engineering program are:

- to provide students with educational experiences that prepare them for fulfilling careers in technology-related industries and research institutions and instill in them an appreciation for lifelong learning and adaptation so that they may better apply their knowledge and experience to the continually evolving, broad domain of electrical engineering
- to offer high-quality instruction that encompasses not only technical content but also makes students aware of the societal implications of technology
- to present a curriculum built on fundamental principles of mathematics, science, and engineering that utilizes departmental disciplinary strengths and gives students the ability to integrate and apply these principles
- to teach the curriculum through integrated experiences in analysis, design, experimentation, and computation
- to foster an environment where students learn to appreciate and refine fundamental communications skills through the integrated use of research, written reports, and presentations targeted at both similar and diverse audiences
- to challenge students to exercise their knowledge, skills, and creativity through exercises in design and problem resolution in both individual and collaborative forums
- to encourage students, through advising and curriculum structure, to pursue individualized, well-rounded plans of study including elective courses, internships, undergraduate research, and the development of leadership skills

The accredited curriculum leading to the degree of bachelor of science in electrical engineering is intended to qualify students to begin a professional

career in electrical engineering or to proceed to advanced study. The departmental concentration electives and free electives permit the undergraduate to select additional courses in the core areas. Students may study a wide variety of topics, including semiconductor integrated circuits, VLSI design, biomedical engineering, microwaves and telecommunications, antennas and antenna systems, optical electronics, lasers, fiber optics, digital image processing, semiconductor and optoelectronics materials, signal processing, switching circuit design, computer architecture, parallel processing, computer systems, and multimedia.

The core courses of the degree program contain elements of design as well as analysis, and include associated laboratory work. They involve concepts of circuits and systems, digital and analog electronics, microprocessors, electromagnetic fields, automatic control and communication.

The program leading to this degree is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). The required courses for the electrical engineering program are listed below. They are presented in one possible arrangement for completing the program.

First Year

FALL TERM

Mathematics 11

Physics 11 with lab

Engineering 2 (half credit)

Elective (half-credit course in Engineering)

English 1

SPRING TERM

Mathematics 12

Physics 12 with lab

Chemistry 1 or 16

Engineering Science 2

Sophomore Year

FALL TERM

Mathematics 13

Engineering Science 3 Introduction to Electrical Systems

Department foundation elective

Humanities or social sciences elective

Science elective

SPRING TERM

Mathematics 38

Engineering Science 4 Introduction to Digital Logic Circuits

Electrical Engineering 13 Circuit Theory

Department foundation elective (Computer Science II)
Department foundation elective

Junior Year**FALL TERM**

Electrical Engineering 11 Introduction to Analog Electronics

Electrical Engineering 14 Microprocessor Architecture and Applications

Department foundation (Probability and Statistics:

Math 161 and **Math 162** or **Environmental Science 56** or **Biology 132** or **Physics 153** or **Electrical Engineering 108**)

Humanities or social sciences elective

SPRING TERM

Electrical Engineering 18 Electromagnetic Waves

Electrical Engineering 12 Intermediate Electronics
Department foundation (Electrical Engineering 102)
Department foundation elective
Humanities or social sciences elective

Senior Year**FALL TERM**

Electrical Engineering 97 Senior design Project (half credit)

Electrical Engineering 105 Feedback Control Systems

Electrical Engineering 107 Communications Systems I
Probability/statistics (see department list)

Free elective

Department concentration elective

Humanities or social sciences elective

SPRING TERM

Electrical Engineering 98 Senior design Project (half credit)

Department concentration elective

Department concentration elective

Humanities or social sciences elective

Free elective

The selection of elective courses described above may be altered for program flexibility. The assignments here represent one possible way of meeting the requirements for the bachelor of science degree in electrical engineering.

A probability and statistics course, taken for a grade, is required. The menu for the requirement is: Environmental Science 56 (Probability and Statistics in Engineering), Mathematics 161 (Probability) AND 162 (Statistics), Biology 132 (Biostatistics),

Physics 153 (Statistical Mechanics), Electrical Engineering 108 (Communication Systems II), or Electrical Engineering 193-PS.

Four of the elective departmental concentration courses are normally chosen from nonrequired electrical engineering courses. The additional one is selected from nonrequired electrical engineering courses; from appropriate graduate-level courses in biology, chemistry, computer science, engineering, engineering science, mathematics or physics; or from a list (provided by the department) of approved undergraduate technical courses.

Bachelor of Science in Computer Engineering

The objectives of the Computer Engineering program are:

- to provide and expose students to fundamental theory and practice in computer engineering
- to prepare students for careers and leadership in computer-related industry and research institutions at a professional level, for lifelong learning, and for adapting to changes in these fast-paced fields
- to offer opportunities for students to participate in teaching and research experiences including interdisciplinary research.

In both required and elective courses throughout the curriculum, the digital computer is used extensively in the study of electrical systems, components, and materials. Students wishing to investigate more intensively the analysis and design of digital computers, as well as the analysis, design, and operation of systems in which computers are an integral part, should follow the computer engineering program.

The program leading to this degree is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). The required courses for the computer engineering program are listed below. They are presented in one possible arrangement for completing the program.

First Year

The same as the standard program in electrical engineering.

Sophomore Year**FALL TERM**

Mathematics 13

Engineering Science 3 Introduction to Electrical Systems

Department foundation elective
 Science elective
 Humanities or social sciences elective

SPRING TERM**Mathematics 38**

Engineering Science 4 Introduction to Digital Logic Circuits

Computer Science 11 Introduction to Computer Science

Electrical Engineering 13 Circuit Theory

Humanities or social sciences elective

Junior Year**FALL TERM**

Electrical Engineering 11 Introduction to Analog Electronics

Electrical Engineering 14 Microprocessor Architecture and Applications

Computer Science 15 Data Structures

Humanities or social sciences elective

SPRING TERM

Electrical Engineering 18 Electromagnetic Waves

Electrical Engineering 26 Digital Logic Systems

Electrical Engineering 102 Linear Systems

Mathematics 22

Humanities or social sciences elective

Senior Year**FALL TERM**

Electrical Engineering 97 Senior Design Project (half credit)

Probability/statistics (see department list)

Electrical Engineering 107 Communication Systems I

Electrical Engineering 126 Computer Engineering

Electrical Engineering 128 Operating Systems

Computer engineering elective*

Humanities or social sciences elective

SPRING TERM

Electrical Engineering 98 Senior design Project (half credit)

Computer engineering elective*

Computer engineering elective*

Free elective

Free elective

*Computer engineering electives are selected from a list provided by the department. The selections are subject to the approval of the departmental adviser.

Bachelor of Science in Engineering

Alternatively, students in the electrical and computer engineering department may follow programs

of study leading to the bachelor of science degree in engineering. These programs of study differ from the regular programs only in the selection of the twelve required departmental concentration courses and the eight required departmental foundation courses. In the bachelor of science in engineering program, these twenty courses are selected by the student, with the approval of the departmental adviser, to satisfy student interest or professional objectives. Normally, five are engineering or engineering science courses, while the remaining fifteen are selected from engineering, engineering science, computer science, mathematics, natural sciences, and other related areas.

Bachelor of Science

If a student wants a program with a strong computer engineering or other electrical engineering component, the faculty adviser will normally be from the Department of Electrical and Computer Engineering. (See School of Engineering Information.)

UNDERGRADUATE MINOR PROGRAMS

(See Disciplinary Minor Programs for restrictions.)

Biomedical Engineering

The department offers a minor in biomedical engineering. Details are available from the Department of Biomedical Engineering.

Computer Science

The department offers a minor in computer science for those students pursuing the B.S.E.E. degree. Details are available from the Department of Computer Science.

Multimedia Arts

The department offers an interdisciplinary minor in multimedia arts, administered jointly by the Departments of Music and Electrical and Computer Engineering. (See Multimedia Arts for description of this minor.)

Certificate Program in Microwave and Wireless Engineering

The department offers a graduate-level certificate in microwave and wireless engineering. The certificate is offered on a part-time, nondegree basis for students seeking professional training. In most cases, courses taken in a certificate program can be transferred into a graduate degree program. For

more information, see Microwave and Wireless Engineering in this bulletin, contact the Office of Graduate Studies at 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

The certificate requires five courses.

Two required courses:

EE 107 Communications Systems I

EE 117 Introduction to Microwave Devices

One or both of the following:

EE 118 Microwave Semiconductor Devices and Circuits

EE 160 Computer-Aided Design of Microwave Circuits

Two graduate-level elective courses in microwave engineering or related fields:

EE 108 Communications Systems II

EE 136 Antennas for Radar, Avionics, and Communications

EE 137 Radar Engineering

EE 161 Microwave Integrated Circuits

EE 193SBC Satellite-Based Communications

EE 194W Wireless Communications

EE 227 Information Theory

(Students may substitute other Tufts graduate courses, subject to the approval of the certificate faculty advisor.)

GRADUATE PROGRAM

Master of Science

The department offers a program leading to the M.S. degree in electrical engineering. The master of science degree requires ten courses, usually one credit per course, and all courses must be at the 100 level or above. At least eight credits must be from approved courses. The two remaining credits usually are a creative thesis work, written and defended orally, and performed under the supervision of a faculty member. Alternatively, these two credits can be a supervised project plus another approved course.

Doctor of Philosophy

The department offers a program leading to the Ph.D. in electrical engineering. Students in each program must already have a master of science degree in the same or a related field. Applicants to the Ph.D. program who do not have the M.S. degree will instead be considered for admission to the master of science degree program, and on completion of that program will automatically be

considered for admission to the Ph.D. program.

The department differentiates between admission to the Ph.D. program and Ph.D. candidacy. No students are accepted as formal doctoral candidates until they have exhibited merit in a qualifying examination and have identified a faculty member who has agreed to be their dissertation supervisor.

Doctoral candidates are expected to plan a program of research under the direction of their dissertation supervisor and with the guidance of a faculty committee. On completion of this research, the candidate must prepare and publicly defend a dissertation.

Students in electrical engineering must take twenty credits beyond the M.S. degree. These credits include both course work and a dissertation; the dissertation effort is usually assigned ten credits. The qualifying examination is a written examination that must be taken within one academic year of admission to the Ph.D. program (within two academic years for part-time students).

Typical areas available for dissertations include solid-state materials with an emphasis on optoelectronic and solar energy applications, microwave devices and systems, microwave thermography, electromagnetics, antennas, plasma physics, small computers, microprocessor applications, computer architecture, multiprocessing, VLSI design, VLSI CAD, microelectronics, communications systems, information theory, signal processing, digital electronics, Fourier optics, coherence theory, image analysis, nonlinear optics, and circuit theory.

For more detailed information, please visit the Web site <http://www.ece.tufts.edu>.

Engineering Management

COORDINATOR:

Robert J. Hannemann, *The Gordon Institute*

A minor in engineering management is available for undergraduate students in engineering. All courses in a minor must be taken for a grade. Five courses are required for this minor. Four are designated:

Engineering Science 51 Technical Writing

Engineering Science 52 Engineering Management

Civil and Environmental Engineering 53 Engineering Economy

Economics 5 Principles of Economics

One must be selected from the following:

Chemical Engineering 110 Optimization

Chemical Engineering 155 The Chemical Processing Industries: Management, Structure, and Dynamics

Civil and Environmental Engineering 102 Probability and Statistics in Engineering

Economics 3 Principles of Accounting

Engineering Science 151 Engineering Systems: Deterministic Models

Engineering Science 152 Engineering Systems: Stochastic Models

Mechanical Engineering 54 Management of Technology and Innovation

Political Science 104 Public Administration

Political Science 105 Constitutional Law

Psychology 17 Industrial and Organizational Psychology

Sociology 122 Organizational Behavior

For more detailed information, please visit the Web site <http://gordon.tufts.edu>.

Engineering Management/ Gordon Institute

DIRECTOR:

Robert J. Hannemann, *Engineering management, product and process development, entrepreneurship*

ASSOCIATE DIRECTOR:

Mary Adams Viola, *Leadership, new product development, innovation, technology strategy*

CORE FACULTY:

Professor Anil Saigal, *Statistical process control*

Professor of the Practice, Arthur Winston, *Quantitative methods*

Senior Lecturer Paolo Gaudiano, *Modeling and simulation*

Senior Lecturer Partha Ghosh, *Multinational strategies*

Senior Lecturer Samuel Liggero, *New product development*

Senior Lecturer Sinaia Nathanson, *Negotiation and conflict resolution*

Senior Lecturer Judy Stafford, *Software methodology*

Senior Lecturer Charlie Rabie, *Business Strategy*

Lecturer Pier Abetti, *Technological innovation and technology transfer*

Lecturer Jerome Brightman, *Leadership development*

Lecturer Gerald Brown, *Continuous quality improvement & supply chain management*

Lecturer Rana Gupta, *Financial management*

Lecturer Michael Kaufman, *Humanities*

Lecturer James Nash, *Software methodology, design of experiments*

Lecturer Chance Reichel, *Project Management*

Lecturer Jared Spool, *Human factors (usability engineering)*

Lecturer Ewa Winston, *Humanities*

The Gordon Institute of Tufts University offers a professional, accredited graduate program in engineering management. The program develops practicing scientists and engineers into effective leaders who possess a blend of advanced technical knowledge, critical management ability, and strong communication skills.

The institute has strong ties to industry, and the program is focused on the practical application of material learned in the classroom. All participants are required to conduct a full-scale, intensive project for an organization as part of the degree requirements. Classes are taught by professors from Tufts University and by industry specialists with extensive corporate experience.

The integrated curriculum addresses current issues in the field and provides participants with the skills and mind-set they need to make sound business decisions regarding new product development; to understand the relationships between product design, engineering, manufacturing, marketing, and human resources; to translate technical ideas into cost-effective and market-desired products and services; to maximize the operational effectiveness of information in both national and international marketplaces; to develop diverse teams of technical and nontechnical personnel; and to lead teams and drive technically challenging projects from start to finish.

Two enrollment options are available: a one year intensive program and a two-year executive style program. Both programs lead to a master of science degree in engineering management. For scientists and engineers employed in the biotechnology industry, there is a joint program with the university's biotechnology center leading to a master of science degree in engineering management with a specialization in biotechnology.

For more detailed information, please visit the Web site <http://gordon.tufts.edu>.

Engineering Physics

(FOR DEGREE REQUIREMENTS, SEE PHYSICS.)

Engineering Psychology/ Human Factors

Associate Professor Caroline G. L. Cao, *Mechanical Engineering*

An interdisciplinary program offered jointly by the departments of mechanical engineering and psychology. Engineering psychology, more commonly called human factors, applies knowledge of human behavior and attributes to the design of products, equipment, machines, and large-scale systems for human use. Areas of application include biomedical engineering, environmental design, safety, consumer product design, and computer interface design. Students in the School of Engineering or the College of Liberal Arts will receive the Bachelor of Science (BS) degree from their respective colleges after meeting the general requirements set by each college.

The program prepares students for professional work and further graduate studies in this discipline. It also serves as a preparation for pre-medical and pre-dental students and for those interested in legal or management careers.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The program features a common core of fifteen courses. For engineering students, an additional twenty-three courses are required for the BS degree. (See School of Engineering Information.) For liberal arts students, an additional nineteen courses are required to meet the foundation and distribution requirements for the BS degree. (See College of Liberal Arts Information.) These students can use the core courses to meet the social and natural science distribution requirements. (See the online bulletin for course descriptions.)

Core Course Requirements

Engineering-Introductory (half credit) any one half-credit course in Introductory Engineering

Engineering 2 (half credit) Engineering Graphics and CAD

Engineering Science 2 Introduction to Computing in Engineering

Mathematics 11 and 12 Calculus I and II

Physics 11 General Physics I or **Computer Science 11**

Introduction to Computer Science

Psychology 1 Introduction to Psychology

Psychology 17 Industrial and Organizational Psychology

Psychology 31 Statistics for the Behavioral Sciences

Psychology 32 Experimental Psychology

Psychology 53 Engineering Psychology

Psychology 130 Advanced Engineering Psychology

Engineering Psychology 61 Introduction to Human Factors and Ergonomics

Engineering Psychology 120 Project Study in Human Systems

Engineering Psychology 161 Human Factors in Product Design

Engineering Psychology 162 Human-Machine System Design

Students enrolled in the School of Engineering will also satisfy the following distribution requirements for the Engineering Psychology Program: Engineering Science 5, 51, and 56; Chemistry 1 or 16; Physics 11; Physics 12 or Chemistry 2; English 1 or 3; Computer Science 11, 15, 106, and 171; Psychology 107; Engineering Psychology 166; one approved course in Natural Science; One approved course in Environmental Science; two approved courses from biology, anatomy, physiology, biomedical engineering, biomechanics, or occupational therapy.

It is recommended that students in the College of Liberal Arts take additional courses in probability and statistics (e.g., Psychology 107), chemistry (e.g., Chemistry 1, 2, or 16), physics (e.g., Physics 11 and 12), physiology and anatomy, environmental studies, computer science (e.g., Computer Science 11, 15, 106, and 171), engineering psychology (e.g., Engineering Psychology 166) and relevant courses from the engineering science series (Engineering Science 5). Sample course plans can be obtained from either of the sponsoring departments.

Engineering Science Studies

FACULTY COORDINATOR: Professor Chris Rogers,
Mechanical Engineering

The interdisciplinary minor in engineering science allows students in the College of Liberal Arts to obtain a broad overview of four engineering disciplines plus an in-depth study of one aspect of engineering.

Five courses are required and distributed as follows:

One half-credit course in each of four engineering disciplines: chemical and biological, civil and environmental, electrical and computer, and mechanical.

Two one-half credit courses: Engineering 1 (Introduction to Computers in Engineering) and Engineering 2 (Engineering Graphics).

Two courses to be selected with the assistance and consent of a minor adviser. These courses must demonstrate a coherent progression in subject matter. The first one must have either a laboratory or design component that will be continued as an independent project under the CIS 95, 96 designation. (See Interdisciplinary Minor Program for details.)

UNDERGRADUATE COURSES

The engineering science courses described below provide an introduction to the methods and techniques used in the application of sciences and mathematics.

Engineering Science 2 Introduction to Computers in Engineering

Engineering Science 3 Introduction to Electrical Engineering

Engineering Science 4 Introduction to Digital Logic Circuits

Engineering Science 5 Introduction to Mechanics—Statics and Dynamics

Engineering Science 7 Thermodynamics

Engineering Science 8 Fluid Mechanics

Engineering Science 9 Applied Mechanics (Strength of Materials)

Engineering Science 10 Structure and Strength of Materials for Chemical Engineers

Engineering Science 11 Introduction to Biology

Engineering Science 20 Consumer Product Evaluation

Engineering Science 25 Environment and Technology

Engineering Science 27 Environmental Health and Safety

Engineering Science 50 Introduction to Biomedical Engineering

Engineering Science 51 Technical Writing

Engineering Science 52 Engineering Management

Engineering Science 73 Musical Instrument Design and Manufacture

Engineering Science 75 Biomedical Engineering II

Engineering Science 88 CAD for Engineers

Engineering Science 95, 96 Special Topics in Engineering Science

COURSES FOR UNDERGRADUATE AND GRADUATE STUDENTS

Engineering Science 101 Numerical Methods

Engineering Science 108 Statistical Quality Control

Engineering Science 118 Advanced Data Acquisition and Image Processing

Engineering Science 121 Engineering Challenges in Physiology I

Engineering Science 122 Engineering Challenges in Physiology II

Engineering Science 125 Science and Technology of Atmospheric Change

Engineering Science 150 Introduction to Biomedical Engineering

Engineering Science 151 Engineering Systems: Deterministic Models

Engineering Science 152 Engineering Systems: Stochastic Models

Engineering Science 175 Biomedical Engineering II

English

Professor Lee Edelman, *Chair; Fletcher Professor of English Literature; Literary theory, film studies, modern poetry*

Professor Elizabeth Ammons, *Harriet H. Fay Professor of Literature; American literature, women writers*

Professor Jay Cantor, *History of consciousness, modernism, creative writing*

Professor Deborah Digges, *Modern poetry, creative writing*

Professor Carol Flynn, *Eighteenth-century British literature*

Professor John M. Fyler, *Chaucer, medieval literature*

Professor Joseph Litvak, *Nineteenth-century British literature*

Professor Jonathan Wilson, *Fletcher Professor of Rhetoric and Debate; American literature, creative writing*

Associate Professor Linda Bamber, *Women and literature, Shakespeare*

Associate Professor Kevin Dunn, *Renaissance literature*

Associate Professor Sheila Emerson, *Victorian literature*

Associate Professor Judith Haber, *Renaissance literature*

Associate Professor Sonia Hofkosh, *British romantic literature*

Associate Professor Virginia Jackson, *Poetics, nineteenth-century American poetry and culture*

Associate Professor Modhumita Roy, *World literature in English*

Associate Professor Christina Sharpe, *Multiethnic literature*

Assistant Professor Radiclan Clytus, *Nineteenth-century American literature and culture*

Assistant Professor Lecia Rosenthal, *Twentieth-century British modernism*

Assistant Professor Ichiro Takayoshi, *Twentieth-century American literature, Asian American literature*

Lecturer Jonathan Strong, *Creative writing*

Lecturer Michael Ullman, *Expository writing*

The Department of English offers a wide range of courses in British, American, and world literatures in English; film; literary theory; and creative writing. Though diverse, these offerings are unified by the study of textual production and the styles and practices of writing in English. Courses in the department examine literary works in their most illuminating contexts: historical, social, philosophical, and political. The department's courses in expository and creative writing enable students to refine their skills through reading, frequent writing assignments, and discussion.

The department serves the interests of students who plan to become teachers or writers of literature, as well as those preparing for other professions that put a high premium on cultural analysis, effective writing, symbolic interpretation, or media studies. Among the fields our students commonly enter are law, diplomacy, journalism, public relations, publishing, teaching, and filmmaking. Students who have majored (or double-majored) in English are also seen as especially attractive candidates by medical, law, and business schools. Our courses are central to a liberal arts education, regardless of anticipated career, because they instill a mastery of critical thinking, linguistic analysis, and persuasive communication in a world that increasingly demands that we not only read but also read *through* the representations that we encounter.

UNDERGRADUATE

CONCENTRATION REQUIREMENTS

English majors work out a sequence of courses in consultation with their advisers. A list of approved courses for each category is available online through the English department Web site:

<http://ase.tufts.edu/english>. Students must take ten courses listed or cross-listed in the department above English 1, 2, 3, and 4 as follows:

1) One survey course from the following:

English 20 Black World Literature (formerly English 36)

English 21 General View of English Literature I (formerly English 51)

English 22 General View of English Literature II (formerly English 52)

English 23 Continuity of American Literature (formerly English 59)

2) Two non-survey classes in American, British, or other Anglophone literature written before 1860, including at least one course in British literature. No more than one course used to fulfill this part of the requirement may be on Shakespeare. A list of approved courses for this category is available at this link: <http://ase.tufts.edu/english/undergrad/majorlist.asp#survey>.

3) Two non-survey courses in American, British, or Anglophone literature written after 1860. A list of approved courses for this category is available at this link: <http://ase.tufts.edu/english/undergrad/majorlist.asp#survey>.

4) Five remaining courses of the student's choice from the department's listings. See course listings by semester at this link: <http://ase.tufts.edu/english/courses/>.

In constructing their majors, students are expected to work with their advisers to design a coherent but wide-ranging course of study. English majors should take survey courses early in their academic career in order to establish the necessary foundation for more advanced classes. We encourage all students majoring in English to explore the full historical range of offerings; to investigate the spectrum of textual differences to be found in the study of Anglophone literatures, film, and oral traditions; and to include exposure to recent approaches in English studies, such as women's studies, literary theory, historical materialism, and cultural studies. With the help of their advisers, English majors should seek to create programs of study that expand their knowledge and challenge their preconceptions.

No more than 4 transfer courses may count toward fulfillment of the major.

Students should be aware that they may count toward the major no more than two creative writing courses at the introductory level in each of the areas offered (i.e. Creative Writing: Fiction; Creative Writing: Poetry; Creative Writing: Journalism) and no more than two intermediate level courses in each of those areas. There is no limit on the number of advanced creative writing courses a student may count. Nonfiction Writing and Intermediate Journalism may each be counted only once.

Beginning with the class of 2008, students must receive a grade of C- or higher in any course that they wish to count toward the fulfillment of English major requirements.

UNDERGRADUATE MINOR PROGRAM

The minor in English requires students to take six courses in the department above English 1, 2, 3, and 4. The purpose of the minor is to allow students to experiment widely, or to follow a particular interest with some concentration. Therefore, each minor will be individual not only in content but also in concept. All students should try, however, to include at least one course numbered below 100 and one above 100 and should consult with faculty members as they pursue their minors. Beginning with the class of 2007, students may count a maximum of three creative writing courses toward fulfillment of the minor in English. No more than 2 transfer courses may count toward fulfillment of the minor.

GRADUATE PROGRAM

The graduate program in English, American, and Anglophone world literature is varied and flexible. It offers special opportunities for literary analysis with a focus on cultural studies, literary theory, and topics in gender, race, and politics. Many of the department's period, genre, and interdisciplinary courses lend themselves to a broadly conceived program in literature and culture, including interdisciplinary work. Approved courses in other departments may be taken to that end. Fall admission only.

More information can be found at this link:
<http://ase.tufts.edu/english/graduate/>.

Master of Arts

Master's candidates are required to complete six

semester courses, with the expectation that they will enroll in three graduate seminars per semester. Because doctoral degree candidates are required to take a comprehensive examination in their third year, students are advised to take courses that offer them breadth as well as depth. At the end of the master of arts year, they will take a written examination to demonstrate their critical and analytical skills. One month before the examination they will be assigned two texts to prepare. The examination will test their ability to integrate critical, theoretical, and contextual analyses of the texts.

At the end of the academic year, the full faculty will consider the master's candidates individually, focusing on the results of their master's examination, their academic records at Tufts, and the recommendations of the faculty who have taught them. On the basis of this appraisal the department will recommend whether or not the candidate should be granted the master of arts; it will also determine whether or not the candidate should be admitted to candidacy in the doctoral degree program.

The required reading knowledge of a foreign language must be demonstrated to the satisfaction of the Graduate Committee (usually by an examination taken at Tufts University) in order to complete the requirements for the master of arts degree.

Students holding teaching assistantships in their second year of graduate work are normally expected to complete the requirements for the master of arts before taking up the appointment.

Doctor of Philosophy

Admission to the doctoral degree program is open to students who have completed with distinction the requirements for the master's degree in English. Decisions about candidacy for the doctoral degree are made after the master of arts written examination.

In the second and third years, doctoral candidates will be offered the opportunity to increase their comprehensive mastery while they begin to concentrate on one particular area or subject. Given that most students will be teaching assistants at this time, it is assumed that they will take four courses each year. Normally, these courses will be chosen from among the graduate seminars offered in the department, but advanced-level undergraduate classes may be counted with the approval of the

director of graduate studies.

At the end of the third year or in the beginning of the fall semester of the fourth year, each student will take a two-hour oral comprehensive examination. The examining committee will consist of three faculty members, one of whom, the chair, has been selected by the student as someone familiar with the student's work in class. In most cases, the graduate student will already have spoken with this faculty member about serving as director of her or his dissertation.

No standardized list of texts is issued for this examination. The graduate program is small and one advantage of its size is that students' individual interests can be accommodated. It is not the purpose of the examination to have everyone do the same thing. Instead, it seeks to test each student's range and breadth of knowledge. Therefore the following guideline of periods and areas of concentration is to be used by each student to generate a foundation list of works in each period or area for which he or she will be responsible. This list is not intended to be exhaustive or exclusive; not everything the student has read will show up on the list. Critical works on periods and texts will be included on each list. This list of specific titles should be arrived at in consultation with individual faculty members and with the director of the graduate program. The list must be submitted to the director of the graduate program in English at least three months before the oral examination.

Periods and areas of concentration for the doctoral degree comprehensive examination are the following: Old English, Medieval Literature, Sixteenth-Century British Literature, Seventeenth-Century British Literature, Eighteenth-Century British Literature, American Literature before 1820, Nineteenth-Century British Literature, Nineteenth-Century American Literature, Twentieth-Century British Literature, Twentieth-Century American Literature, Contemporary World Literature, and Literary Critical Theory. Each student will select eight of the periods or areas for particular development for the comprehensive examination. Two of those fields will be fulfilled by course work completed in graduate school. The other six will be the focus of the comprehensive oral examination. Students who do not pass the oral examination, in whole or in part, may take the examination again at a later date.

In order to complete the doctoral degree, each student is required to demonstrate by examinations or courses taken at Tufts an ability to read two foreign languages (one of which was necessary in order to fulfill the requirements for the master of arts). Alternatively, doctoral candidates may complete with a passing grade at least one graduate-level course in a foreign literature. It is generally expected that this course will be done in a body of literature relevant to the student's graduate study.

Once the student has passed the oral comprehensive, he or she will prepare a prospectus for the dissertation. This must take place not later than six months after the oral examination.

To gain experience in teaching, students in the doctoral program must also assist in undergraduate instruction, usually as readers or teaching assistants, during their two-year period of residency.

Tufts in London

The Department of English cooperates with other departments in offering undergraduates a year of study in England. For more information, see Tufts Programs Abroad.

For more detailed information, please visit the Web site <http://ase.tufts.edu/english/>.

Entrepreneurial Leadership

DIRECTOR:

Pamela Goldberg, *The Gordon Institute*

FACULTY:

Nancy Wilson, *Associate Dean, Tisch College*

Cindy Connelly, *Adjunct faculty*

Robert Creeden, *Adjunct faculty*

Jeremy Halpern, *Adjunct faculty*

John Hodgman, *Adjunct faculty*

The Entrepreneurial Leadership Program at Tufts provides hands-on educational opportunities for students interested in founding their own companies or working in entrepreneurial environments. The program strives to engage students in the ever-changing world of new business ventures and teaches them to develop innovative, real-world solutions to business challenges.

The program attracts top faculty and develops industry partnerships. Through our rigorous curriculum and connections to alumni in business and industry, the program strives to benefit both students and the corporate community. With access to outstanding teachers, intensive coursework, guest speakers, internships, and real-world business networks, our students develop the advanced knowledge they need to become the entrepreneurial leaders of the future.

A minor in entrepreneurial leadership is available for all arts, sciences, and engineering undergraduate and graduate students interested in leadership positions at start-up companies or entrepreneurial segments of the corporate or social sector. Students are required to take four courses plus one elective course from the lists below. All courses must be taken for a grade. Students will attend lectures, discuss relevant issues with guests from the real world, complete homework assignments, take tests, participate in focused discussions of relevant issues and current events, and complete a course project on a topic central to the theme of the course.

Undergraduate engineering students may not count any of these courses toward foundation and concentration requirements. A maximum of two courses may be used toward social science requirements.

After meeting the necessary requirements for the minor, students complete the minor certification form and return it to The Gordon Institute.

Required Courses

101 Entrepreneurship and Business Planning
103 Entrepreneurial Finance
105 Entrepreneurial Marketing
107 Entrepreneurial Leadership

Elective Courses

141 Social Entrepreneurship: Innovative Nonprofits
193, 194 Entrepreneurial Special Topics
199 Entrepreneurial Field Studies
American Studies 141 Innovative Non-profits
Economics 3 Principles of Accounting
Economics 6 Business Law
Urban and Environmental Planning 23
Negotiation

For more detailed information, please visit the website <http://gordon.tufts.edu/leadership.htm>.

Environmental Health

DIRECTOR:

Associate Professor David M. Gute, *Environmental and occupational epidemiology*

CORE FACULTY:

Professor Linfield C. Brown, *Water quality modeling, environmental engineering*

Associate Professor Wayne Chudyk, *Drinking water quality and treatment*

Associate Professor Christopher Swan, *Site remediation*

Lecturer Anne Marie Desmarais, *Environmental health*

Lecturer Diane Silverman, *Toxicology*

Lecturer Mark Woodin, *Epidemiology*

The Environmental Health program is an interdisciplinary program based in the Department of Civil and Environmental Engineering of the School of Engineering. Historically, professional programs in environmental health were established in schools of engineering to promote research on control of infectious disease, purification of water supplies, and sanitary disposal of human wastes. Today, focal points of concern have been broadened to such challenging issues as environmental pollution, epidemiological aspects of chronic illnesses, occupational health, brownfields redevelopment, and risk assessment and management.

While the program retains its traditional strength in environmental engineering, it also provides a sound background in epidemiology, biostatistics, and environmental health. The problems and issues in environmental health can be viewed in three broad categories:

- 1) Biological: living things, ranging from food upon which life depends to pathogenic microorganisms responsible for disease.
- 2) Physical: nonliving things affecting people (physical agents such as heat, noise, radiation, consumer and industrial products, and chemical agents such as environmental pollutants and systemic poisons).
- 3) Social: the interrelationship within society, which includes cultural values, customs, attitudes, economic status, and social-political organization.

In response to these issues and to the current needs of society for a comprehensive approach to health and disease problems, the program gives students both a theoretical and practical knowledge of environmental health, epidemiology, biostatistics, drinking water quality and treatment, occupational hygiene, and environmental toxicology.

Supporting course work is tailored to the interests of the individual student and drawn from other departments, including the departments of biology, chemistry, economics, engineering science, mathematics, political science, physics, philosophy, psychology, sociology, and urban and environmental policy and planning, as well as the School of Nutrition Science and Policy.

UNDERGRADUATE PROGRAM

Bachelor of Science in Engineering

The Department of Civil and Environmental Engineering offers a B.S.E. program in environmental health. (See Civil and Environmental Engineering for program description and requirements.)

GRADUATE PROGRAM

Master of Science

Students in the Environmental Health program are required to elect one of three tracks: environmental epidemiology, risk assessment and risk management, and environmental health policy. The tracks are designed to allow students to concentrate on a specific area of environmental health. The environmental epidemiology track is designed for students with an interest in public health issues associated with environmental contamination and its links to chronic disease. This track will capitalize on the program's links with Tufts' M.P.H. program. The risk assessment and risk management track focuses on assessing exposure and risk associated with environmental contaminants, with emphasis on brown-field redevelopment and environmental cleanup strategies to manage risk. The environmental health policy track is designed for students with an interest in how environmental health programs are managed in governmental agencies.

All students are required to complete a total of ten course credits. For students accepted fall term 2001 and later, four core courses are required:

Civil and Environmental Engineering 154

Principles of Epidemiology

Civil and Environmental Engineering 158

Occupational and Environmental Health

Civil and Environmental Engineering 173

Health Effects and Risk Assessment

Civil and Environmental Engineering 292R

Research Methods in Environmental Health

In addition to the four core courses, students must take three additional courses in their respective tracks:

ENVIRONMENTAL EPIDEMIOLOGY TRACK

Civil and Environmental Engineering 164

Environmental Methods

Civil and Environmental Engineering 167

Environmental Toxicology

Civil and Environmental Biology 132 Biostatistics

or **Civil and Environmental Engineering 102**

Probability and Statistics in Engineering

RISK ASSESSMENT AND RISK MANAGEMENT TRACK

Civil and Environmental Engineering 143

Site Remediation

Civil and Environmental Engineering 167

Environmental Toxicology

Civil and Environmental Engineering 168

Exposure Assessment

ENVIRONMENTAL HEALTH POLICY TRACK

Civil and Environmental Engineering 168

Exposure Assessment

Civil and Environmental Engineering 176

Pollution Prevention

UEP 230 Negotiation, Mediation, and Conflict Resolution

Students will take one or two electives in addition to the core and track courses. Students in the master's degree program in environmental health are encouraged to complete a two-credit thesis; however, they may complete a one-credit master's project with approval of their adviser.

ENVIRONMENTAL HEALTH COURSES

(See online bulletin for course descriptions.)

Civil and Environmental Engineering 32

Environmental Systems Engineering

Civil and Environmental Engineering 132

Environmental Engineering Processes

Civil and Environmental Engineering 133

Water and Wastewater Plant Design

Civil and Environmental Engineering 137 Public Health

Civil and Environmental Engineering 143

Site Remediation

Civil and Environmental Engineering 154

Principles of Epidemiology

Civil and Environmental Engineering 158

Occupational and Environmental Health

Civil and Environmental Engineering 161

Internship in Epidemiology and Biostatistics

Civil and Environmental Engineering 164

Epidemiologic Methods

Civil and Environmental Engineering 168

Exposure Assessment

Civil and Environmental Engineering 171

Hazardous Materials Management

Civil and Environmental Engineering 172

Fate and Transport of Environmental Contaminants

Civil and Environmental Engineering 173

Health Effects and Risk Assessment

Civil and Environmental Engineering 175

Hazardous Materials Safety

Civil and Environmental Engineering 176

Pollution Prevention Management

UEP/Civil and Environmental Engineering 207

Environmental Law

UEP/Civil and Environmental Engineering 267

Methods in Environmental Impact Assessment

Courses in other departments frequently taken by students in environmental health include the following:

Biology 81 Environmental Biology and Conservation

Biology 143 Biology of Populations

Biology 167 Environmental Toxicology

Chemistry 141 Instrumental Analysis

Community Health 101 Introduction to Community Health

Community Health 102 Health Care in America: Policies and Politics

Mathematics 161, 162 Probability and Statistics

Nutrition 101 Human Nutrition

Nutrition 120 Political Economy of World Hunger

Philosophy 124 Bioethics

Political Science 104 Public Administration

Political Science 114 Urban and State Politics

Sociology 141 Sociology of Medicine

Sociology 145 Science, Technology, and Society

Sociology 180 Sociology of Mental Health

UEP 166 International Environment and Development Policy

UEP 203/Philosophy 173 Political Economy, Ethics, and the Environment

UEP 205 Urban Planning and Design

UEP 230 Negotiation, Mediation, and Conflict Resolution

UEP 253 Financial Analysis and Management

UEP 262 Environmental Economics

In addition, on a space-available basis, students may enroll in courses offered by the Master's in Public Health (M.P.H.) degree program at Tufts School of Medicine.

For more detailed information on this department, please visit the Web site <http://publicsafety.tufts.edu/ehs/laboratory/hazardouswaste.html>.

Environmental Management

FACULTY ADVISER:

Lecturer *Anne Marie C. Desmarais, Civil and Environmental Engineering*

Environmental managers in industry, government, and consulting know that the new century brings with it challenges and opportunities in environmental management and compliance. Complex regulations, environmental technologies, international environmental treaties, and multinational corporate environmental programs will determine the direction that environmental managers must take. The certificate in environmental management provides students with the tools and techniques to understand the complex issues of future environmental management.

The program blends courses in fundamentals such as regulations and compliance issues with leading-edge concepts in life-cycle analysis, risk management, and remediation technologies. Students select courses from regular Tufts' graduate offerings and may choose to focus their course work in environmental technology, health, or policy.

The program is open to students with a bachelor's degree; undergraduate course work in natural or physical science, mathematics, or engineering; two years of work experience; and some knowledge of current environmental issues.

This five-course, graduate-level certificate, offered in collaboration with the Department of Civil and Environmental Engineering and the Office of Graduate Studies, is designed to be pursued on a part-time basis by professionals seeking advanced training in this area or preparing to enter a master's degree program. In most cases, courses taken as a certificate student can be transferred into a Tufts degree program.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395 or visit the Web site <http://gradstudy.tufts.edu/>.

Environmental Studies

PROGRAM DIRECTOR:

Associate Professor George Ellmore, *Draupner Ring Scholar; Biology; adviser, environmental science*

EXECUTIVE BOARD AND ADVISERS:

Professor J. Michael Reed, *Biology;*

Associate Professor Wayne Chudyk, *Civil and Environmental Engineering; adviser, environment and technology*

Associate Professor Stephen Levine, *Civil and Environmental Engineering; adviser, environment and technology*
adviser, environmental science

Associate Professor Jeffrey E. Zabel, *Economics;*
adviser, environment and society

Lecturer Ann Rappaport, *Urban and Environmental Policy and Planning; adviser, environment and society*

This multidisciplinary program highlights our natural surroundings, along with designs that help minimize degradation of those surroundings, and the social and political tools needed to preserve and improve the environment. Environmental studies provides a strong foundation in the natural sciences, with directed training in social sciences and humanities.

Environmental studies is offered as a second major in conjunction with any departmental major in arts and sciences and engineering, normally excluding interdisciplinary programs. The major requires completion of eight core courses, three courses in any one track, and an internship. The program has three tracks. Track I, Environmental Science, focuses on basic principles, theories, and methods of the natural sciences (biology, physics, chemistry, and geology) and their application to environmental problems. Track II, Environment and Technology, emphasizes engineering and applied science aspects of resource management, environmental impacts, and pollution prevention and abatement. Track III, Environment and Society, examines sociopolitical, humanistic, economic, and cultural aspects of managing environmental problems.

Students in each track complete a core curriculum that captures the fundamental principles of disciplines in the three tracks. The core requires students to master basic scientific principles of environmental processes, to examine interactions between technology and the environment, and to

explore the societal context for implementing environmental policy.

The core seminar requirement can be fulfilled by taking a seminar on environmental topics offered in various departments including philosophy, biology, political science, and urban and environmental policy and planning.

Because the environmental studies curriculum is designed as a second major, students may double count courses (but no more than fifty percent of the courses counted in the primary major) to fulfill both their first and second majors. A course in GIS (computer mapping and spatial analysis) is recommended.

The general components of this program are given below. Students who choose this major register with the director, and are placed in one of the three tracks—each of which has its own adviser/s. We recommend that students begin the major by taking Biology 7 early on to get to know our program.

TRACK COURSES

Three courses in any one track, provided they include offerings from at least two departments. Up to one core course numbered 100 or higher may be double-counted toward both the core and the appropriate track. (Environmental courses are occasionally offered by visiting scholars. With approval of the track adviser such courses may fulfill some track requirements.)

For more detailed information, please visit the Web site <http://www.tufts.edu/tie/EnvStudies/>.

Ethnic Groups in America

Whether the various social and ethnic groups in America have been assimilated into the larger culture (the “smelting pot”) or have maintained their distinctive cultures and identities, they have contributed to the unique character of the country. The interdisciplinary minor in ethnic groups in America explores the interrelations of political, historical, social, aesthetic, and ethical issues raised by a society of migrants, voluntary and forced, who came to the United States from Africa, Asia, Europe, and other nations and societies in the Western hemisphere. In particular, the minor

encourages the student to make appropriate integrations of these theories.

Five course credits with at least one course from each of three different departments are required. In addition to the five credits, students are required to complete an appropriate project, such as a thesis, an oral presentation, or a performance, which integrates the knowledge and methodologies of the disciplines involved. (See Interdisciplinary Minor Program for details.)

Film Studies

(SEE COMMUNICATIONS AND MEDIA STUDIES.)

French

(FOR DEGREE REQUIREMENTS, SEE ROMANCE LANGUAGES.)

Geology

Associate Professor Anne F. Gardulski, *Chair; Sedimentology, oceanography, structure, stratigraphy*
Professor Grant Garven, *Groundwater geology and hydrology*

Professor Jack C. Ridge, *Quaternary, glacial, and environmental geology; geomorphology*

Associate Professor Robert L. Reuss, *Metamorphic and igneous petrology, mineralogy*

Assistant Professor Molly McCanta, *Igneous and metamorphic petrology, mineralogy, planetary geology*

Senior Lecturer Jacob S. Benner, *Paleoecology, stratigraphy*

Adjunct Associate Professor Samuel Kounaves, *Analytical, environmental, and materials chemistry*

Adjunct Associate Professor Laurie Baise, *Geotechnical engineering, geotechnical earthquake engineering*

Geology is the science of the earth. It involves an interdisciplinary exploration of the earth's 4.5-billion-year history and a study of the processes that form and shape the rocks and minerals of the earth. Geology integrates biology, chemistry, astronomy, and physics in the study of the earth, and has broad applications in engineering, archaeological, and environmental investigations. Tufts University has well-equipped geological laboratories and an excellent collection of geologic materials for study and research. Field trips to the northeastern and southwestern United States offer

abundant opportunities for the study of a great variety of geological phenomena.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The geology department offers two programs: the geological sciences major, for students who wish to pursue graduate study in geology and related fields, or work at entry-level jobs; and the geology major, which emphasizes breadth and flexibility for students seeking a double major, teaching certification, entry to medical programs, careers in multidisciplinary fields such as environmental law, or a broad-based liberal arts major.

Geological Sciences Major

Students intending to continue with geology after graduation should complete Geology 1 and 2, eight or more geology courses above Geology 9, plus Mathematics 12, Chemistry 2, and Physics 1 and 2 (or 11 and 12) and their labs. The geology courses should normally include Geology 11, 12, 22, 32, 35, and one of the following: Geology 36, 102, 115, or 131. Approved related fields courses may replace up to two upper-level geology courses. Research experience and a six-week geology summer field camp are strongly recommended.

Geology Major

Students electing this option should complete Geology 1 and 2, eight other geology courses (except Geology 9), plus Chemistry 1 and Physics 1 with labs. Approved related fields science courses may replace as many as three of the upper-level geology courses. Upper-level engineering courses may substitute for up to two of the upper-level geology courses with prior written consent.

UNDERGRADUATE MINOR PROGRAM

Geoengineering Minor

The Civil and Environmental Engineering Department offers a minor in geoengineering available to students of the College of Liberal Arts and the School of Engineering, except those majoring in Civil and Environmental Engineering. Professor Lewis Edgers is the adviser for the minor.

Five courses are required:

Engineering Science 5 Applied Mechanics (Statics)

Engineering Science 9 Applied Mechanics (Strength of Materials)

Civil and Environmental Engineering 12

Introduction to Hydraulic Engineering

Civil and Environmental Engineering 42

Introduction to Geotechnical Engineering

One elective selected from:

Civil and Environmental Engineering 112

Hydrology and Water Resource Engineering

Civil and Environmental Engineering 113

Groundwater Engineering

Civil and Environmental Engineering 146

Foundation Engineering

Civil and Environmental Engineering 149

Earth Support Systems

Prerequisites for the above course sequence are Mathematics 12 and Physics 12.

For more detailed information, please see the Web site <http://ase.tufts.edu/geology>.

German, Russian, and Asian Languages and Literatures

Professor (Japanese) Hosea Hirata, *Chair; Director of Film Studies minor; Acting Director of Arabic Program, Japanese literature*

Professor (German/Judaic Studies) Sol Gittleman, *Alice and Nathan Gantcher University Professor of Judaic Studies; Earlier twentieth century, Yiddish literature, national socialism*

Professor (Russian) Vida Johnson, *Director of Russian Program; Twentieth century, film and culture*

Professor (Japanese) Charles Inouye, *Director of Japanese Program, Co-director of International Letters and Visual Studies; Japanese literature*

Professor (Japanese) Susan Napier, *Director of Japanese Program; Japanese literature, popular culture, Anime film*

Emeritus Professor (German) Charles G. Nelson, *Literary theory and criticism, medieval literature*

Professor (German) Christiane Zehl Romero, *Goldthwaite Professor of Rhetoric; Tübingen; Professor of German; Director of German program; Twentieth century, women writers, film, advanced language*

Associate Professor (German/Judaic Studies) Gloria J. Ascher, *Co-director of Judaic Studies; German literature of the eighteenth and nineteenth centuries, Sephardic studies, Ladino language and literature, Scandinavian literature*

Associate Professor (German) Daniel Brown, *Director of Africa in the New World; Reformation, documentary theatre, language pedagogy*

Associate Professor (Russian) Gregory Carleton, *Twentieth-century Russian literature and culture*

Associate Professor (German) Bernhard Martin, *Director of German Graduate Program, medieval German literature, cultural studies*

Associate Professor (Judaic Studies) Joel Rosenberg, *Lee S. McColester Associate Professor of Biblical Literature; Co-director of Judaic Studies; Co-director of International Letters and Visual Studies; Central European writers, South African writers, film studies*

Associate Professor (Russian) David Sloane, *Nineteenth Century Russian literature, poetry, language pedagogy*

Associate Professor (Chinese) Xueping Zhong, *Director of Chinese program; Modern Chinese literature, culture, film*

Assistant Professor (Arabic) Amira El-Zein, *Arabic language and literature*

Assistant Professor (Chinese) Ning Ma, *Pre-modern Chinese literature, Comparative literature*

Lecturer (Arabic) Valerie Anishchenkova, *Coordinator of Arabic language courses*

Lecturer (Japanese) Kiyomi Kagawa, *Coordinator of Japanese language courses*

Lecturer (Hebrew/Judaic Studies) Rahel Meshoulam, *Coordinator of Hebrew language courses*

Senior Lecturer (German) Saskia Stoessel, *Coordinator of German language courses*

Senior Lecturer (Chinese) Mingquan Wang, *Coordinator of Chinese language courses*

Lecturer (Arabic) Rana Abdul-Aziz, *Arabic language*

Lecturer (Arabic) Mohammed Alwan, *Arabic language and literature*

Lecturer (Chinese) Jianping Feng, *Chinese language*

Lecturer (Arabic) Fadi Jajji, *Arabic language*

Lecturer (Japanese) Shiori Koizumi, *Japanese language*

Lecturer (Chinese) Joanna Kuriyama, *Chinese language*

Senior Lecturer (Chinese) Jinyu Li, *Chinese language*

Lecturer (German) Doris Pfaffinger, *German language*

Lecturer Shaomei Wang, *Chinese language*

Lecturer (Japanese) Kiyoko Morita, *Japanese language*

Lecturer (Arabic) Paul Wulfsberg, *Arabic language*

Part-time Lecturer (Arabic) Mervat Ali, *Arabic language*

Part-time Lecturer (Russian) Tanya Gassel, *Russian language*

Part-time Lecturer (German) Geraldine Grimm, *German language and literature*

Part-time Lecturer (Hebrew) Hava Kimelman, *Hebrew language*

Part-time Lecturer (Hebrew) Tomer Levi, *Hebrew language*

Part-time Lecturer (Russian) Nancy Petrov, *Russian language*

Part-time Lecturer (German) Elisabeth Rettelbach, *German language*

Part-time Lecturer (Judaic Studies) Jeffrey Summit, *Judaic Studies*

Part-time Lecturer (Chinese) Zhongxin Sun, *Chinese language*

Part-time Lecturer (Chinese) Min Wan, *Chinese language*

Part-time Lecturer (Arabic) Souhad Zendah, *Arabic language*

The Department of German, Russian, and Asian Languages and Literatures is administrative home to the following language and culture programs: Arabic, Chinese, German, Hebrew, Japanese, Russian, and Swahili. The Department is also closely connected to various interdepartmental programs: Africa in the New World (ANW), Asian Studies, Communication and Media Studies (CMS), International Relations (IR), International Letters and Visual Studies (ILVS), Judaic Studies, and Middle Eastern Studies.

The Department offers eight majors and two graduate degrees. The undergraduate majors are Chinese, German Language and Literature, German Studies, Japanese, Judaic Studies, ILVS, Russian Language & Literature, and Russian and East European Studies. The graduate degrees are M.A. in German and M.A. in German with Teaching Licensure. Students can minor in Arabic, Chinese, German, Japanese, Judaic Studies, and Russian. (For majors in Asian Studies, IR, and Middle Eastern Studies, as well as minors in ANW, Asian Studies and CMS, please consult their websites).

SPECIAL MINOR FOR ENGINEERING STUDENTS

Students earning a bachelor degree in engineering may minor in either Arabic, Chinese, German, Hebrew, Japanese, or Russian language and culture.

The minor requires a total of six (6) courses:

- a. four language courses above the beginning 2nd semester level – 3, 4, 21, 22
- b. one course in the social science concentrating on the area in which the target language is spoken (e.g. for Arabic: History 60, 61, 64, 65; for Chinese: History 43, 44, Political Science 126; for German: History 31, Political Science

125, 147; for Hebrew: History 61; for Japanese: History 47, 48, 122, 123, 124, 125, Political Science 131; for Russian: History 27, 28, 29)
 c. a fourth-year level language course (Arabic 121, Chinese 121, German 121, Hebrew 121, Japanese 121, Russian 121) or, in conjunction with the social science course, a Directed study in the language focusing on materials relevant to that course.

Arabic

Each day we realize the vital role languages play in understanding different cultures. The Arabic Program, with its primarily language, literature and culture courses, aims to bridge the gap between Western and Arab cultures and traditions. It offers strong foundation in Fusha – Modern Standard Arabic, as well as exposure to cultural and contemporary issues of the Middle East.

UNDERGRADUATE MINOR PROGRAM

The department offers a minor in Arabic requiring the completion of six courses beyond the intermediate level (ARB 3-4) and two courses in Arabic literature or culture.

Chinese

Underlying much of East Asian culture, the Chinese tradition is the longest continuous civilization on earth. Now home to one-fifth of humankind and launched into rapid growth, China plays an increasingly pivotal role in today's world. The Chinese Program offers courses aimed at giving students a sound understanding of Chinese literature and culture, and proficiency in the modern Chinese language.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The major in Chinese requires ten courses: nine courses in the program beyond Chinese 4, plus one in a related field. Those who place out of language courses still need to complete ten approved courses. At least one course from categories b or c must be a seminar or advanced course approved by the Chinese program director. If qualified, a student may opt to do an honors thesis.

- a. Language requirement: four courses beyond Chinese 4. Those who place out of Chinese 121 and 122 are strongly encouraged to take Chinese 123 to 128.
- b. Chinese 61 and four additional literature and culture courses from Chinese offerings in the department.
- c. One course in Chinese culture or in related disciplines offered by another program or department and approved by the Chinese program director.

UNDERGRADUATE MINOR PROGRAM

The department offers a minor in Chinese requiring the completion of six courses beyond the intermediate level (Chinese 3-4). These must include two language courses at the 100 level and two literature/culture courses. Details are available from the departmental office.

CHINESE LANGUAGE COURSES

Regular classes at the lower levels (1 through 22) meet three times a week; regular classes at the higher levels (121 through 128) meet twice a week. Intensive classes meet six times a week.

THE CHINESE HOUSE

The Chinese House is a language based housing unit sponsored by the Chinese Program. The mission of the Chinese House is to provide language learning experience outside of the classroom and to promote and facilitate cross-cultural exchange and understanding within the larger community at Tufts. The Chinese House provides space and opportunity for the residents and non-residents to share their Chinese learning experience and practice their Chinese. Through academic, educational and social events, students in the Chinese House reach out to the rest of the University community, enriching the life and learning experience of the larger community at Tufts. Applications are available from the Chinese Program early in the spring semester.

STUDY OPPORTUNITIES IN CHINA

TUFTS-IN-CHINA

The Tufts-in-China program offers a fall semester in Hangzhou, China, at Zhejiang University, one of the top seven universities in China. The combination of the city of Hangzhou and the renowned Zhejiang University makes Tufts-in-China a unique program for students of Chinese language and cul-

ture. Prerequisites: Well-prepared undergraduates who have successfully completed Chinese 4 (or the equivalent) by the time of departure are eligible to apply. Tufts-in-China is open to students from all majors.

German

The German program promotes an understanding of the extraordinary contributions made by German-speaking writers, artists, and thinkers to the past eight hundred years of civilization, and their implications for the modern world.

A wide range of courses in German gives students with varied interests and goals the opportunity to attain a thorough knowledge of the language, literature, and general culture. The program also provides a significant number of courses in English so that students not conversant in German may become familiar with important aspects of German culture.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

German Language and Literature

To major in this area, a student should take nine courses above the intermediate (German 3, 4) level. These should be courses taught in German and, depending on the student's preparation, include German 21, German 33 and/or 44, German 61, 62, and 100-level courses. A minimum of two 100-level courses taught entirely in German (121 and one literature/culture course at that level) is required. Also required is one course in a related field, such as German art, film, or history. The Tufts-in-Tübingen program (see below for description) is highly recommended for language and literature majors. Courses taken in German at the University of Tübingen in the areas of German language, literature, and culture (e.g., film) count toward the major.

German Studies

As an alternative to the language/literature concentration, the department offers an interdisciplinary major with two options:

A. TUFTS-IN-TÜBINGEN PROGRAM

A unique opportunity for students from various disciplines to spend their junior or senior year abroad experiencing the culture of German-speaking coun-

tries within the larger European context, and combining study outside of literature with their knowledge of German. All courses taken in German at the University of Tübingen in the areas of Politikwissenschaft, Volkswirtschaft, Geschichte, Kunstgeschichte, Volkskunde, Sozial- und Kulturwissenschaft, Germanistik, and Vergleichende Literaturwissenschaft will count toward the concentration requirement of nine German courses beyond the intermediate (German 3, 4) level and one course in a related field. On returning to the Tufts Medford/ Somerville campus, two 100-level courses taught in German on the Tufts campus, 121, and one 100-level literature/culture course will be required.

B. TUFTS-MEDFORD/SOMERVILLE

This major requires nine courses plus one course in a related field approved by the German program. It includes at least five courses above the intermediate (German 3, 4) level taught in German, including German 121, and one 100-level literature/culture course taught in German. The remainder is a combination of courses dealing with German subject matter taught through at least three of the following departments: German, Russian, and Asian languages and literatures, history, music, philosophy, or political science. Courses taken in other departments must be approved by the German program for concentration credit.

UNDERGRADUATE MINOR PROGRAM

The department offers a minor in German requiring six courses above the intermediate level (German 3, 4). These must include two courses at the 100 level taught in German at Tufts/Medford; one of them is to be German 121. Details are available from the departmental office.

GERMAN HOUSE

The department sponsors a German house, which provides a pleasant residential environment and the opportunity to enjoy intensive language practice in an informal setting. Every year a native German student from Tübingen is resident director and helps the students organize a variety of social and cultural activities. Preference is given to students who are currently enrolled in a German course.

TUFTS-IN-TÜBINGEN PROGRAM

Majors in German, as well as qualified juniors and seniors from other departments, are encouraged to spend a year abroad in the department's overseas program, which normally consists of two semesters of study at Eberhard-Karls-Universität in Tübingen under the direction of the Tufts resident director. (One semester, in the spring only, is also possible.) A minimum of two years of college-level German is required to qualify for Tufts in Tübingen, but third-year-level proficiency is strongly advised. Students who have been accepted into the program may attain it by participating in a six-week intensive language course, which will prepare them for the transition into regular courses at a German university. This course starts at the beginning of September.

GRADUATE PROGRAMS

The department offers two master of arts degree programs in German. These programs typically enroll a small number of highly motivated and talented students, who-together with faculty both on the Tufts campus and in Tübingen- form a supportive, stimulating, and congenial community that helps students realize their full potential. Both master's programs provide a wide range of courses in language, literature, and culture, as well as instruction in computer-assisted language programming and the use of media, including hypermedia presentations in language and culture courses.

Tufts-in-Tübingen

All students may choose to study one year at the Eberhard-Karls-Universität in Tübingen, Germany, and one year on the Tufts campus; or they may spend both years on the Tufts campus in Medford/Somerville. The Tufts resident director in Tübingen offers an informal colloquium to acquaint students with traditional and contemporary aspects of German cultural life, and assists students in planning a program of study that draws upon university lecture courses and seminars. On the Tufts campus students do regular course work, participate in a graduate colloquium, and serve as teaching and research assistants.

Master of Arts in German

The program requires two academic years and is designed to prepare students for doctoral work in German or to provide career enhancement for

fields such as international business or law, media and communications, and library science.

Master of Arts in German with Teaching Licensure

The program requires two academic years plus one summer, and is offered in conjunction with the Department of Education. It is designed to prepare highly qualified secondary school teachers.

Master of Arts in Teaching (M.A.T.)

The Department of Education, in conjunction with the German program, offers the M.A.T. degree in German as a foreign language. For more information and application materials, please contact the Department of Education.

Japanese

The Japanese program offers a strong foundation in the Japanese language and introduces students to many facets of Japanese culture. The major prepares students for careers in academics, business, law, diplomacy, or technology where the knowledge of Japanese language and culture is an invaluable asset.

**UNDERGRADUATE
CONCENTRATION REQUIREMENTS**

The major in Japanese requires nine courses beyond Japanese 4, plus one in a related field. Those who place out of language courses still need to complete ten approved courses.

- a. Language requirement: four courses beyond Japanese 4; continuation to Japanese 123, 124 strongly recommended.
- b. Japanese 61 and four additional literature/culture courses from Japanese offerings in the department. Two of these courses must be at the 100 level, including one seminar. If qualified, a student may opt to do an honors thesis (JPN 198, 199) instead of a seminar. Only one course with a half Japanese content can count toward this category.
- c. One course in Japanese culture offered by another department and approved by the program director.

UNDERGRADUATE MINOR PROGRAM

The department offers a minor in Japanese requiring the completion of six courses beyond the inter-

mediate level (JPN 3-4). These must include two language courses (121, 122, or 123, 124) and two literature/culture courses. Details are available from the departmental office.

JAPANESE CULTURE HOUSE

The department administers the Japanese Culture House, a coeducational undergraduate dormitory that serves as an informal center for Japanese studies on the campus. It aims to provide an experiential learning environment for students who would like to improve their language skills and deepen their knowledge of Japanese culture. It also accommodates native speakers who would like to share their knowledge of Japan with other students and take a leading role in organizing social events related to Japan. The minimum requirement to be a resident is Japanese 2 or equivalent. The selecting committee considers the leadership potential of the applicants as well as the balance of gender and of linguistic levels. Together the occupants organize various cultural activities that further the understanding of Japan on campus, as well as weekly Japanese chat hours to which any student interested in practicing conversation is welcome.

STUDY OPPORTUNITIES IN JAPAN

Tufts in Japan

The Tufts-in-Japan program is offered at Kanazawa University, a prestigious national institution in a picturesque city rich in history. Students are strongly recommended to study in Japan during their junior year. Excellent scholarships are available. Tufts financial aid can also be used.

Judaic Studies

CODIRECTORS:

Associate Professor Gloria J. Ascher, *German/Judaic studies*

Associate Professor Joel Rosenberg, *McCollester Associate Professor of Biblical Literature; Judaic studies*

CORE FACULTY:

University Professor Sol Gittleman, *German/Judaic studies*

Professor Jonathan M. Wilson, *English*

Lecturer Rahel Meshoulam, *Hebrew/Judaic studies*

Lecturer/Rabbi Jeffrey Summit, *Judaic studies*

The program in Judaic studies comprises the courses listed below under Hebrew and Judaic Studies, as well as a number of courses in other departments. The program gives students the opportunity to explore the experience and diverse cultural heritage of the Jewish people from various perspectives.

**UNDERGRADUATE
CONCENTRATION REQUIREMENTS**

The major in Judaic studies consists of ten courses: eight primary courses and two related courses. Up to two courses in Hebrew language (Hebrew 21 and above) may be counted as primary courses. Courses not listed below, offered at Tufts and elsewhere, are acceptable upon approval of the program directors (Professor Gloria Ascher, Olin 332, and Professor Joel Rosenberg, Olin 322), but at least four of the primary courses must be taken at Tufts. Students majoring in Judaic studies must have the equivalent of three years of Hebrew, or two years of Hebrew and two years of a second language related to the student's special interests within the field. Qualified students majoring in Judaic studies are encouraged to consider participating in the Thesis Honors Program.

PRIMARY COURSES:

- Hebrew 121, 122** Composition and Conversation
- History 32** Italy and the Jews
- Judaic Studies 48** Israeli Film
- Judaic Studies 65** Introduction to Yiddish Culture
- Judaic Studies 73** Aspects of the Sephardic Tradition
- Judaic Studies 77** Archaeology of Palestine (cross-listed as **Archaeology 77**)
- Judaic Studies 78** Jewish Women
- Judaic Studies 84** The Sources of Jewish Tradition
- Judaic Studies 91-01** Ladino Language and Culture
- Judaic Studies 92-01** Introduction to Judaism
- Judaic Studies 92** Special Topics
- Judaic Studies 93** Directed Study
- Judaic Studies 95** Topics in Jewish Literature
- Judaic Studies 96** Introduction to the Talmud
- Judaic Studies 99** Judaic Studies Internship
- Judaic Studies 126** Roots of the Jewish Imagination
- Judaic Studies 132** The Book of Genesis and Its Interpreters
- Judaic Studies 136** King David and the Israelite Monarchy
- Judaic Studies 142** Jewish Experience on Film
- Judaic Studies 159** Contemporary Jewish Fiction

- (cross-listed as **English 159**)
- Judaic Studies 162** Philip Roth and Company (cross-listed as **English 162**)
- Judaic Studies 164** Representing the Jew (cross-listed as **English 164**)
- Judaic Studies 191** Special Topics
- Judaic Studies 193, 194** Advanced Directed Study
- Judaic Studies 198, 199** Senior Honors Thesis
- Religion 21** Introduction to the Hebrew Bible
- Religion 52** Judaism Through the Centuries

Related Courses

Related courses establish links between Judaic studies and other disciplines by examining such topics as countries or regions that are major sites of Jewish civilization, past or present; the life of cosmopolitan and multiethnic societies more generally; the dynamics of tradition; the impact of modernity and historical crisis on traditional societies; issues of philosophy, ethics, myth, religion, and spirituality that bear upon Jewish life and thought; issues of race, class, gender, and sexuality in the life of a culture; the legacy of biblical and Jewish tradition in world cultures. A student may, with the approval of the program directors, substitute an appropriate course.

- Anthropology 119** Peoples of the Middle East
- Anthropology 132** Myth, Ritual, and Symbol
- Arabic 61** Classical Arabic Literature
- Arabic 62** Modern Arabic Literature
- Arabic 64** The Literary Qur'an
- Art History 1** Art, Ritual, and Culture
- Art History 24** Iconoclasm and Iconophobia
- Art History 27** The End of the World in Art and Thought
- Art History 128** Medieval Art in the Mediterranean: Pagans, Jews, Christians, Muslims
- Classics 75** Classical Mythology
- Classics 152** Ancient Philosophy
- English 31** Underworlds
- English 39** Death and Literature in the 20th Century
- English 49** The English Bible
- English 69** Contemporary Multi-Ethnic Literature
- English 77** The Modern Mind
- English 104** The Literature of the Middle Ages
- English 108** Virgil and Dante
- English 111** English Literature of the 17th Century
- English 114** Milton
- English 170** Sexuality, Literature, and Contemporary Criticism

English 171 Post-Structuralist Literary Theory
History 60 The Modern Middle East to World War I
History 61 The Modern Middle East from World War I
History 64 Medieval Islamic History
History 65 The World of Islam
History 98 The Immigrant in American History
History 113 The Religious and Spiritual Map of Europe, 300-1500
Philosophy 48 Feminist Philosophy
Philosophy 55 The Making of the Modern Mind
Philosophy 126 Theories of Human Nature
Philosophy 128 Human Rights, History and Theory
Political Science 45, 46 Western Political Thought
Religion 6 Philosophy of Religion
Religion 48 Introduction to Islam
Religion 51 Fundamentalism in Comparative Perspective
Religion 58 Ethics through Literature
Religion 72 Contemporary Arts and Religion
Religion 195 Mystics
Russian 73 The Bible in Russian Literature
Sociology 143 Sociology of Religion
Spanish 30 Civilization of Muslim Spain
World Literature 120 Central European Writers
World Literature 122 South African Writers

UNDERGRADUATE MINOR PROGRAM

The minor in Judaic studies consists of six courses selected from those approved for the major, including at least four primary courses. Four of the six courses must be taken at Tufts and must include a course in which a substantial integrative project is produced. Two years of Hebrew or the equivalent are strongly recommended. For further information consult the program directors.

Russian

The department offers a major in Russian language and literature and an interdisciplinary major in Russian and East European studies. Various courses in English provide a survey of Russian literature and culture, not only for the majors, but for all students. Because literature has played a central role in Russia's intellectual and political life, its study provides the student with insight into Russian society and culture. At the same time, the moral, philosophical, and artistic issues raised by Russian writers from Pushkin to Pelevin are universal in scope, and an acquaintance with their

work broadens the student's awareness of intellectual history. For both majors a semester of study in Russia is strongly recommended (see below).

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Russian Language and Literature

The Russian language and literature major is oriented exclusively toward the undergraduate student, with emphasis placed on a sound knowledge of the Russian language and literature. The department provides its majors with a firm grounding in Russian to prepare them for graduate study. Special attention is paid to reading, speaking, and composition in modern Russian, as well as to modern and historical approaches to literature.

The major requires ten courses as follows:

- a. Russian 21 and 22.
- b. Three advanced (100-level) courses conducted in Russian. At least one of these must be in Russian literature (Russian 131, 132, or a substitute approved by the Russian program.) At least one must be a language course (e.g., 121 or 122). An advanced course in some special topic (e.g., Russian 123, 125, 191, 192) may be substituted for Russian 121 or 122 with program approval. Students coming back from a semester in Russia are required to take one 100-level course conducted in Russian. (Students going abroad in the spring of senior year must take one 100-level course in Russian before leaving.)
- c. Four courses in Russian literature (must include Russian 60 and either 61 or 62).
- d. One additional course in Russian culture (literature, art, music, film, history, political science, or religion).
- e. Students who place out of Russian 21, 22, 121 and/or 122 on the basis of the Russian language placement examination administered by the department still need to take ten courses to complete the major.

Russian and East European Studies

The Russian and East European Studies major offers the student training in the history, politics, literature, and arts of Russia and the nations of Eastern Europe, as well as a grounding in contemporary oral and written Russian. (Training in some other Slavic languages is available as independent study.)

The major is designed for students who intend

to pursue careers in which familiarity with Russia and the East European area is an attractive or necessary asset, or for students planning to enter graduate school in law, business, or diplomacy with a specialization in Russian and East European affairs. The area concentration also prepares students for graduate work in Russian and East European studies.

Normally, faculty in the Department of German, Russian, and Asian Languages and Literatures can be advisers for students majoring in Russian and East European studies. It should be emphasized, however, that a course of study tailored to the individual student's educational and career plans should be arranged in close cooperation with the appropriate members of all departments participating in the major.

Ten courses as follows:

- a. Four core language courses: Russian 21, 22, 121, 122. For Russian 121 and 122 the student may substitute Russian 123, 125, 131, and 132 or any advanced course related to the area in which all readings are in Russian. Students coming back from a semester in Russia will be required to take one 100-level course conducted in Russian. (Students going abroad in spring of senior year must take a 100-level course in Russian before leaving.)
- b. Six courses with a primary focus in the Russian and East European area chosen from the following three categories: 1) history 2) political science, and 3) literature and the arts. At least one course in each of the three categories and at least three courses from a single category must be taken. One of the courses must be a special topics course, seminar or an advanced directed study.
- c. Students who place out of Russian 21, 22, 121 and/or 122 on the basis of the Russian language placement examination administered by the department still need to take ten courses to complete the major.

UNDERGRADUATE MINOR PROGRAM

The department offers a minor in Russian requiring the completion of six courses above the intermediate level (Russian 3, 4). These must include two courses at the 100 level taught in Russian. Details are available in the departmental office.

RUSSIAN/SLAVIC CULTURE HOUSE

The department administers the Russian/Slavic Culture House, a coeducational undergraduate dormitory that serves as an informal center for Russian and East European studies on the campus. The house sponsors dinners, films, receptions, and lectures. Residence in the house is open to all students who satisfy any of the following requirements: 1) enrollment in courses related to the Russian and East European culture area (languages, history, literature, art, political science, or economics), 2) Slavic or East European background, or 3) a strong interest in the area. Applications for residence in the house are available from the department early in the spring semester.

STUDY OPPORTUNITIES IN RUSSIA

Majors are encouraged to study in Russia for a summer, semester, or full year. Recommended programs include CIEE, ACTR, and Middlebury College. All students studying abroad are required to take a placement exam upon their return. For more information, see the Russian program faculty.

For more detailed information, please visit the Web site http://www.tufts.edu/as/ger_rus_asian.

Greek

(FOR DEGREE REQUIREMENTS, SEE CLASSICS.)

History

Professor Howard L. Malchow, *Chair; Modern Britain, Europe*

Professor Virginia G. Drachman, *Arthur Jr. and Lenore Stern Chair in American History; Women in the U.S., medicine and society in the U.S., modern U.S.*

Professor Leila Fawaz, *Issam M. Fares Chair in Lebanese and Eastern Mediterranean Studies, Middle East*

Professor Felipe Fernandez-Armesto, *Prince of Asturias Chair in Spanish Culture and Civilization; Spanish, colonial, environmental, and global history*

Professor Ayesha Jalal, *South Asia, the Muslim world*

Professor Gary P. Leupp, *Japan*

Professor George J. Marcopoulos, *Southeastern Europe, Byzantine history, and European diplomatic history*

Professor Steven P. Marrone, *Medieval, early modern Europe*

Professor Daniel Mulholland, *Russia and modern Germany*

Professor Reed Ueda, *Industrial and urban U.S. history, immigration, American social history, comparative and world history*

Professor Peter Winn, *Latin America*

Associate Professor Ina Baghdiantz McCabe, *Darakjian and Jafarian Chair in Armenian History; Armenia and cross-cultural world history*

Associate Professor Beatrice F. Manz, *Middle East and Inner Asia*

Associate Professor Jeanne Penvenne, *Africa; Labor and social history of Mozambique*

Assistant Professor Benjamin Carp, *Early American history*

Assistant Professor Shruti Kapila, *Usen Family Career Development Professorship at Tufts University; South Asian history*

Assistant Professor Ya-Pei Kuo, *China*

Lecturer Barbara Driscoll, *Latino/a history*

Adjunct Professor Gregory R. Crane, *Winnick Family Chair in Technology and Entrepreneurship; Greek literature, computers, and classics*

Adjunct Professor R. Bruce Hitchner, *Roman history, archaeology and international relations*

Adjunct Professor John C. Perry, *Japanese diplomatic history*

Adjunct Associate Professor Steven W. Hirsch, *Greek, Roman, and Near Eastern history*

Adjunct Associate Professor Winifred Rothenberg, *Economic history*

Adjunct Senior Lecturer John C. Schneider, *U.S. urban and social history*

Adjunct Lecturer Steven Cohen, *History, political science and philosophy, curricula instruction, practice of teaching history and political science*

The study of history reveals the past, enlightens the present, and influences the future. Historians seek to understand how nations, societies, and individuals have lived and thought, and why they have behaved the way they did. Supplying the context that informs art, ideas, institutions, and events, history illuminates all of human experience.

Students of history apply the tools of critical analysis and imaginative synthesis. Trained to examine evidence carefully and evaluate received interpretations of the past, they construct their own understanding of historical processes and occurrences, building on the foundation of primary sources and the writings of other historians.

The Department of History offers a wide range

of courses designed to meet the needs and interests of students with differing concerns and levels of preparation. General surveys (numbered below 100) cover entire periods, fields, or geographic areas, while thematic courses (numbered 100 to 179, 190-197) provide more specific, comparative, or regional perspectives. Foundation Seminars (announced each semester and numbered History 1XX) introduce undergraduate majors to the historian's craft. Research seminars (numbered 180 to 187) provide students with the opportunity to practice it through a significant research project. Students interested in specialized work are encouraged to explore independent study or to consider the option of writing a senior honors thesis.

Undergraduates may adopt history as either a major or a minor concentration. The history graduate program offers the M.A. degree, with the option of earning a certificate in museum studies, and (in a limited number of fields) the Ph.D.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The history major requires completion of a minimum of ten courses, ordinarily to be taken within the department. (History courses taken at Tufts' programs abroad or transferred from other accredited institutions may be counted toward the minimum of ten courses.) However, in consultation with their adviser, majors may petition the chair of the department (normally prior to taking such courses) to count up to two courses from outside the department in cases where it may be difficult or impossible to complete their concentration core (see below) within the department. Such courses may not count toward either of the seminar requirements.

Of the ten courses, the following are required:

- 1) One foundation seminar (a high-demand course) to be completed during the sophomore year or as soon as possible after declaration of the major
- 2) One course covering the pre- and early-modern period
- 3) One course in U.S. history, one in European history, and one in any two of the following areas: Africa, Latin America, the Middle East or Central Asia, East Asia, South Asia
- 4) Four or more courses to serve as a coherent concentration (which may be defined geographically or topically)

5) One research seminar (a high-demand course) to be taken within the history department at Tufts

In consultation with their adviser, majors should prepare for their research seminar by taking courses, either at Tufts or abroad, that build toward this capstone experience. Ordinarily a research seminar will form part of the major's core concentration. Those intending to write a senior honors thesis (see below) should plan to take their research seminar in the second semester of their junior year or, at the latest, the first semester of their senior year.

Please note that in some instances the same course may be used to fulfill more than one of these conditions.

UNDERGRADUATE MINOR PROGRAM

The department offers a minor in history requiring a minimum of five courses in history to which the following conditions apply:

- 1) One history course covering the pre- or early-modern period
- 2) One history course in at least two of three areas: North America, Europe, other world areas (e.g., Africa, Middle East, Asia, or Latin America)
- 3) Three courses developed as a coherent core in consultation with an adviser in the history department

Please note that some courses within the five may be used to fulfill more than one of the above conditions.

DEPARTMENTAL HONORS

When nominating seniors for honors the department looks carefully at qualitative issues—especially performance in work beyond the introductory, survey-course level (advanced courses, seminars, and independent study)—and not simply GPA and the number of A grades earned. History majors intending to pursue thesis honors should consult their advisers and the guidelines described under Thesis Honors Program in this bulletin.

GRADUATE PROGRAM

The Department of History offers qualified students a small, selective program of graduate study, organized around comparative and regional topics, the preparation of specified fields, and individual research in consultation with a faculty member. Teaching assistantships are available to the best-

qualified graduate students, providing a valuable experience in classroom teaching.

Master of Arts

The master's program is designed both to prepare students for doctoral programs in history and to enhance the historical knowledge and interpretative skills of professionals working in secondary schools, libraries, foundations, and museums. Students planning a career in the museum field may choose to coregister in the certificate program in museum studies (see below).

GRE scores (verbal, quantitative, analytical) and, if appropriate, TOEFL, are required for admission to the graduate history program. Admissions are contingent, in part, on an appropriate match between faculty and student interest. Completion of the program requires proven reading proficiency in at least one foreign language. Anyone not meeting the language requirement at the time of matriculation must indicate a plan to acquire this knowledge within two years.

Normally, students are expected to complete the program within two academic years. The successful completion of ten courses is required. These courses must include the following: the historiography proseminar (fall), a graduate colloquium (spring), and two research courses.

Up to two of the ten courses required for the master's degree may, by prior agreement with the principal adviser, be taken in a department other than history. Students may take selected undergraduate courses, numbered 1 through 99, for graduate credit by enrollment in the related 200-level readings course by arrangement with the principal adviser and the relevant instructor. Graduate students may not take undergraduate colloquia. Appropriate courses offered by the Fletcher School will be accepted by petition.

In consultation with the student's principal adviser and a field committee chosen before the end of the first semester of graduate work, each student will choose two fields of study to be prepared for examination. These fields may be regional or comparative in focus. The student and the committee will design a sequence of courses that will best prepare the student for examinations in each field; these examinations will be taken at least six weeks prior to graduation.

A student may devote two out of ten courses to the writing of a thesis. The subject of the thesis

must be chosen in consultation with the principal adviser, and a written proposal must be submitted for approval to a thesis committee containing at least one member from outside the department. The thesis committee shall evaluate the completed thesis and conduct an oral examination of the student on the topic of the thesis. The student whose thesis proposal is accepted by the thesis committee will be excused from examination in one of the required two fields of study; the determination of the excused field is to be made by the student's field committee. Work on the thesis will count as one of the two required research courses.

In the last year of graduate study the student will present a research project drawn from graduate course work at Tufts to an ongoing graduate history roundtable for critical discussion.

Museum Studies Program

The museum studies program provides qualified postbaccalaureate students with professional training in the administration, preservation, and interpretation skills required for a career in the museum field. Course work may be pursued on a single-course basis, as a candidate in the certificate program, or as a candidate in the combined master of arts in history and museum studies. The certificate in museum studies requires completion of the museum studies foundation course, three elective courses, and the internship. Students interested in the museum studies courses or the certificate program should contact the Office of Graduate Studies or visit the website at <http://ase.tufts.edu/museumstudies>.

Criteria for admission to the combined master's program in history and museum studies are the same as those for the master's degree. The requirements for completion of a master's degree in history and museum studies are:

- 1) The successful completion of eleven courses, including the historiography proseminar, at least one research course, the museum studies foundation course, three museum studies elective courses, and the museum studies internship.
- 2) Preparation of one regional or comparative field of study and examination in that field (see requirements in preceding description of master's degree in history). A thesis is optional.
- 3) The presentation of one research project drawn from course work to the graduate history roundtable.

Doctor of Philosophy

Tufts is a place for global thinking, where students learn about the equipollency and interdependence of all world cultures and the importance of multiple perspectives. The Tufts History Department aims to educate professional historians of the future who work on subjects and problems that transcend traditional constraints, study national and regional histories in the broadest possible contexts, eschew partisanship and prejudice, emphasize global or long-range connections and comparisons, and encourage interdisciplinary methods. In furtherance of this objective, the Department of History offers these major fields of study for the Ph.D. in History.

- Global History is a major field that treats the world as a whole. The Global History program provides an axis of intellectual life for Tufts historians, especially for graduate students and faculty. Our commitment to interdisciplinary, cross-cultural studies, non-Western perspectives, and comparative approaches provides a framework for the exchange of ideas and knowledge, in the life of the department and, in particular, in the Boston Area Global History Consortium's Pearson Prentice Hall Seminar in Global History, which meets at Tufts.
- Modern South Asian History is a major field of doctoral studies in which Tufts has a long-standing tradition and international reputation. Students in this major field can partake of the active intellectual life surrounding South Asian studies in the Boston area, including the South Asia seminar and other events and programs of the Center of South Asian and Indian Ocean Studies at Tufts.
- Modern Spanish History is a major field within the doctoral program in history. Students who choose to do a doctoral degree in global History must have a secondary field in any of the regions represented by the expertise of the department. At present, these include South Asia, Europe, the USA, Latin America, East Asia, Central Asia, Africa, and the Middle East. Students pursuing the doctoral degree in South Asian History or Spanish History must have a secondary field in one of these regions or in Global History.

Other areas of study are thematic fields designated as follows:

Civil society, the Public Sphere, and the State
Film, Media, and History
Gender and Sexuality
International and Inter cultural Relations
Labor and Social Movements
Nationalism and Collective Identity
Environmental History

The Ph.D. program in history accepts only well-prepared students who intend to work closely with a particular Tufts faculty member in a limited number of fields. Students in the Tufts M.A. program may apply to be transferred into the Ph.D. program after one year of study, and the department will consider applications from students who have completed a master's degree in history or the equivalent elsewhere.

Modern Spanish History

* Language requirements: Spanish, English and one other European language;

* Primary field of concentration: Social and political history of

Spain in the nineteenth and twentieth centuries;

* Secondary geographic field: An appropriate field in European,

Mediterranean, or Latin-American History;

* One of the following:

· Thematic fields: An appropriate interdisciplinary field in topics such as nationalism, mass politics, praetorianism, or labor history;

· Cultural field: An appropriate interdisciplinary and comparative field in topics such as cultural history or Hispanic literatures.

Modern South Asian History (supervised by Ayesha Jalal)

* Language requirements: English, at least one major South Asian language, and one other appropriate language;

* Primary field of concentration: Nineteenth- and twentieth-century South Asia;

* Secondary geographic field: An appropriate field in the history of the Middle East, East Africa, Central Asia, Southeast Asia, or East Asia;

* Thematic field: An appropriate interdisciplinary and comparative field in topics such as nationalism, agrarian or labor history, world history.

Global History (Please contact the Director of Graduate Studies. Requirements for admission are as follows: exceptional performance in M.A. course work; proficiency on entrance in at least one foreign language (proficiency in two foreign languages is required before completion of the degree); GRE (Aptitude section only) and, if appropriate, TOEFL; detailed statement of intent, including discussion of planned dissertation field; the written support of a primary Tufts faculty sponsor, who will have arranged for at least one other faculty adviser. Students admitted with a master's degree from another university will be allowed to transfer up to eight course credits.

Requirements for completion of the degree are as follows: proficiency in two foreign languages; completion of sixteen courses at the graduate level, including the historiographical proseminar two graduate colloquia; at least three semesters of independent readings or research; oral and written examinations in three fields, based on course work and readings, administered by the appropriate members of the department; dissertation directed by the supervising faculty, to be read and defended before a committee including the adviser, at least one other member of the department, and a third faculty member in the field, drawn, if possible, from another institution. This defense will also include presenting a chapter to the Graduate-Faculty Roundtable.

For more detailed information, please visit the Web site <http://ase.tufts.edu/history/>.

Human Factors

(SEE ENGINEERING PSYCHOLOGY/HUMAN FACTORS.)

Human-Computer Interaction

FACULTY ADVISER: Professor Robert Jacob, *Computer Science*

With hardware processing power increasing and software development techniques improving, the user interface is fast becoming the key bottleneck in developing computer products that meet market needs. When interface design does not reflect the

needs of the intended user, products fail in the marketplace and enormous sums of money are spent on documentation, help lines, and training courses to overcome the difficulties of running programs. Much of this difficulty can be avoided with proper attention to both the physical and the psychological constraints of the user.

In an interdisciplinary collaboration between the Department of Psychology, the Department of Electrical and Computer Engineering, the Department of Computer Science, and the Department of Occupational Therapy at Tufts, this four-course, graduate-level certificate is designed to train the next generation of computer professionals for tomorrow's complex challenges. The program is open to individuals with a bachelor's degree, and is designed to be pursued on a part-time basis by computer programmers, Web designers, human factors professionals, software engineers, and user-interface designers who wish to develop or enhance their user-interface design and implementation skills.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395 or visit the Web site <http://gradstudy.tufts.edu/>.

Interdisciplinary Studies

The Center for Interdisciplinary Studies is located in Eaton Hall. Programs physically housed at the center include American Studies, Asian Studies, Peace and Justice Studies, and Women's Studies. Other programs affiliated with the center include Africa in the New World, Archaeology, Communications and Media Studies, Community Health, Environmental Studies, the Experimental College, International Relations, Latin American Studies, Latino Studies, Middle Eastern Studies, and World Civilizations.

The Center for Interdisciplinary Studies (CIS) designation is reserved for interdisciplinary courses developed by the center and for the integrative exercise required of all students completing an interdisciplinary minor.

CIS Senior Thesis

Arts, Sciences, and Engineering students who wish to write a senior thesis outside their major

area of concentration may be eligible to write a CIS senior thesis. The student must satisfy the CIS board that the topic falls outside the purview of any department or interdisciplinary program and that significant course work and/or faculty-directed research relevant to the thesis topic has been accomplished. The student must assemble a committee of three faculty readers with expertise in the disciplines involved, one of whom is designated as the chair of the committee and who is responsible for submitting a grade and designating the amount of credit for the thesis course work. One member of the committee must be from a department or program in which the student is majoring. The topic must be approved by the CIS board no later than the end of the first week of classes in the first semester of the student's senior year. Students who would like to be recommended for degrees with honors by departments that require a thesis should be aware that these departments require a thesis within their own department and a CIS thesis will not usually count as a substitute. However, students may apply for a CIS thesis to count as an honors thesis in the Thesis Honors Program like a thesis in any other discipline by assembling a thesis committee and filing the appropriate paperwork. If the CIS thesis is to qualify as an honors thesis, the chair of the thesis committee must be from a department or program in which the student is majoring.

For more detailed information, please visit the Web site <http://ase.tufts.edu/cis/>.

International Letters and Visual Studies

CODIRECTORS:

Professor Charles Inouye, *German, Russian, and Asian Languages and Literatures*

Associate Professor Joel Rosenberg, *German, Russian, and Asian Languages and Literatures*

The program in International Letters and Visual Studies makes possible the study of literature, film, and visual arts in an international context. ILVS students share an interest in literature, cinema, and visual arts, which they approach in a comparative, theoretical way.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Language Preparation for the Major

Students are to have or to attain competency in one foreign language (to 122 or equivalent), and are strongly urged to begin the study of a second. (In some cases, depending on the student's background, one of these might be English.)

Disciplinary focus

ILVS offers three tracks. A student focuses on one, but also does work in the other two.

Literature

Film

Visual Arts (painting, sculpture, photography)

Cultural areas

ILVS majors select a primary and a secondary area of study. For example, Russia, Germany, France, Latin America, the Middle East, etc. Normally, these culture areas reflect one's language preparation—Japanese and Japan, Chinese and China—but this is not always the case. For example, a native speaker of French might choose French and Spanish as his languages, and Spain and Japan to be his areas of cultural study. Or someone just starting Spanish and interested in film might choose Latin America and an Anglophone culture area. In all cases, however, ILVS requires the study of more than one culture.

Theory courses

To aid their comparative approach, ILVS students are required to take courses from an approved selection of literary, film, visual, gender, and culture theory courses.

A senior project or thesis

A thesis is not mandatory but is highly encouraged. ILVS is both inter-disciplinary and multicultural, therefore, the number of courses available to a major is large. For this flexibility to work to one's advantage, each student should have a conceptual focus, developed in consultation with one's major advisor. This might be a question about a certain cultural phenomenon, or an aesthetic school, style, or problem. For example, "What is the relationship between art and politics?" Or, "How is art education handled in different cultures, and to what result?" Or, "Is sorrow universally beautiful?" Alternatively, you might also focus on an interaction or common development in two or

more cultures, or on a particular genre or form.

Working toward an approved senior thesis or project—such as a scholarly study, a film, a photo exhibit, etc.—will give focus to your study.

Courses

The major consists of twelve courses, not counting those taken for language preparation.

At least one of the twelve courses should be a seminar, directed study, or other intensive course requiring a substantial integrative project.

The particular distribution of courses is determined by the disciplinary track selected by the student.

Courses that might serve two categories of the requirements cannot be double-counted within the major. Any departures from the proportions or content of these categories must be approved by petition to a committee of core faculty.

Here is the distribution of required courses for each of the three possible tracks.

LITERATURE EMPHASIS

I. National and ethnic literatures (six courses)

The student must take six literature courses—four in the primary cultural area and two in secondary area. Where possible, at least two of the six courses should be 100-level courses that require reading the foreign language.

II. Visual arts and/or film (two courses)

The student must take two courses in film or other visual arts (normally, one in primary cultural area, the other in the secondary area) [chosen from course lists on website].

III. Cross-cultural and/or gender-oriented literary or visual studies (two courses)

The student must take two courses of a cross-cultural or gender-oriented nature in a literary or visual art or from film and visual arts courses [chosen from course lists on website]

IV. Literary and cultural theory (two courses)

The student must also complete one semester of literary theory and one semester of cultural theory [chosen from course lists on website].

FILM EMPHASIS

I. National and ethnic literatures (three courses)

The student must take three literature courses, two in the primary culture area and one in the secondary area.

II. Film (five courses)

The student must take five courses in film, normally including one in the primary cultural area and another in the secondary area. The student may substitute, for one of the five courses, a course in visual arts or a studio course in some domain of filmmaking (screenwriting, directing, acting, etc.) [chosen from the course lists on website].

III. Cross-cultural and/or gender-oriented literary or visual studies (two courses)

The student must take two courses of a cross-cultural or gender-oriented nature in a literary or visual art, or from film and visual arts courses [chosen from course lists on website].

IV. Film theory and cultural theory (two courses)

The student must take one course in film theory plus one course in cultural theory [chosen from course lists on website].

VISUAL STUDIES EMPHASIS

I. National and ethnic literatures (three courses)

The student must take three literature courses, two in the cultural area of the primary language and one in that of the secondary language. At least one of the courses should be a literature course in a language not native to the student, with readings in the original language, whatever the language of instruction or written assignments.

II. Visual arts (five courses)

The student must take five courses in visual arts, normally including one in the cultural area of the primary language and another in that of the secondary language. The student may substitute, for one of the five courses, a course in film or a studio course in a visual art (drawing, painting, sculpture, filmmaking, etc.) [chosen from course lists on website].

III. Cross-cultural and/or gender-oriented literary or visual studies (two courses)

The student must take two courses of a cross-cultural or gender-oriented nature in a literary or visual art or from film and visual arts courses [chosen from course lists on website].

IV. Visual and cultural theory (two courses)

The student must take one course in visual theory and one course in cultural theory [chosen from course lists on website].

For more detailed information, please visit the Web site http://www.tufts.edu/as/ger_rus_asian/int.html.

International Relations

DIRECTOR:

Associate Professor Malik Mufti, *Political Science*

CORE FACULTY:

Assistant Director Dale Bryan, *Peace and Justice Studies*

Professor Gregory Crane, *Classics*

Professor Robert Devigne, *Political Science*

Professor Leila T. Fawaz, *History*

Professor Felipe Fernandez-Armesto, *History*

Professor Gerard Gasarian, *French*

Professor David M. Guss, *Anthropology*

Professor Hosea Hirata, *Japanese*

Professor Bruce Hitchner, *Classics*

Professor Charles Shiro Inouye, *Japanese*

Professor Yannis Ioannides, *Economics*

Professor Ayesha Jalal, *History*

Professor Vida Johnson, *Russian*

Professor Paul Joseph, *Sociology*

Professor Howard Malchow, *History*

Professor Beatrice Manz, *History*

Professor Daniel M. Mulholland, *History*

Professor George Norman, *Economics*

Professor Daniel J. Richards, *Economics*

Professor Tony Smith, *Political Science*

Professor Enrico Spolaore, *Economics*

Professor Vickie Sullivan, *Political Science*

Professor Christiane Zehl Romero, *German*

Professor Jonathan Wilson, *English*

Associate Professor Gloria Ascher, *German/Judaic Studies*

Associate Professor Paula Aymer, *Sociology*

Associate Professor Cristelle Baskins, *Art and Art History*

Associate Professor Nancy Bauer, *Philosophy*

Associate Professor Marcelo Bianconi, *Economics*

Associate Professor Drusilla Brown, *Economics*

Associate Professor Gregory Carleton, *Russian*

Associate Professor Consuelo Cruz, *Political Science*

Associate Professor David Dapice, *Economics*

Associate Professor Richard C. Eichenberg, *Political Science*

Associate Professor David Gute, *Civil and Environmental Engineering*

Associate Professor Claudia Kaiser-Lenoir, *Spanish*

Associate Professor Ikumi Kaminishi, *Art and Art History*

Associate Professor Erin Kelly, *Philosophy*

Associate Professor Brigitte Lane, *French*

Associate Professor David Locke, *Music*

Associate Professor Bernhard Martin, *German*

Associate Professor Ina Bagdiantz-McCabe, *History*

Associate Professor Margaret McMillan, *Economics*

Associate Professor Lionel McPherson, *Philosophy*
 Associate Professor Jayanthi J. Mistry, *Child Development*
 Associate Professor Sharun Mukand, *Economics*
 Associate Professor Isabelle Naginski, *French*
 Associate Professor Jeanne M. Penvenne, *History*
 Associate Professor Peter Probst, *Art and Art History*
 Associate Professor Elizabeth Remick, *Political Science*
 Associate Professor Pearl T. Robinson, *Political Science*
 Associate Professor Modhumita Roy, *English*
 Associate Professor Rosalind H. Shaw, *Anthropology*
 Associate Professor David Sloane, *Russian*
 Associate Professor Jeffrey Taliaferro, *Political Science*
 Associate Professor Rosemary Taylor, *Sociology/Community Health*
 Associate Professor Peter Winn, *History*
 Associate Professor Xueping Zhong, *Chinese*
 Assistant Professor David Art, *Political Science*
 Assistant Professor Claire Conceison, *Drama and Dance*
 Assistant Professor Amira El-Zein, *Arabic*
 Assistant Professor Ioannis Evrigenis, *Political Science*
 Assistant Professor Kelly Greenhill, *Political Science*
 Assistant Professor Richard Jankowsky, *Music*
 Assistant Professor Henry Sunghyun Kim, *Economics*
 Assistant Professor Ya-Pei Kuo, *History*
 Assistant Professor Phillip Munoz, *Political Science*
 Assistant Professor Oxana Shevel, *Political Science*
 Assistant Professor Jay Shimshack, *Economics*
 Assistant Professor Paulette Smith, *French*
 Assistant Professor Chih Ming Tan, *Economics*
 Senior Lecturer David O'Leary, *Religion*
 Professor of Practice Astier Almedom, *Biology*
 Lecturer Professor Valerie Anishchenkova, *Arabic*

The program offers a rigorous plan of study for students with a primary interest in international relations. The field of international relations includes the study of international and regional systems; the foreign relations of states, including their political, military, economic, and environmental policies; the sources of international conflict and cooperation; the domestic and transnational interests and actors that influence states; and the historical, political, social, cultural, ethical, and humanistic traditions that impinge on the international relations of particular states or regions.

The program is governed by an executive committee representing the departments that serve the major. All majors select an academic adviser who is a member of the international relations core faculty.

First-year students who anticipate majoring in international relations should read the concentration requirements below. Generally, prospective majors in the first year should select a program of study that includes a foreign language and perhaps the first course in international relations (Political Science 61) and in economics (Economics 5). The major is usually declared during the sophomore year, although first-year students are encouraged to consult with the program in planning their course of study, especially if they plan to spend all or part of their junior year abroad.

The program awards four academic prizes: the John S. Gibson Prize, the Distinguished Achievement Award in International Relations, the International Relations Research Scholars Award, and the Anne E. Borghesani Memorial Prize. The International Relations Research Scholars Award is designed to enable promising IR majors to conduct high-level, original research under the supervision of IR core faculty members in the summer before their senior year. The Borghesani award, open to sophomores and juniors from any concentration, is intended to help defray the costs of study, research, or community service abroad that adds an international dimension to the student's program of study. Each year the IR program also selects students to represent Tufts at several national student conferences.

Majors in international relations may take advantage of the Tufts-in-Washington program administered by the Department of Political Science. Additionally, they are strongly encouraged to take advantage of study abroad opportunities and to participate in the Tufts-in-Talioires summer session, where several international relations courses are offered each session. Students who study abroad with non-Tufts programs may credit qualified courses toward the major, provided that they have consulted closely with the IR program office, have completed the appropriate transfer credit preapproval forms (available from the registrar), and have submitted appropriate documentation to the IR program office in Cabot 605. Students who study on Tufts programs should consult with their adviser and the IR program to make sure course work fulfills requirements.

International relations majors may wish to note the combined-degrees program offered by the College of Liberal Arts and the Fletcher School of

Law and Diplomacy. Qualified juniors may apply to the Fletcher School after they have completed and received grades in twenty courses. Details of this highly competitive dual-degree program are described in this bulletin under Combined-Degrees Programs; an interview with the Fletcher admissions office is required.

UNDERGRADUATE MAJOR REQUIREMENTS

The international relations major requires twelve courses as follows. No course may be counted more than once. A grade of C- or better is required for a course to count for the IR major. The following are required of all majors:

Language Requirement

The IR program requires of all of its students oral and written proficiency in a language other than English. Proficiency is defined as successful completion of eight semesters (or equivalent) of university-level language instruction. All students wishing to major in international relations are required to comply with this requirement. Courses used to fulfill this requirement may not overlap with the core or thematic concentration requirements.

Core Requirements (five courses)

The Core Requirements constitute the foundation of knowledge that is needed by all majors in International Relations, regardless of thematic concentration. They are comprised of broad introductory courses that cover the major themes and debates within each discipline on the study of international affairs.

Political Science 61 International Relations

Economics 5 Principles of Economics

One course in international economics*

One course in theories of society and culture*

One course in the historical dimension*

Thematic Concentration Requirement (seven courses)

All majors must choose one of the following six thematic concentrations and complete seven courses within that concentration. These must include at least 2 social science, 1 history, and 1 culture courses. At least one of the 7 courses must also address the role of the United States in the relevant regional or issue area. Moreover, the nor-

mal expectation is that no more than 3 of the 7 courses in each concentration may be an introductory-level course, and that one must be a capstone research course (seminar, honors thesis, or directed research).

1. REGIONAL AND COMPARATIVE ANALYSIS

Choose one of the following:

Africa

East and Southeast Asia

Europe and the former Soviet Union

Latin America

Middle East and South Asia

2. INTERNATIONAL ECONOMIC AND ENVIRONMENTAL AFFAIRS

Choose one of the following:

International economics and trade

International economics and finance

International economics and environment

International economics and development

3. GLOBAL HEALTH, NUTRITION, AND THE ENVIRONMENT

4. INTERNATIONAL SECURITY

5. THE UNITED STATES IN WORLD AFFAIRS

6. IDENTITY AND IDEOLOGY

Choose one of the following:

Political Ideologies

State, Empire and Colonialism

Constructions of Personal Identity and International Affairs

*A complete list of courses that satisfy the above requirements is contained in The International Relations Program Handbook, available in Cabot 605, and on the IR website, www.ase.tufts.edu/ir/.

For more detailed information, please visit the Web site <http://ase.tufts.edu/ir/>.

Italian Studies

(FOR DEGREE REQUIREMENTS, SEE ROMANCE LANGUAGES.)

Japanese

(FOR DEGREE REQUIREMENTS, SEE GERMAN, RUSSIAN, AND ASIAN LANGUAGES AND LITERATURES.)

Judaic Studies

(FOR DEGREE REQUIREMENTS, SEE GERMAN, RUSSIAN, AND ASIAN LANGUAGES AND LITERATURES.)

Latin

(FOR DEGREE REQUIREMENTS, SEE CLASSICS.)

Latin American Studies

DIRECTOR:

Professor Peter Winn, *History*

Latin America is increasingly important in the world and for the United States in particular. The study of our hemispheric neighbors, the area of origin of our country's second largest minority group, is important in itself, and also relevant for the understanding of larger international issues. Latin American studies is an interdisciplinary minor that encourages students to integrate the varying disciplinary perspectives of the arts, literature, social sciences, and history, along with study of the languages of the area, into a coherent view of Latin America.

Major in Latin American Studies

The major in Latin American Studies offers students the opportunity to combine the approaches of several academic disciplines in a focused study of the region. In recent decades, Latin America has become a field of rapid development in the arts, humanities and social sciences. The major's interdisciplinary approach integrates historical, social, political, economic and cultural perspectives at both national and regional levels. The program of study culminates in an original interdisciplinary project on a Latin American subject.

Requirements for the Latin American Studies major are 11 courses + 5-semester language prerequisite.

Important note: at least one of the requirements should be focused on pre-20th century Latin America and at least one of the requirements should be focused on indigenous cultures/societies.

INTERDISCIPLINARY MINOR

There are three requirements for completing an interdisciplinary minor in Latin American studies.

1) Students should study one of the region's languages for three years (e.g., Spanish 22) or the equivalent. Normally, this language will be Spanish or Portuguese, but others (e.g., Quechua) may be substituted with the approval of the coordinator.
2) Students must complete at least five credits in Latin American studies, which should include at least one course from each of the three disciplinary areas: arts and literature, social sciences, and history. Students may count as many as two courses transferred from other institutions or used to satisfy another concentration requirement toward the minor.

3) Students must complete a project that integrates at least two of the three disciplinary areas of the minor (arts and literature, social sciences, and history). This project may be a written work, a performance, or some other creative work for which the student will receive one course credit. Normally, the project will emerge out of one of the courses that the student takes for the minor and will be advised by the instructor of that course. The student must also form a committee of at least two faculty members to evaluate the project, normally the project's faculty adviser and a faculty member from the other disciplinary area involved in the project. The format is flexible, but the content must conform to these guidelines. Normally, a student will complete the project in the final semester at Tufts. (See Interdisciplinary Minor Program for details.)

APPROVED COURSES

The following courses have been approved for the Latin American studies interdisciplinary minor. Each semester an updated list of current Latin American studies courses is available from the coordinator. Seminars and other courses on the region may be offered from time to time and credited toward the minor. Students may also petition the coordinator to credit courses not included in this list toward the minor.

LATIN AMERICAN STUDIES >

LATINO STUDIES >

LEADERSHIP STUDIES >

For more detailed information, please visit the Web site <http://ase.tufts.edu/latinocenter/LatAmStudies.html>.

Latino Studies

DIRECTOR:

Associate Professor Deborah Pacini, *Anthropology*

The interdisciplinary minor in Latino Studies requires six credits, which includes required course work in Latin America as well as key areas of inquiry concerning race within the U.S. social context. This minor allows students to emphasize either Latinos' connections with Latin America or their location within the U.S. racial and sociopolitical context. Students may also draw from offerings listed under Ethnic Studies if their interest is the study of Latinos in relation to other ethnic and minority groups in the U.S. All students must take an introductory Latino Studies survey course and participate in a capstone experience involving work in one of Boston's Latino communities.

The following are required; one introductory survey course, one Latin American survey course, and one survey course in comparative race relations in the U.S. context from the list online or an approved equivalent.

One core course with at least 50 percent Latino content. This course can support an analytic perspective (courses on race/ethnicity) or an area perspective (Latin America or U.S.-centered courses). With approval of Latino Studies faculty, this requirement can be met by taking a Latino Studies course from one of Tufts' consortium partners.

One elective course relevant to Latino Studies with substantial and/or relevant Latino content, in which student must do project/paper on Latino topic. An independent study course with a Latino Studies faculty on a Latino Studies topic may also count.

NOTE: All courses taken for the Latino Studies minor program must be taken for a letter grade and may not be used toward the fulfillment of the foundation requirements. A maximum of two credits from the minor may be counted toward a major or majors; up to two credits may be used for distribution requirements. Also, one language course above the intermediate level, or Spanish for Her-

itage Speakers (Spanish 23) can count as either one of the Core or Elective courses.

One capstone experience:

The experience must follow the guidelines of the Interdisciplinary Minor Program by including a project, thesis, performance, or an oral presentation, which integrates the knowledge and methodologies of the disciplines involved. The integrative project will be given one course credit under a CIS (Center for Interdisciplinary Studies) 95-96 designation and will receive a letter grade. The capstone can be fulfilled by taking Anthropology 183 (Urban Borderlands), a community-based research course; by doing a supervised internship in a Latino-oriented organization and a final paper analyzing the experience (supervised by Latino Studies faculty); or an approved equivalent community-based research course in which the research focuses on Latinos (e.g. an internship with the Mystic View Project researching the impact of pollution on working class Latino communities in the watershed). Humanities majors may fulfill this requirement by interning at an approved arts agency that works with Latino artists and/or serves Latino communities and then producing a project analyzing the experience. Spanish majors and others interested in improving their Spanish will be encouraged to seek a project/internship where they can strengthen their Spanish proficiency.

For more information about academic requirements, please review the Bulletin of Tufts University. Students interested in pursuing a Latino Studies Minor should register with: Associate Professor Deborah Pacini Hernandez, Anthropology, Eaton Hall, Phone: 617-627-2463, Email: deborah.pacini@tufts.edu.

For more detailed information, please visit the Web site <http://ase.tufts.edu/cis/LatinoStudies.htm>.

Leadership Studies

DIRECTOR:

Professor George Norman, *Economics*

Leadership studies is an interdisciplinary field that offers students the opportunity to study leadership theory from a multi-disciplinary perspective. Scholarship in leadership studies analyzes the influence of historical, political, economic, psycho-

logical, and technological forces on effective leadership and leadership models. Leadership studies at Tufts places particular emphasis on leadership that bridges cultural divides. Leadership studies is part of the broader study of society. It is imperative that leadership be understood if organizations and the role of organizations in complex societies are to be understood.

While research in leadership has been dominated by social scientists, leadership studies at Tufts recognizes the contributions that the humanities and technology make to our understanding of organizations and leadership, from Plato's *Republic* to Robert Penn Warren's *All the King's Men*, from the invention of the cotton gin to the invention of the internet. Leadership studies at Tufts is a rigorous intellectual program that develops creative, analytical and practical skills and attitudes: creative to generate a vision; analytical to assess whether creative ideas are good ideas; practical to execute ideas and persuade others of their value. Skill development is further encouraged through courses emphasizing public speaking, cross-disciplinary and cross-cultural communication and team building, persuasion, negotiation, mediation, framing, and creative problem solving. The leadership studies minor also requires students to analyze issues relating to ethics, risk assessment and decision making under uncertainty, organizational behavior, power and power relations, failed leadership and corruption, and policymaking.

INTERDISCIPLINARY MINOR

Students pursuing the interdisciplinary minor in Leadership Studies takes a total of six courses at 5.5 credits. Two of these must be Tier 1 core courses and two must be drawn from the list of Tier 2 courses. The fifth course may be selected from Tier 1 or Tier 2. The director of the Minor in Leadership Studies advises on course selection to fit each student's interests and to establish the basis for the Tier 3 capstone senior project. No more than two of the Tier 1 and Tier 2 courses may be taken in a single department. All courses must be taken for a letter grade. As a capstone, students must complete a Tier 3 senior project. Here, students put theory into practice, and take a seminar course in which they reflect on their experience in the context of their leadership courses. Students apply to the leadership program by considering how the courses they propose to take and their

leadership experience constitute a coherent whole.

LEADERSHIP STUDIES CURRICULUM

The Leadership Studies curriculum at Tufts consists of many courses drawn from across the range of departments and disciplines at Tufts that either directly or indirectly address the issues of leadership. The Director and the faculty committee overseeing the program are charged with maintaining an appropriate selection of courses in Tier 1 and 2 (including evaluating student petitions).

Tier 1 Courses

The courses in Tier 1 develop the intellectual underpinnings of Minor in Leadership Studies. These courses introduce the basic principles of leadership and introduce theories of leadership that have been developed in a number of different disciplines.

Tier 2 Courses

Courses in Tier 2 allow students to round out their study of leadership. These courses widen the disciplinary foundations of the study of leadership.

Tier 3 Courses

To complete the minor, students must engage in a practical leadership capstone experience. Students must apply to the director of the program with a prospectus describing the goals, challenges, and objectives of their leadership experience. Students participating in programs such as the Institute for Global leadership, University Scholars Program, Reserve Officers Training Corps, and Entrepreneurial Leadership Program may apply to have that experience count as the capstone, but other leadership experiences may constitute the basis of their applications as well. As an alternative, and with permission of the director of the program, students can complete Tier 3 by undertaking a senior thesis on leadership. Structured reflection is a key element of the capstone experience. Students will be required to meet with other students pursuing the capstone in a half-credit pass-fail seminar. For the seminar, they will write a paper linking their experience to the theories and issues covered in their coursework.

LINGUISTICS >
MANAGEMENT OF COMMUNITY ORGANIZATIONS >
MANUFACTURING ENGINEERING >
MASS COMMUNICATIONS AND MEDIA STUDIES >
MATHEMATICS >

Linguistics

For course information, please visit the Web site <http://studentservices.tufts.edu/registration.htm>.

Management of Community Organizations

FACULTY ADVISER:

Lecturer Rusty Russell, *Urban and Environmental Policy and Planning*

Many people who work in community organizations are accidental managers who started organizing or providing a direct service because of their deep commitment to an issue. They then often find themselves running a growing, complex organization without formal training or theoretical backing.

The certificate in Management of Community Organizations (MCO) is a graduate-level certificate program that provides management training within the framework of social, economic, and political values that shape the nonprofit sector. The program's goal is to train people with a commitment to social concerns and effective management who wish to work at the community level. The certificate is offered in collaboration with the Department of Urban and Environmental Policy and Planning and the Office of Graduate Studies.

The certificate requires the completion of four courses that address issues such as financial analysis, program evaluation, urban and social policy, fundraising, and conflict resolution.

The program is open to individuals with a bachelor's degree and is especially appropriate for new managers of community organizations, those with experience in the field who wish to obtain management training, midcareer professionals interested in pursuing community work, and individuals who wish to start a new agency or program.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395 or visit the Web site <http://gradstudy.tufts.edu/>.

Manufacturing Engineering

FACULTY ADVISER: **Professor Anil Saigal**, *Mechanical engineering*

As the United States continues to compete in global markets, the need for manufacturing engineers who can design, build, operate, and manage competitive production systems has never been greater. Excellence in design and production—especially knowledge of CAD, CAM, CNC machining, and robotics—is essential as industries strive to reduce labor costs, increase productivity and profitability, tighten performance standards, and improve quality.

In collaboration with the Office of Graduate Studies, the Department of Mechanical Engineering offers a four-course graduate-level certificate in manufacturing engineering. The program is offered on a part-time, nondegree basis for students seeking professional training in manufacturing engineering. In most cases, courses taken as a certificate student can be transferred to a degree program. Graduate students may also pursue the certificate as a concentration within their degree. The program is open to students with a bachelor's degree and a background in engineering, science, or mathematics.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395 or visit the Web site <http://gradstudy.tufts.edu/>.

Mass Communications and Media Studies

(SEE COMMUNICATIONS AND MEDIA STUDIES.)

Mathematics

Professor Bruce Boghosian, *Chair; Fluid dynamics*
Professor Christoph Börgers, *Mathematical biology*
Professor Fulton Gonzalez, *Harmonic analysis*
Professor Mauricio Gutierrez, *Group Theory*
Professor Marjorie Hahn, *Probability*
Professor Boris Hasselblatt, *Dynamical systems*
Professor Misha Kilmer, *Numerical linear algebra*
Professor Zbigniew H. Nitecki, *Dynamical systems*

Professor Eric Todd Quinto, *Robinson Professor of Mathematics; Tomography and functional analysis*

Professor Montserrat Teixidor i Bigas, *Algebraic geometry*

Professor Loring Tu, *Algebraic geometry*

Professor Richard Weiss, *William Walker Professor of Mathematics; Group theory*

Associate Professor/Coordinator Lenore Feigenbaum, *History of mathematics*

Associate Professor George McNinch, *Algebraic groups*

Associate Professor Kim Ruane, *Geometric group theory*

Assistant Professor Charles Hague, *Algebraic group theory*

Assistant Professor Scott MacLachlan, *Computational partial differential equations*

Assistant Professor Dan Margalit, *Geometric group theory and topology*

Assistant Professor Sabir Umarov, *Probability*

Assistant Professor Genevieve Walsh, *Geometric topology*

Senior Lecturer Mary Glaser, *Combinatorics*

Lecturer Gail Kaufmann

Visiting Research Professor Mary Beth Ruskai, *Mathematical physics, quantum computing*

SECONDARY APPOINTMENTS:

Professor Lenore J. Cowen, *Computational biology, theory of computation, algorithm design and analysis*

Professor Diane Souvaine, *Design and analysis of algorithms, computational geometry*

Our experience up to date justifies us in feeling sure that in Nature is actualized the ideal of mathematical simplicity.

Albert Einstein
Spencer Lecture, Oxford, 1933

UNDERGRADUATE CONCENTRATION REQUIREMENTS

To major in mathematics, a student must take ten courses in the department. Up to two of these courses may be replaced by certain courses in related fields approved by the department. The courses in mathematics may not include Mathematics 4 through 12, or 17, and must include Mathematics 13 or 18, 46, 135, and 145. For depth, students must complete at least one of the four major yearlong sequences (Mathematics 135/136, 145/146, 151/152, and 161/162), and for breadth, students must either complete a second of these sequences or else take an additional course

chosen from among Mathematics 126, 128, 151, 158, 161, 167, and 168. Majors are advised to complete Mathematics 13 or 18 and Mathematics 46 by the end of their sophomore year. Majors must demonstrate knowledge of a computer language by including an approved course in computer science in their program.

Students in the School of Engineering may, with certain exceptions, choose mathematics as a second area of concentration. To do so a student must notify the dean of engineering through the Department of Mathematics at least one semester before graduation. The student must complete a program that simultaneously satisfies the conditions for a degree from the School of Engineering and the concentration requirements of the Department of Mathematics.

UNDERGRADUATE MINOR PROGRAM

To minor in mathematics, a student must take six courses in the department beyond the level of Mathematics 12 (or 17). These must include Mathematics 13 (or 18) and 46, as well as Mathematics 135 or 145 (or both).

GRADUATE PROGRAM

The Department of Mathematics offers programs leading to the degrees of master of science or arts, and doctor of philosophy. Applicants for the master's degree are expected to have a preparation equivalent to the usual major in mathematics, including courses in analysis and modern algebra. Applicants for admission directly into the doctoral program will be considered only if they have shown exceptional ability. Often doctoral candidates are drawn from the Tufts master's program.

Master's Degree

To qualify for the master's degree a student completes an approved program of at least nine courses numbered above 100. At least seven of these courses must be numbered 136, 146, 158, or above 164; this may include 295 and 296. A student must either write a master's thesis, which counts as two of the nine required courses, or pass oral examinations on analysis, algebra, and geometry as in the Ph.D. program.

For breadth, the nine courses taken to fulfill the master's degree course requirement must include at least one course from each of the following four categories:

Real analysis: 136, 211, 212

Complex analysis: 158, 213

Algebra: 146, 215, 216

Geometry or topology: 167, 168, 217, 218

No more than two of these four courses can be at the 100 level. Any part of this requirement may be fulfilled by equivalent courses with prior approval by the mathematics department graduate committee.

Doctor of Philosophy

A student who has been admitted to the doctoral program must first pass oral examinations on analysis, algebra, and geometry, and then pass an oral qualifying examination on material studied in preparation for work on a dissertation.

The major task of a doctoral student is to write a dissertation under the direction of a department member. This must be a substantial original contribution to the field of the student's specialty and must meet standards of quality as exemplified by current mathematical research journals.

In addition, a student must demonstrate proficiency in reading mathematics written in French, German, or Russian. A student who is not a native speaker of English must also demonstrate proficiency in oral and written mathematical communication in English. A student is also required to have at least one semester's teaching experience at Tufts.

UNDERGRADUATE COURSES

Please note: Students who wish to begin calculus should register for either Mathematics 5, 11, or 17. Those interested in computer science, engineering, mathematics, and the physical sciences should begin the three-course sequence Mathematics 11, 12, 13 or the two-course accelerated honors sequence Mathematics 17, 18. Other combinations of these courses may not be granted full credit (see the separate course descriptions). Mathematics 4, 5, 6, 7, 8, 9, and 10 do not count toward a degree in the School of Engineering. Students entering Tufts starting in the fall of 2007 will receive an additional half-credit (with grade) for passing Math 11 after receiving credit for Math 5. Math 11 must be taken at Tufts and for a grade in order to obtain this extra half-credit. The extra half-credit will not count toward the mathematical sciences distribution requirement.

Students who matriculated before the fall of 2007 and who pass Math 11 at Tufts after receiving credit for Math 5 should seek approval from

the mathematics department if they choose to obtain this extra half-credit.

Math 5 may not be taken for credit after receiving credit for Math 11. For more detailed information, please visit the Web site

<http://www.tufts.edu/as/math/>.

Mechanical Engineering

Professor Richard Wlezien, *Chair; Fluid mechanics, wind engineering*

Professor Mark Kachanov, *Fracture mechanics and micromechanics of materials*

Professor Vincent P. Manno, *Computational thermal-fluid dynamics and power generation systems*

Professor Chris Rogers, *Robotics, musical instrument design, wafer manufacturing, and engineering education*

Professor Anil Saigal, *Materials engineering, manufacturing processes, quality control*

Emeritus Professor William J. Crochetiere, *Machine design, mechatronics and biomedical applications*

Emeritus Professor Robert Greif, *Vibrations, composite materials, vehicle dynamics*

Emeritus Professor John G. Kreifeldt, *Engineering psychology, human factors, product design*

Emeritus Professor Frederick C. Nelson, *Active and passive control of vibration and noise, rotordynamics*

Emeritus Professor Armand Benjamin Perlman, *Finite element methods and rail vehicle dynamics and materials*

Associate Professor Behrouz Abedian, *Fluid mechanics, electrokinetics and thermal-fluid systems*

Associate Professor Caroline G. L. Cao, *Human factors, medical systems, technology assessment, and motor skills training*

Associate Professor Marc Hodes, *Sustainable energy, heat transfer*

Associate Professor Douglas M. Matson, *Solidification processes, thermal manufacturing, machine design*

Emeritus Associate Professor James P. O'Leary, *Machine & product design; manufacturing; biomedical devices*

Assistant Professor Jason Rife, *Robotics, dynamics and controls*

Assistant Professor Robert White, *Acoustics, MEMS, sensors, cochlear mechanics*

Research Assistant Professor and Lecturer Gary G. Leisk, *Machine design, non-destructive testing*

Professor of the Practice Robert Hannemann, *Thermal sciences and heat transfer*

PART-TIME FACULTY:

Research Associate Professor Peter Y. Wong, *Thermal materials processing and radiative heat transfer*

Lecturer John Arata, *Finite element analysis*

Lecturer Mehran Asdigha, *Electromechanical systems*

Lecturer Dan Hannon, *Human factors in product design*

Lecturer Kenneth James, *Biomaterials*

Lecturer Kenneth Kaiser, *Controls*

Lecturer Peter Kerney, *Thermodynamics*

Lecturer Ryan Kilgore, *Interface design*

Lecturer Alan Klemow, *Mechanical design*

Lecturer Paul Lehrman, *Electronic musical instrument design*

Lecturer Michael A. Wiklund, *Human factors in software interfaces*

Lecturer Michael A. Zimmerman, *Material science, thermal manufacturing*

Mechanical engineering is a rich and versatile profession that encompasses invention, analysis, and manufacture of mechanical components and systems. Broadly speaking, mechanical engineering is the branch of engineering that encompasses the generation and application of heat and mechanical power. In other words, mechanical engineering is all about the analysis, design and manufacturing of systems in motion. It spans both mature well-established industries such as automotive, aerospace, shipping, power, heating and cooling and machinery and new and emerging technologies such as robotics, medical devices, micro and nano devices. Some of the most exciting areas in mechanical engineering occur where it interfaces with other disciplines.

In addition to the traditional disciplines of heat transfer, fluid dynamics, dynamics and controls, materials processing, manufacturing, mechanics, and mechanical design, the Department of Mechanical Engineering is focused in three integrated areas of specialization.

- Mechatronics, which is the interface between mechanical engineering and electronics. This specialty encompasses robotics, dynamics and controls, micro electro-mechanical systems (MEMS), manufacturing, and advanced materials.

- Biomechanical systems, which is the interface between mechanical engineering and biology. This specialty includes human factors engineering, tissue scaffolds, soft-bodied robots, micro fluidic systems, biofluidics, biomechanics, and biological materials.

- Sustainable energy, which is focused on

systems for the generation or consumption of power in a sustainable system. This specialty includes power generation and propulsion system efficiency and innovation, electronics thermal management, sustainable data center technology, superconducting energy transmission and storage, wind energy, advanced thermodynamic cycles, heat transfer and fluid mechanics.

The department also has a special focus on engineering education and education outreach. The Center for Engineering Educational Outreach has three main areas of interest: research in engineering education, outreach to the local and global community of teachers, and tool development. It is best known for its work with the LEGO Group in developing ROBOLAB, the educational version of LEGO Robotics. Over 40 engineering undergraduates work with the Center every semester to go into local classrooms to help teachers bring engineering into elementary schools.

The mission of the Department of Mechanical Engineering is to provide educational experiences that give students a sound basis for professional practice and a career of lifelong learning. Each program has specific objectives, but the common goal is to learn fundamental principles of mechanical engineering and to master engineering methods to solve challenging technical problems and to communicate these solutions to the technical and non-technical community. The department strives to offer programs that are recognized as distinctive in their combination of technical quality, diverse areas of technology, and attention to the individual

UNDERGRADUATE PROGRAM

The undergraduate curricula is based on a strong foundation in the physical, mathematical, and engineering sciences and enriched with courses in the humanities and social sciences. This skill set is augmented with hands-on laboratory and practical design experiences. Students select upper-level elective courses to offer exposure to a wide range of advanced and applied courses in thermal-fluid sciences, design methodology, materials and materials processing, manufacturing, applied mechanics, and system automation and control. This provides students with a broad intellectual foundation upon which to build future careers in advanced engineering education and research; engineering practice; or non-engineering professional training in business, education, law, and medicine.

The Department of Mechanical Engineering offers three undergraduate degree programs leading to the undergraduate degrees of bachelor of science in mechanical engineering (BSME), bachelor of science in engineering (BSE), and bachelor of science (BS). The BSME program is accredited by the Accreditation Board for Engineering and Technology (ABET) and qualifies graduates for the Fundamentals of Engineering (FE) examination, which is the first step toward registration as a licensed professional engineer.

Bachelor of Science in Mechanical Engineering

Consistent with the requirements for ABET accreditation, the objectives of the BSME program are presented here. We expect that graduates of the BSME Program will:

1. Integrate fundamental engineering, mathematics, and science principles to solve engineering or other professional challenges in an interdisciplinary environment.
2. Develop successful engineering or professional careers, either directly after an undergraduate degree or after pursuing graduate studies.
3. Communicate both technical and non-technical principles to a wide range of audiences.
4. Demonstrate leadership both through their individual efforts and through the roles attained within their respective organizations.

Given that contemporary interests in mechanical engineering involve many potential outcomes, the department has designed a series of four tracks that can be tailored to the specific needs and interests of a student. With the assistance of a faculty advisor, students should individually plan a program and, if desirable, modify that program each term as their experience and plans develop. In consultation with their advisors, students select a course of study that not only satisfies program requirements but also reflects their unique educational objectives.

1. **Research and Academic Track:** designed for a student who wishes to continue into graduate school and pursue a career in research. This track focuses on independent study on a cutting-edge research topic that culminates in a senior thesis. Students are expected to take Independent Study (ME93 or ME94) during either fall of junior year or spring of senior year to begin development of

their research topic. Their senior design project may focus on the design and fabrication of experimental hardware, followed by a semester of research towards their thesis using this hardware.

2. **Business and Management Track:** designed for a student who wishes to move into an entrepreneurial business or management role following completion of their undergraduate degree. In the junior year the student will either complete an internship with a business (ME99) or a course in engineering management (ME54). The track will culminate in a capstone design experience (ME43) that will mimic a large-scale industrial design project.

3. **Project Engineering Track:** designed for a student who wishes to gain individualized project experience through independent study in their final semester. This track is designed for students who intend to work in industry after graduation, and who wish to complete and present an engineering project that they perform under the supervision of a faculty advisor. This project can be a follow-on to the capstone design project they undertake in the Fall semester of Senior year.

4. **Human Factors Track:** designed for a student who wishes to gain some expertise in human factors and apply it to a large-scale design project. The student will take a human factors design course (ENP120) in their junior year and are expected to use this expertise in a large-scale capstone design course in the second semester of their senior year (ME43).

CORE PROGRAM

Freshman Year

FALL TERM

- Engineering 2** Engineering Graphics and CAD (half credit)
- Engineering Elective (half-credit)
- Mathematics 11 Calculus I
- Physics 11 General Physics I with Lab
- English 1 Expository Writing

SPRING TERM

- Engineering Science 2** Introduction to Computing in Engineering
- Mathematics 12** Calculus II
- Chemistry 1** or **Chemistry 12**
- Humanities/Arts or Social Sciences elective

Sophomore Year

FALL TERM

- Engineering Science 3** Electrical Systems

Engineering Science 5 Introduction to Mechanics: Statics and Dynamics

Mathematics 13 Calculus III

Physics 12 or **Chemistry 2**

Humanities/Arts or Social Sciences elective

SPRING TERM

Mechanical Engineering 1 Introduction to Mechanical Engineering

Engineering Science 7 Thermodynamics

Engineering Science 9 Strength of Materials

Mathematics 38 Differential Equations

Foundation elective

Junior Year

FALL TERM

Career Sequence 1

Engineering Science 8 Fluid Mechanics

Mechanical Engineering 37 Dynamics and Vibrations

Biology 1 Introduction to Biology with Lab or equivalent Science elective

Free elective

SPRING TERM

Mechanical Engineering 18 Introduction to Research Instrumentation

Mechanical Engineering 16 Heat Transfer

Mechanical Engineering 80 Systems Design and Controls Mathematics/science elective

Humanities/Arts or Social Sciences elective

Senior Year

FALL TERM

Career Sequence 2

Mechanical Engineering 25 Engineering Materials

Mechanical Engineering Concentration Elective

Mathematics/science elective or Free elective

Humanities/Arts or Social Sciences elective

SPRING TERM

Career Sequence 3

Mechanical Engineering Concentration Elective

Mechanical Engineering Concentration Elective

Free elective or Mathematics/science elective

Humanities/Arts or Social Sciences elective

MECHANICAL ENGINEERING CAREER ELECTIVE TRACKS

Research and Academic Track

Career 1 **Mechanical Engineering 42** Machine Design

Career 2 **Mechanical Engineering 43** Senior Design Project

Career 3 **Mechanical Engineering 92** Senior Thesis (Career Elective)

Business and Management Track

Career 1 **Mechanical Engineering 99** Internship or

Mechanical Engineering 54 Engineering Management (Career Elective)

Career 2 **Mechanical Engineering 42** Machine Design

Career 3 **Mechanical Engineering 43** Senior Design Project

Project Engineering Track

Career 1 **Mechanical Engineering 42** Mechanical Design

Career 2 **Mechanical Engineering 43** Senior Design Project

Career 3 **Mechanical Engineering 94** Independent Study (Career Elective)

Human Factors Track

Career 1 **Engineering Psychology 120** Project Study in Human Systems (Career Elective)

Career 2 **Mechanical Engineering 42** Mechanical Design

Career 3 **Mechanical Engineering 43** Senior Design Project

The above courses, in conjunction with the courses taken in the first year, satisfy the following distribution requirement

- a. A total of ten credits in introductory engineering sciences: four courses in biology, chemistry, geology, or physics, including Physics 11, Chemistry 1, 3, or 16, and either Physics 12 or a second course in chemistry, four courses in mathematics comprised of Mathematics 11, 12, 13, and 38, and two credits in introductory engineering to include Engineering Sciences 2 and Engineering 2 (including a half-credit project-based course). Many students opt to include biology in their electives, reflecting the increasing importance of biomedical engineering applications in Mechanical Engineering.
- b. A total of six courses in humanities, arts and social studies, including English 1. At least one humanities and one social sciences course must be included.
- c. Eight department foundation courses: five required courses related to engineering science, two elective courses in mathematics and/or science, and one foundation elective to be satisfied by taking either: 1) Engineering Science 4 (Introduction to Digital Logic Circuits) or any course with Engineering Science 3 (Introduction to Electrical Engineering) or 4 as its prerequisite; 2) Computer

Science 11 (Introduction to Computer Science) or any course with Computer Science 11 as its prerequisite; 3) a non-introductory science course, which has a prerequisite from the department in which the course is offered; and 4) specific engineering courses that are consistent with a student's pursuit of a minor or ancillary focus. Examples include Electrical Engineering 50 (Introduction to Biomedical Engineering), Engineering Psychology 61 (Introduction to Human Factors and Ergonomics), Engineering Science 20 (Consumer Product Evaluation), Engineering Science 25 (Environment and Technology), and Engineering Science 88 (Introduction to Computer-Aided Design). The science elective courses cannot be from courses primarily for non-science majors or from courses that deal primarily with computational methods or computer programming.

d. Twelve department concentration courses: four required mechanical engineering science courses (Mechanical Engineering 16, 25, 37, and 80), introduction to research instrumentation (Mechanical Engineering 18), two mechanical-engineering design courses (Mechanical Engineering 1 and 42), a senior design project elective (Mechanical Engineering 43), a mechanical engineering career elective, and three mechanical-engineering concentration electives. The concentration electives vary from year to year and a list for the current year is issued by the department at the time of preregistration. Note that Engineering Science 101 (Numerical Methods) and Mechanical Engineering 150 (Advanced Mathematics for Engineers) may be counted as either concentration electives or mathematics/science electives.

e. Two free elective courses without restriction.

In addition to mechanical engineering courses, the department may approve certain courses given by other departments to substitute for one of the mechanical engineering concentration courses. Also, the department may permit the substitution of certain courses for some of the required courses listed in the above core curriculum. In all such cases, however, the advisor should be consulted and prior department approval obtained.

Bachelor of Science - Engineering Psychology

This program is available for students planning a career or further graduate study in the field of human factors and ergonomics. Students generally

should plan to elect the program at the end of the first year and will graduate with a BS degree in engineering psychology. Program requirements are detailed in this bulletin under Engineering Psychology. Students may also pursue a MS degree in human factors.

CERTIFICATE PROGRAM IN MANUFACTURING ENGINEERING

This certificate is offered on a part-time, non-degree basis for post baccalaureate students seeking professional training in manufacturing engineering with emphasis on manufacturing processes, robotics, designs, quality control, or cost-effective production systems. Courses taken in the certificate program may be transferred to the degree program. Professor Anil Saigal is the faculty adviser of this program. (See Manufacturing Engineering for program description.)

The certificate requires four courses (format code: ME = Mechanical Engineering; CEE = Civil and Environmental Engineering).

Two core courses are required

ME 125 Manufacturing Processes and Materials Technology

ME 180 Digital Control of Dynamic Systems.

Two elective courses are required from the following

ME 108 Modern Quality Control

ME 126 Computer-Integrated Engineering

ME 129 Finite Element Methods in Engineering Systems

ME 182 Automation

ME 184 Robotics

CEE 188 Engineering Design with CAD

GRADUATE PROGRAM

Master of Science in Mechanical Engineering

The goal of the MSME degree program is to provide students with an opportunity to strengthen their technical background so that they may pursue successful professional careers in engineering research, development, entrepreneurship, and production. Candidates are admitted to this program on the basis of a strong academic background in mechanical engineering or a related technical discipline. The department encourages but does not require applicants to submit GRE scores.

Candidates are required to complete the equivalent of ten graduate-level (100-level or above)

course credits (normally, this consists of eight 100-level courses and a thesis worth at least 2 credits). All students are required to choose two core areas from the three offered in the department (Thermal Fluids, Materials and Solids, and Dynamic Systems and Controls). They are then required to take a two-course sequence in each of these two areas in the first two semesters of their MS program.

The two-course sequence is referred to as core A and core B, with core A being a prerequisite for core B). All core A courses will have a math component that is relevant to the subject area, a project/design component, and a software component. The three core area course sequences are Thermal Fluids (ME 165 and ME 166), Materials and Solids (ME 122 and 123), and Dynamic Systems and Controls (ME 180 and 181).

Students are also required to take an advanced math course (ME 150 or ES 101) in semester 2 or 4. The advanced math course has the prerequisites of the two core A courses. The student and thesis advisor determine the remaining 5 credits in the MS program.

A thesis is required in partial fulfillment of the degree. Ordinarily, the thesis is two or three of the ten required course credits. The exact number of course credits to be considered for the thesis research is determined by the thesis committee. After selecting a thesis topic and advisor, a student must register for thesis credit and submit a thesis prospectus signed by the student and advisor describing the proposed research. The thesis defense is the final step in obtaining approval for the thesis.

Master of Science in Human Factors

Human Factors Engineering is also referred to as Engineering Psychology or Ergonomics. The field is rapidly growing with wide engineering and non-engineering applications. The program offers specialized courses, and research opportunities and training in the human-centered aspects of engineering activities such as: medical devices and systems design, transportation systems research, product design, computer-interface design, ergonomics and workplace safety.

Students interested in pursuing an MSHF should apply for admission to the Mechanical Engineering graduate program indicating on their application that they are interested in Human Factors. Although this program has its own entrance

and course requirements separate from Mechanical Engineering Master of Science, it is expected that applicants to the Human Factors program will have an acceptable BS in engineering or science. Relevant course work and research experience may be considered for non-engineering students. It is strongly recommended that the prospective student identify and contact the potential thesis advisor before applying to the program.

Candidates are required to complete the equivalent of ten graduate-level (100-level or above) course credits (normally, this consists of eight 100-level courses and a thesis worth at least 2 credits). All students are required to complete a two-course sequence in each of the following two core areas: Human-Machine Systems and Advanced Probability and Statistics. The courses must be taken in the first two semesters of their MS program.

The two-course sequence is referred to as core A and core B, with core A being a prerequisite for core B. The two core area course sequences are Human-Machine Systems (ENP 162 and ENP 163) and Advanced Probability and Statistics (PSY 107 and 108). Students are also required to take an advanced design course (ME 102) in semester 1 or 3. The student and thesis advisor determine the remaining 5 credits in the MS program.

A thesis is required in partial fulfillment of the degree. Ordinarily, the thesis is two or three of the ten required course credits. The exact number of course credits to be considered for the thesis research is determined by the thesis committee. After selecting a thesis topic and advisor, a student must register for thesis credit and submit a thesis prospectus signed by the student and advisor describing the proposed research. The thesis defense is the final step in obtaining approval for the thesis.

Master of Engineering

The goal of the master of engineering program is to afford qualified post baccalaureate students the opportunity to obtain the advanced engineering education needed to grow as engineering professionals. Applicants are admitted to the master of engineering (MEng) program based on a strong academic background in mechanical engineering or a related technical discipline. The department encourages but does not require GRE scores for admission. As such the MEng program empha-

sizes technical course work and a project, and can be contrasted with the departmental MS program, which is focused on research and development and includes a research thesis.

Candidates are required to complete the equivalent of ten graduate-level (100-level or above) courses.

All students must take at least three courses from the six available core topic classes. Students should honor prerequisites when selecting courses.

Students are required to take at least one math course selected from ME150, ES101, and ME108. Students are also required to take ME102 (Inventive Design).

The remaining 5 courses in the MEng program are four elective courses and a one-credit project (Mechanical Engineering 299). The project is conducted under the guidance of a faculty advisor and must address a substantive engineering analysis or design problem. Students are required to submit a written report and make an oral presentation of their project work.

Doctor of Philosophy

Applicants to the PhD program are expected to have an outstanding academic record and an MS degree in mechanical engineering or a related discipline. All applicants to the Ph.D. program should outline in writing their reasons for applying to the doctoral program and their tentative plan of study. For general information and admission requirements for the Ph.D. degree, see the graduate school section of this bulletin.

For admission to doctoral candidacy the individual must pass a qualifying examination by the end of their third academic semester in the program. The student must select two out of the four track areas (Solids/Materials, Fluid/Thermal, Systems/Controls, Human Factors) for the qualifying examination.

A PhD candidate is required to complete at least 5 course credits beyond their MS degree in classroom courses at the 100-level or higher. Doctoral candidates are expected to pursue either course work in direct support of their research or course work that addresses the recommendations made during the qualification period. In the interest of broadening the educational experience, students are also expected to take at least one advanced course in a technical discipline outside of the department.

After the successful qualifying exam, PhD candidates are required to present a thesis prospectus to a committee composed of the thesis advisor, other mechanical engineering faculty, and possibly outside experts. This presentation includes questioning by the committee and other faculty to assess whether the candidate has sufficient background to study the research area. The purpose of the prospectus is to inform the department in a concise statement of the candidate's research program.

Ph.D. candidates must defend their dissertation in an oral examination, open to the community. The candidate is examined by a committee of at least three members, one of whom is an expert from outside the mechanical engineering department, and another from outside Tufts University. Recent doctoral dissertation topics include haptic feedback in minimally invasive surgery, novel materials processing approaches with application to ceramics, metal casting, and biomaterials development, modeling and experimental characterization of semiconductor manufacturing processes, development of optical techniques for microscale measurements, modeling, design, and fabrication of microscale sensor arrays for aeroacoustic applications, computational and experimental cochlear mechanics, development of method for polymer synthesis using microfluidic enzymatic cascade, and electrowetting phenomenon for microscaled fluidic devices.

For more detailed information, please visit the Web site <http://ase.tufts.edu/mechanical/>.

Medieval Studies

FACULTY COORDINATOR:

Professor Steven Marrone, *History*

The interdisciplinary minor in medieval studies presents a multidisciplinary focus on the world of the Middle Ages. The medieval world introduces us to the cultural roots of Europe and Islam in a preindustrial society and to the beginnings of Western and Middle Eastern languages and literatures.

Five credits with at least one course from each of the three categories (as stated online) are required for the minor. In addition to the five cred-

its, a student is required to complete an appropriate project, such as a thesis, an oral presentation, or a performance, which integrates the knowledge and methodologies of the disciplines involved. (See Interdisciplinary Minor Program for details.)

Microwave and Wireless Engineering

FACULTY ADVISER:

Professor Mohammed Afsar, *Electrical and Computer Engineering*

In today's changing economy, the microwave and wireless engineering industry is moving away from developing traditional military applications and toward exploration of commercial opportunities. With the new availability of relatively inexpensive microwave components and improved digital communications, these opportunities have few limits. Radar, satellite, wireless radio and optical communications, and collision avoidance radar are just a few areas which utilize microwave technology.

In addition, computer hardware researchers and designers are finding that some microwave engineering concepts are necessary to develop faster computer circuits. As engineers explore low microwave frequencies and even lower radio frequencies, this technology will be applied to cable, broadband, television, medical, and other commercial uses.

In collaboration with the Office of Graduate Studies, the Department of Electrical and Computer Engineering and the Department of Computer Science offer this five-course, graduate-level certificate in microwave and wireless engineering. The certificate program educates professionals in the exciting new uses of microwave and wireless technology through extensive laboratory and project work. The program can be pursued on a part-time, nondegree basis by professionals seeking advanced development and training or as an intermediate step to a master's degree. In most cases, courses taken as part of a certificate program can be transferred into a graduate-degree program in electrical engineering. The program is open to students with a bachelor's degree in electrical engineering or physics or with equivalent preparation,

including a background in general physics and intermediate circuit theory.

For more information and an application, contact the Office of Graduate Studies at 617-627-3395.

Middle Eastern Studies

DIRECTOR:

Associate Professor Eva Hoffman, *Art and Art History*

FACULTY:

Professor Leila Fawaz, *History*

Professor Ayesha Jalal, *History*

Professor George Marcopoulos, *History*

Associate Professor Gloria Ascher, *Judaic Studies*

Associate Professor Madeleine Fletcher, *Romance Languages*

Associate Professor Steven Hirsch, *Classics*

Associate Professor Beatrice Manz, *History*

Associate Professor Ina Bahgdiantz McCabe, *History*

Associate Professor Joel Rosenberg, *Judaic Studies*

Assistant Professor Eva Hoffman, *Art and Art History*

Lecturer Mohammed Alwan, *Arabic language and literature*

Adjunct Professor Lucy Der Manuelian, *Art and Art History*

Middle Eastern Studies is an interdisciplinary program that encourages breadth and significant immersion in one or more Middle Eastern cultures. The program gives students an opportunity to study the history and culture of the Middle East and of areas of the world whose territories were part of Middle Eastern empires or were under the influence of Middle Eastern civilizations in premodern and modern times. Study abroad is highly recommended.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Middle Eastern Studies

The Middle Eastern studies major comprises ten courses:

- a. Two courses in a Middle Eastern language (level 121-122, or equivalent). Students who have demonstrated language competence through level 121-122 by a placement test must take two advanced language courses, two semesters of a sec-

and Middle Eastern language, or two other courses listed in section b. for a total of ten courses. This requirement will take effect beginning with the Class of 2012.

b. Six courses in Middle Eastern studies—chosen in consultation with an adviser—from an approved list updated by the Middle Eastern Studies program annually. These courses must include at least one course in premodern and one course in modern Middle Eastern studies. They must also include one course in each of two Middle Eastern cultures. Three courses must be chosen from each of the following two groups: 1) art history, religion, literature, Judaic studies, music, and 2) anthropology, history, political science.

c. One course that relates the Middle East to other regions of the world.

d. One advanced research course, such as thesis honors, a seminar, or advanced directed study.

For more detailed information, please visit the Web site <http://farescenter.tufts.edu/majorMES.asp>.

Multimedia Arts

CODIRECTORS:

Associate Professor Karen Panetta, *Electrical and Computer Engineering*

Howard Woolf, *Experimental College*

CORE FACULTY:

Associate Professor Alva Couch, *Computer Science*

Associate Professor Eva Hoffman, *Art and Art History*

Associate Professor Karen Panetta, *Electrical and Computer Engineering*

Associate Director Howard Woolf, *Experimental College*

Assistant Professor Don Weingust, *Drama and Dance*

Senior Lecturer Neal Hirsig, *Drama and Dance*

Lecturer Christine Cavalier, *Art and Art History*

Lecturer Paul Lehrman, *Music*

The multimedia arts (MMA) program provides a framework for the analysis of and practical training in emerging digital media. Linking the School of Engineering with the College of Liberal Arts, the MMA program is supported by the Electrical and Computer Engineering Department and the Computer Science Department in concert with the Art and Art History Department, the Drama and Dance Department, the Music Department, and the Experimental College.

INTERDISCIPLINARY MINOR IN MULTIMEDIA ARTS

The multimedia arts minor now forms a third track within Communications and Media Studies, along with minors in Mass Communications and Media Studies, and Film Studies. The minor includes—and often mixes—work in animation, filmmaking, photography, music, text, drawing, collage, graphic design, software development, Web site construction, user interface strategies, and human factors theory.

Through course work and collaboration on the part of students in liberal arts and students in technical disciplines, the minor aims to foster the development of a body of shared knowledge and ideas and, in so doing, to break down barriers that have traditionally hindered such cross-fertilization.

The minor also develops skills relevant to many careers: project design and implementation, creativity and critical thinking, media and computer literacy, oral and written communication, as well as teamwork and leadership. All undergraduates are therefore encouraged to participate.

The interdisciplinary minor in multimedia arts requires a minimum of five courses and a senior project.

Multimedia Practice Courses

Students must take two courses from an approved list of courses (as stated online) that introduce students to the tools, methods, and theories current in the field.

Electives

Students must take two full-credit, letter-graded courses selected from courses offered by the supporting departments—Art and Art History, Drama and Dance, Music, Electrical and Computer Engineering—or those listed and approved by the program (e.g., Experimental College courses). Courses taken to fulfill a requirement for a student's major cannot be counted as multimedia arts electives. No more than one elective can be taken from a student's major study area. For example, music majors may fulfill one of their electives by taking a course in art and art history. A second elective must then be in electrical engineering, computer science, or another approved technology course. All elective decisions must be made in consultation with a student's adviser for the minor.

MANDATORY COURSES

Experimental College 190C Senior Colloquium
 (half-credit, pass/fail)

This is a mandatory course for students enrolled in any of the three CMS minors. It is taken in the fall of a student's senior year and is designed to aid in the planning and successful completion of the senior project.

The senior project is an original work that reflects an understanding of and facility with one or more of the expressive and/or conceptual disciplines associated with multimedia. Collaborative projects are strongly encouraged. A thesis or project completed for the major may not be used as the MMA senior project. On a case-by-case basis, however, a student may be allowed to create a thematic relationship between the two projects.

All courses taken as part of the multimedia arts minor must be taken for a letter grade and may not be used toward fulfillment of the foundation requirement. (See Interdisciplinary Minor Program for details.)

**APPROVED COURSES FROM THE
 EXPERIMENTAL COLLEGE**

New courses in multimedia practice as they are developed and approved by the program

For specific information about the policies governing requirements and electives, visit the Web site <http://www.excollege.tufts.edu/mma>.

Museum Studies

Professor Kathleen Weiler, *Faculty adviser; Education*
Assistant Professor Monica McTighe, *Faculty adviser; Art and Art History*
Assistant Professor Benjamin Carp, *Faculty adviser; History*
Lecturer Cynthia Robinson, *Director and Internship supervisor*

As the stature and number of American museums responsible for artistic, historical, ethnographic, and living collections grow, so has the need for appropriate professional training. More than ever before, today's museum professionals need to be problem-solvers, educators, administrators, and

logistical experts who understand not only the information that their collections hold, but how to tell their stories.

Offered in collaboration with the Tufts Departments of Art and Art History, Classics, Education, and History, and the Office of Graduate Studies, this certificate program trains students in the preservation, administration, and education skills required for work in museums and historic settings. The course work clarifies career goals for those who may be considering museum work, as well as enhances the skills of professionals in the field.

Four courses and a one-semester internship are required for the certificate. The courses cover museum history, administration, education, collections management, conservation and preservation, material culture, fund-raising, and exhibition planning. The internship is the culminating course in the certificate program, and is intended to provide the student with firsthand professional experience in the museum field.

The program is open to individuals with a bachelor's degree who are recent graduates interested in pursuing a museum-based career, entry-level museum professionals who wish to improve their credentials for career advancement, and professionals in related fields—such as education, fine arts, research, or arts administration—who wish to shift career direction.

For a brochure and application, contact the Office of Graduate Studies at 617-627-3395 or visit <http://ase.tufts.edu/museumstudies>.

Music

Professor Joseph Auner, *Chair; Music history, musicology*
Professor Jane A. Bernstein, *Fletcher Professor of Music; Music history, musicology*
Associate Professor David Locke, *Music culture, ethnomusicology, performance*
Associate Professor John McDonald, *Composition, music theory, performance; Director of Graduate Studies*
Associate Professor Janet Schmalfeldt, *Music theory, analytic and cultural studies in music*
Associate Professor Jeffrey Summit (*Joint appointment in Judaic Studies*), *ethnomusicology*

Assistant Professor Alessandra Campana, *Musicology*

Assistant Professor Richard Jankowsky,
Ethnomusicology

Lecturer Paul Ahlstrand, *Small Jazz Ensemble*

Lecturer Scott Aruda, *Small Jazz Ensemble*

Lecturer Edith Auner, *Coordinator of Performance and Outreach*

Lecturer Nina Barwell, *Flute Ensemble*

Lecturer Don Berman, *New Music Ensemble*

Lecturer Andrew Clark, *Director of Choral Activities;*
music theory, orchestration

Lecturer David Coleman, *Gospel Choir*

Lecturer Barry Drummond, *Javanese Music Ensemble*

Lecturer Jane Hershey, *Early Music Ensemble*

Lecturer Paul Lehrman, *Music for Multimedia,*
Coordinator of Audio Technology

Lecturer Carol Mastrodomenico, *Opera Ensemble*

Lecturer John McCann, *Director of Wind Ensemble;*
music theory

Lecturer Michael McLaughlin, *Klezmer Ensemble, theory*

Lecturer Steven Morris, *Opera scenes, chorale and staff accompanist*

Lecturer Gil Rose, *Director of Orchestral Activities*

Lecturer Kareem Roustom, *Arabic Ensemble*

Lecturer Ed Schwehm, *Pep Band*

Lecturer Joel Larue Smith, *Director of Jazz Activities;*
jazz composition, theory, and performance

Lecturer Julie Strand, *Ethnomusicology*

Lecturer Michael Ullman (*Joint appointment in English*),
Music history: blues and jazz

Mellon Fellow Mary Talusan Lakanale,
Ethnomusicology

Music plays an essential role in a liberal arts college education. Musical studies integrate mind, body, and spirit. Students who study music in college prepare themselves for a lifelong appreciation of the musical arts. The faculty of the Department of Music guides students along a rigorous yet joyful pursuit of knowledge in the following fields: instrumental/ensemble performance, theory of music, history of music, social/cultural musical context, and musical composition. Musical studies are interdisciplinary, drawing on other disciplines in the arts, humanities, social sciences, mathematics, sciences, and engineering. Studies in music teach transferable skills of value for careers in the professions and business.

The Department of Music offers courses in the disciplines of composition, ethnomusicology, musi-

cology, performance, and music theory. Our curriculum is inclusive and diverse, with emphasis on the traditions of Western classical music, American music (especially African-American music and jazz), and world music (especially African and Asian music). Individual study of instrumental and vocal performance and participation in performing ensembles is enthusiastically endorsed; students may earn academic credit for these musical activities.

The music department's flexible program serves (a) those students who would choose music as a major or minor, and (b) all students seeking to develop their musical knowledge and/or performance skills. Students may major in music, double major in music and another field, or minor in music. Music courses fulfill many requirements (arts distribution, world civilizations, international relations, American studies, and several interdisciplinary minors). The courses, programs, and facilities of the Music Department are open to all members of the Tufts community.

PERFORMANCE OPPORTUNITIES

The music department provides students the opportunity for private study of instrumental and vocal performance with the outstanding faculty in our applied music program. Lessons may be taken for half credit (0.5) or not for credit (NC). Extra tuition of \$660 (2008-09) is required; beginning in the junior year, students majoring or minoring in music are eligible for a ninety-percent tuition waiver for two semesters. For detailed information, contact Edith Auner, Coordinator of Performance, at 617-67-5616.

Faculty in the Department of Music teach a diverse variety of courses in ensemble performance, including African Ensemble (*Kiniwe*), Arabic Ensemble, chamber ensembles, Chamber Singers, University Chorale, Chamber Singers, Early Music Ensemble, Flute Ensemble, Gospel Choir, Javanese Gamelan, Jazz Big Band, Jazz Improvisation Ensembles, New Music Ensemble, Pep Band, Tufts Symphony Orchestra, and University Wind Ensemble. Enrollment in performing groups requires audition; contact the department office for audition information, 617-627-3564. Musical excellence is highly valued, but membership is less competitive than in music conservatories.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The curriculum required of music majors provides a rigorous, balanced exposure to the essential fields in liberal arts music studies, including composition, ethnomusicology, musicology, performance, and theory. Normally, students declare the major in music and choose a member of the full-time faculty as major adviser during the spring semester of the sophomore year. Students obtain the necessary signatures for declaration of major forms and change of adviser forms at the department office.

Undergraduate students who major in music are required to take ten courses in the department. Students considering graduate studies in music or careers in music are advised to take additional courses beyond the ten required for the major; please see your advisor for a list of specific recommendations. No course may be used to fulfill more than one requirement in the major.

Courses required for the undergraduate major in music are:

- a. History of Western Music (two one-credit courses): Music 142, 143.
- b. Principles of Tonal Theory I and II (two one-credit courses): Music 101, 102.
- c. Advanced Theory (one-credit course): Music 103-110
- d. Ethnomusicology—(two one-credit courses): Music 171-192
- e. Performance—instrumental/vocal study (two half-credit courses): Music 68.
- f. Electives—Theory, Composition, Ethnomusicology, Musicology, Performance (two one-credit courses): Music 111-141, 146-199.

In addition to courses listed above for the music major, students must enroll in a performing-ensemble course (Music 69-96) for four semesters. Ensembles may be taken for credit or non-credit; however, credit for ensembles does not count toward the ten courses required for the major.

Students who entered Tufts prior to Fall 2008 may elect to complete the requirements for the major that were in place when they entered. Please consult with your advisor about the details.

UNDERGRADUATE MINOR PROGRAMS

Minor in Music

Students who intend to pursue music studies seri-

ously at Tufts may choose the disciplinary minor in music. The undergraduate minor in music requires five courses. Courses must be chosen from those numbered Music 100 and above. Two semesters in instrumental and/or vocal study (Music 68 or 195) are required; no more than one credit of private lessons may count toward the minor. Students minor-ing in music must enroll in a performing-ensemble course (Music 69-96) for two semesters, but these credits cannot count toward the minor. After consultation with a member of the full-time music faculty for advice on a suggested program of study, students should complete a minor declaration form (available from the department office).

Minor in Multimedia Arts

An interdisciplinary minor in multimedia arts is offered by the Departments of Art and Art History, Drama and Dance, Electrical Engineering and Computer Science, and Music, and is administered jointly by the Department of Music and the Department of Electrical Engineering and Computer Science. A detailed description of the minor and its requirements may be found in the alphabetical listings in this bulletin under Multimedia Arts.

COURSES AT NEW ENGLAND CONSERVATORY OF MUSIC

A reciprocal arrangement between Tufts University and New England Conservatory of Music allows students at both institutions to select a limited number of courses at either school that may be applied toward their respective degrees. Students may not take a course at the conservatory if it is offered at Tufts. This agreement does not apply to summer school. Students must first receive permission from their own dean, then from the dean of the second institution.

COMBINED-DEGREES PROGRAM WITH NEW ENGLAND CONSERVATORY OF MUSIC

Music studies at Tufts are enhanced by the five-year double-degree program leading to a bachelor of arts or bachelor of science degree from Tufts and a bachelor of music degree from New England Conservatory of Music. (Please consult the academic catalogue of New England Conservatory of Music for information about its programs.) Students interested in this program first must be

MUSIC >

MUSICAL INSTRUMENT ENGINEERING >

NUTRITION >

admitted to both institutions; acceptance into the double-degree program is highly selective, based on both academic and musical competence. Transfer students are not normally accepted into this program; students currently enrolled at either school may apply for admission to the other institution and place themselves in contention for a place in the program. Students may discontinue the program and continue toward completion of the preferred degree at the chosen institution. The cost of the program is based on Tufts undergraduate tuition rates. For information about the program, please contact Associate Dean Jeanne Dillon, NEC liaison at Tufts University; or the Dean of Enrollment Services, Office of Admission, New England Conservatory of Music, 290 Huntington Avenue, Boston, Massachusetts 02115.

GRADUATE PROGRAM

Master of Arts

The Department of Music offers the degree of master of arts in the areas of music theory, composition, musicology, or ethnomusicology. Applicants for the master's degree must demonstrate a satisfactory background in music studies, must submit a writing sample or composition as part of their application, and are urged but not required to take the Graduate Record Examination. The two-year program of study consists of eight semester courses numbered 100 and above (excluding Mus 101 and 102, and Mus 142 and 143), a thesis or composition (one course of the eight required), and an oral defense of the thesis or composition. A reading knowledge in one foreign language is required, and students are expected to take music courses outside their subfield. The department encourages students to gain practical experience in performance courses, but these do not count for credit toward the master of arts degree.

For more detailed information, please visit the Web site <http://www.tufts.edu/as/music>.

Musical Instrument Engineering

FACULTY COORDINATOR:

Professor Chris Rogers, *Mechanical engineering*

Lecturer Paul Lehrman, *Music*

UNDERGRADUATE MINOR

The minor in musical instrument engineering (MIE) allows students from various disciplines to learn fundamental engineering principles using musical instruments as a focal point of study.

The minor includes five courses. These courses must include Mechanical Engineering 37; either Engineering Science 73 or Music 66 (cross-listed as Mechanical Engineering 95); Physics 10 or Engineering Science 8; and a music composition course such as Music 10 or 64. An approved practical experience in musical instrument construction must also be conducted.

This requirement could be an internship with a musical instrument company or craftsman, a musical-instrument-making course at the Museum School, or a research project conducted at Tufts. Depending on project circumstances, the student will register for one of Mechanical Engineering 19, Mechanical Engineering 93, Mechanical Engineering 94, or Mechanical Engineering 99. In addition to the above course work, attendance at the monthly MIE seminar series during the junior and senior years is also required.

CONCENTRATION CERTIFICATE

The concentration certificate in musical instrument engineering gives mechanical engineering students the opportunity to focus their education on the construction, performance, and manufacture of musical instruments.

In order to receive the certificate, six courses must be completed in addition to the requirements above for the bachelor of science in mechanical engineering. These courses include Mechanical Engineering 129, 137, and 139; Engineering Science 51, and either Mechanical Engineering 120 or 122. Mechanical Engineering 43 is also required, and must include a design project related to musical instruments.

For more detailed information, please visit the Web site <http://www.tufts.edu/mie/>.

Nutrition

The Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy at Tufts University was established in 1981, bringing together biomedical, social, political, and behavioral scientists

to conduct research, educational, and community service programs in nutrition.

The school offers master of science and doctor of philosophy degrees in nutrition and, in cooperation with the Frances Stern Nutrition Center of the New England Medical Center Hospital, a combined master of science/dietetic internship program. Dual-degree programs are offered with the School of Medicine (M.S./Master of Public Health) and with the Fletcher School of Law and Diplomacy (M.S./M.A.L.D.). A one-year combined master of arts degree in humanitarian studies is offered in conjunction with the Fletcher School. A tri-university certificate program in humanitarian studies is offered in conjunction with Harvard University and Massachusetts Institute of Technology. The faculty includes anthropologists, biomedical scientists, economists, nutritionists, physicians, political scientists, and psychologists, all dedicated to teaching and research in the field of nutrition.

The Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy is located at 150 Harrison Avenue, Boston, Massachusetts 02111; phone 617-636-3777, fax 617-636-3600. For more information about the school and its degree programs and research, visit the Web site <http://www.nutrition.tufts.edu>.

Courses

For current course listings, visit “course information” at <http://www.nutrition.tufts.edu>. Although no undergraduate degree programs are offered, the courses listed below are available to undergraduates. Consent must be obtained from the instructor for courses numbered 200 and above.

Occupational Therapy

Professor Linda Tickle-Degnen, *Chair; Clinical Reasoning, evidence-based practice, research methods, and therapeutic behavior and motivation*

Professor Sharan L. Schwartzberg, *Group theory and practice, psychosocial rehabilitation*

Associate Professor Diana Bailey, *Health care policy, health care management, research methods*

Assistant Professor Gary Bedell, *Rehabilitation outcomes measurement, pediatrics, HIV/AIDS, research methods*

Sr. Lecturer Janet Curran Brooks, *Physical dysfunction*

Lecturer Jennifer Buxton, *Assistive technology*

Lecturer Molly Campbell, *Assistive technology*

Lecturer Regina Doherty, *Interactive reasoning*

Lecturer Paul C. Leavis, *Physiology*

Lecturer Monica Pessina, *Neuroanatomy*

Lecturer Sharon A. Ray, *Pediatrics, kinesiology*

Lecturer Joan Retsinas, *Health and community service*

Lecturer Deborah Rochman, *Pain management*

Lecturer Stephen N. Sarikas, *Anatomy*

Lecturer Andrea Sherwin, *Child development, early intervention and research*

Lecturer Deborah Slater, *Management*

Lecturer Scott Trudeau, *Psychosocial dysfunction, gerontology*

Lecturer Elizabeth Ratcliff Whitney, *Neuroanatomy*

Academic Fieldwork Coordinator Mary Evenson, *Fieldwork education*

Fieldwork Coordinator Mary Alicia Barnes, *Fieldwork education*

The Boston School of Occupational Therapy, the first of its kind in the country, was founded in 1918 at the request of the surgeon general of the United States Army to meet the need for personnel in military hospitals. It was later reorganized on a civilian basis and in 1921 was incorporated as a nonprofit educational institution under the laws of the Commonwealth of Massachusetts.

In 1945 the Boston School of Occupational Therapy became affiliated with Tufts University through the College of Special Studies. As a result of a merger between Tufts University and the Boston School of Occupational Therapy in January 1960, the legal name was changed to Tufts University-Boston School of Occupational Therapy. It became a department within Arts and Sciences and is currently housed on the Medford/Somerville campus at 26 Winthrop Street.

The goal of occupational therapy is to develop an individual's ability to handle life tasks and activities in a way that enhances the quality of life. Occupational therapy focuses on both preventive and rehabilitative services.

GRADUATE PROGRAM

The department offers both master's and doctoral degree programs which prepare graduates for work as clinical specialists, administrators, researchers, and educator. The program interfaces the social and the health sciences, recognizing the importance of the profession's theoretical base in both the liberal arts and the sciences.

Clinical reasoning is the central organizing

framework of the curriculum. It provides a foundation for clinical decision making and interaction that considers theoretical and procedural components of therapeutic interventions. Human behavior results from dynamic interaction between the individual's innate potentials and characteristics, and experiences with people, objects, and events in the environment. In ongoing clinical reasoning seminars, the faculty and students examine these interactions in the context of clinical and community-based practice.

MASTER'S DEGREE PROGRAM

The master's degree program prepares students for entry-level positions in occupational therapy or provides postprofessional graduate studies for therapists with a bachelor's degree in occupational therapy.

Entry into the master's degree program can be accomplished in different ways, according to the academic degree and professional status of the applicant. Two types of master's degrees are offered: master of science in occupational therapy (M.S. in O.T.) without a thesis requirement, for students interested in an applied professional degree, and master of arts (M.A.) or master of science (M.S.) with a thesis requirement, for students interested in a research-oriented academic degree.

Both professional and postprofessional programs are offered. Program options are described below.

Professional-Level Programs for Non-OTRs (Options I and II)

Eligibility: A bachelor's degree in a field other than occupational therapy. Candidates enter the program at the professional level and proceed to eventual certification as registered occupational therapists. Fall, spring, or summer entry and full-time first year.

Prerequisites: (Total of five courses.) All prerequisites must be passed with a grade of B- or better and taken at an accredited college. Two courses in social sciences, i.e., anthropology, psychology, human development, sociology. Two courses in biology, including content in cell biology. (Anatomy and physiology may be substituted for the biology prerequisite.) One course in introductory statistics. Certificate of Hepatitis B vaccination upon enrollment is required.

Option I (No thesis)

Master of Science in Occupational Therapy

REQUIRED COURSES

OTS 101 Human Physiology (one course credit)

OTS 102 Gross Anatomy (one course credit)

OTS 103 Neuroanatomy (one course credit)

OTS 104 Kinesiology (one course credit)

OTS 106 Occupation and Adaptation in the Child and Adolescent (one course credit)

OTS 107 Occupation and Adaptation in the Adult Years (one course credit)

OTS 137 Fieldwork Seminar (no credit)

OTS 138 Fieldwork Seminar (no credit)

OTS 205 Clinical Reasoning Seminar I: Observation and Interpretation (one-half course credit)

OTS 206 Clinical Reasoning Seminar II: Interactive Reasoning in the Practice of Occupational Therapy (one-half course credit)

OTS 207 Clinical Reasoning Seminar III: Procedural Reasoning in the Practice of Occupational Therapy (one-half course credit)

OTS 209 Clinical Research (one course credit)

or **OTS 210** Thesis Research (one course credit)

OTS 219 Group Theory and Community-Based Practice (one course credit)

OTS 224 Occupational Therapy Practice in Physical Dysfunction (one course credit)

OTS 226 Occupational Therapy Practice with Pediatric Population (one course credit)

OTS 227 Occupational Therapy Practice in Psychosocial Dysfunction (one course credit)

OTS 229 Occupational Therapy Practice with Older Adults (one course credit)

OTS 232 Health and Community Systems (one-half course credit)

OTS 233 Occupational Therapy Management and Administration (one-half course credit)

OTS 237 Fieldwork Experience (no credit)

OTS 238 Fieldwork Experience (no credit)

OTS 242 Health Conditions: Pathology and Prevention I (one-half course credit)

OTS 243 Health Conditions: Pathology and Prevention II (one-half course credit)

OTS 244 Health Conditions: Pathology and Prevention III (one-half course credit)

Total number of course credits for the degree is sixteen. If they desire, non-thesis students may take two elective classroom credits in the department in addition to the sixteen required credits.

To maintain full-time status, a student must be

registered for a minimum of three course credits. Several course sequences are suggested by the department. Some of these include fieldwork during the summer, part-time fieldwork, and fieldwork during the academic year with course work in the summer. Please consult the department for further information.

Option II (Thesis)

Master of Arts or Master of Science

Required Courses: All of the Option I requirements, and substitute OTS 210 (Thesis Research) for OTS 209 (Clinical Research). Similar course sequences to Option I.

Thesis: Two course credits of thesis supervision (OTS 295, 296) and completion of thesis.

Total number of credits required for the degree is eighteen (sixteen course credits and two thesis credits).

Post-professional-Level Programs for OTRs (Options III and IV)

For post-professional students interested in developing their knowledge base in areas such as administration and management, aging, education, mental health, childhood and adolescence, and upper extremity function and rehabilitation. Students may also choose the self-directed concentration focused on their individual interests.

Eligibility: Registered occupational therapists or candidates are eligible for registration.

Prerequisite: One course in introductory statistics. The prerequisite course must be passed with a grade of B- or better and taken at an accredited college.

Option III (No thesis—practice option)

Master of Science in Occupational Therapy

Required Courses: OTS 209 (Clinical Research, one course credit); OTS 208 (Clinical Reasoning Seminar IV, one course credit); OTS 233 (Occupational Therapy Management and Administration, one-half course credit); OTS 232 (Health and Community Systems, one-half course credit). These required courses may be taken in any sequence or combination depending on student interest and courses offered.

Concentration: Three courses in an area of concen-

tration; one practicum (OTS 234 or OTS 235); one special topic (directed readings); OTS 293 or OTS 294.

Electives: Two.

Total number of course credits for the degree is ten.

Option IV (Thesis—research option)

Master of Arts or Master of Science

Required Courses: OTS 210 (Thesis Research, one course credit); OTS 208 (Clinical Reasoning Seminar IV, one course credit).

Thesis: Two course credits of thesis supervision (OTS 295, 296) and completion of thesis.

Concentration: Three courses in concentration (three course credits); one related research course (one course credit).

Electives: Two.

Total number of course credits for the degree is ten.

DOCTORAL DEGREE PROGRAM (OTD)

The occupational therapy doctoral degree program prepares occupational therapists to assume leadership roles upon completion of the degree. These roles are expected to make a real impact on individuals and groups in society and the world in such areas as health functioning, wellness, and quality of life. As leaders the graduates will be prepared to implement leadership projects and disseminate results.

REQUIRED COURSES

OTS 208 Clinical Reasoning Seminar IV: Evidence-Based Practice (one course credit)

OTS 286 Leadership Project Planning (one-half course credit)

OTS 287 Leadership Project Implementation (one and one-half course credits)

OTS 288 Outcomes Measurement and Monitoring: Using Data to Inform Practice (one course credit)

OTS 289 Integrative Paper (one course credit)

OTS 297, 298 Proseminar (one-half course credit each)

Two graduate-level courses in specialty area (equivalent to two course credits)

CERTIFICATE PROGRAMS

The Certificate program is offered on a nondegree, part-time basis to students with a bachelor's degree in occupational therapy who are seeking advanced professional education in occupational therapy or are preparing to enter a graduate degree program.

The certificate program gives students the option of focusing on three different subject areas: advanced professional study, school-based practice, and hand and upper extremity rehabilitation. These programs are offered through the Office of Graduate Studies. In most cases, courses taken as a nondegree certificate student can be transferred into the master's degree program. For more information, contact the Office of Graduate Studies in Ballou Hall, 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

Advanced Professional Study in Occupational Therapy

Many occupational therapists are quickly confronted in their careers with consultative, administrative, and supervisory responsibilities and the need for increased specialization. The advanced professional study (CAPS) specialization offers a way for occupational therapists to prepare to meet some of these growing demands in the field. It also provides occupational therapists with a valuable means of pursuing their professional education in the rapidly expanding specialty areas of community-based and school-based programs.

The certificate requires four course credits as follows.

One core course:

OTS 209 Clinical Research (prerequisite: statistics)

Three specialty courses:

OTS 105 Assistive Technology

OTS 220 Methods of Education for Occupational Therapists

OTS 229 Occupational Therapy Practice with Older Adults

OTS 233 Occupational Therapy Management and Administration

OTS 273 Theory and Management of Pain

OTS 280 Early Intervention: Assessment and Programming

OTS 281 Early Intervention: An Ecological Approach

OTS 284 School-Based Practice: Programmatic Issues

OTS 285 School-Based Practice: Assessment to Intervention

OTS 291 Physiology of Exercise and Physical Performance

OTS 293 Special Topics

OTS 294 Special Topics

These courses and other electives are offered on the basis of interest and enrollment. Elective graduate-level courses at Tufts may be substituted based on a student's needs. An individual course of study is arranged with the program adviser.

Hand and Upper-Extremity Rehabilitation

The hand and upper extremity rehabilitation specialization is intended for practicing occupational therapists who would like to use course work to gain knowledge in the occupational therapy specialty of hand and upper extremity therapy. Therapists who complete this course series are eligible to apply for a hand therapy clinical fellowship at the Massachusetts General Hospital. Students who do not elect to pursue the fellowship will still receive the certificate of advanced professional study upon completion of the four courses.

The certificate requires four course credits as follows:

OTS 274 Topics in Hand and Upper Extremity Rehabilitation I: Fall

OTS 275 Topics in Hand and Upper Extremity | - Rehabilitation II: Spring

OTS 276 Topics in Hand and Upper Extremity Rehabilitation III: Summer

OTS 209 Clinical Research
or **OTS 210** Thesis Research

School-Based Practice

The school-based practice specialization will prepare occupational therapists to be advanced practitioners in the area of school-based practice. Graduates of the program will be able to influence services within their local schools to provide educational relevant services consistent with special education law and the direction from the American Occupational Therapy Association.

The program requires four courses as follows:

School Setting specific (2 course credits)

OTS 284 School-based Practice: Programmatic Issues

OTS 285 School-based Practice: Assessment to Intervention

Research or related coursework (1 credit)

OTS 208 Clinical Reasoning IV: Evidence Based Practice

OTS 209 Clinical Research

OTS 288 Outcomes Measurement and Monitoring

Content Course (1 credit) to be approved by your adviser

ADMISSION

All applications for admission with requests for university-based financial aid, including scholarships and assistantships, must be submitted in a complete

form by February 15 for fall entry and October 15 for spring entry. For complete information on the application process, visit <http://ase.tufts.edu/bsot>.

ACCREDITATION AND CERTIFICATION

The Entry Level Masters Occupational Therapy Program is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA), located at 4720 Montgomery Lane, P.O. Box 31220, Bethesda, MD 20824-1220. AOTA's phone number is 301-652-AOTA. The Web site is <http://www.AOTA.org>. Graduates of the program will be able to sit for the national certification examination for occupational therapists administered by the National Board for Certification in Occupational Therapy (NBCOT). For information about the national certification examination, please contact NBCOT at 301-990-7979 or visit <http://www.nbcot.org>. After successful completion of this examination, the individual will be certified as an occupational therapist, registered (OTR). In addition, most states require licensure in order to practice.

POLICIES AND PROCEDURES

Exemption from Courses

A student may be exempt from a required occupational therapy course on satisfactory completion of an equivalent course in terms of content knowledge and experiential learning. The student must demonstrate proficiency in the area to the course instructor. Satisfactory completion of proficiency will be determined by the individual instructor. A petition for variance from department requirements must be completed.

Leave of Absence

To be granted a leave of absence, a student must petition in writing the departmental chair and the dean of the graduate school. The petition is then submitted to the Graduate School of Arts and Sciences executive committee. Each request is treated on its individual merit. The departmental policy states that no more than a one-year leave of absence may be granted from the academic portion of the program; it also states that each entry-level masters student must complete the six months Level II fieldwork required for the degree no later than twenty-four months following completion of academic preparation.

Acceptable Grades

Graduate students are expected to achieve a grade of B- or better in all courses. Courses completed with less than a B- may be retaken only once. The original grade earned remains on the student's academic record. If a student obtains two grades of less than B-, the student's record will be reviewed by the department. This will usually result in a recommendation to the dean that the student be administratively withdrawn from the program. Only the dean of the Graduate School of Arts and Sciences may administratively withdraw an enrolled student.

Grades of Incomplete

Students may not enter an occupational therapy course with an incomplete or an unsatisfactory grade in a prerequisite to that course. Grades of incomplete are not automatically given. The student who desires an extended time period in which to complete the semester's work in a particular course must negotiate an incomplete with the instructor. This negotiation must be completed by the final class meeting of the course. Normally course work must be completed six weeks into the following semester. It is the responsibility of the student to ensure that course work is completed and that the process to update the transcript is followed through to completion.

Students who, due to extenuating circumstances, are not able to comply with any of the above grade policies may petition the Department of Occupational Therapy Academic Standards Committee for a variance.

Withdrawals

A student is allowed no more than one withdrawal from any required or elective class after the add-drop period. Graduate students are not allowed to repeat the same course more than once. Withdrawal in any semester from two or more required courses after the add-drop period will normally result in a recommendation to the Dean of the Graduate School by the Academic Review Committee that the student be administratively withdrawn.

Required Occupational Therapy Courses

Students will take professional courses in accordance with the Standards of an Accredited Educational Program.

Fieldwork

The Accreditation Council for Occupational Therapy Education and the National Board for Certification in Occupational Therapy require the equivalent of six months of supervised fieldwork in a hospital, school, or health care agency as a prerequisite to taking the certification examination. Level II fieldwork must be completed within 24 months following completion of academic preparation. Placements for these internships are arranged for students by the department's academic fieldwork coordinator. These internships are also part of the degree requirements. In addition to these internships, students participate in approximately 100 hours of course-related fieldwork concurrent with specific courses. These are arranged by the fieldwork coordinator. Placements for Level I and II fieldwork are subject to availability at locations that have contracts with Tufts-BSOT. The availability of a placement and the locations that have contracts with Tufts-BSOT vary from semester to semester.

For more detailed information, please visit the Web site <http://ase.tufts.edu/bsot>.

Occupational Therapy Certificate Program

Faculty adviser: Professor Sharan Schwartzberg,
Occupational Therapy

Occupational therapists are confronted with administrative and supervisory responsibilities and the need for increased specialization. Areas of practice such as early intervention, home care for the elderly, and community services expect extraordinary growth. Legislation has also increased the need for occupational therapists experienced in treating children in a variety of settings including schools. To help occupational therapists meet these demands, Tufts Department of Occupational Therapy, in conjunction with the Office of Graduate Studies, offers part-time certificate programs. The certificate program gives students the option of focusing on three different subject areas: advanced professional study, school-based practice, and hand and upper extremity rehabilitation.

The certificate program is open to those with a bachelor's or master's degree in occupational therapy, the program is especially designed for:

Occupational therapists who are interested in expanding their careers

Fieldwork educators, administrators, clinical specialists, and supervisors

Seasoned professionals eager to strengthen their expertise

For more information and an application, contact the Office of Graduate Studies at 617-627-3395, or visit <http://gradstudy.tufts.edu/>.

Peace and Justice Studies

DIRECTOR:

Professor Paul Joseph, *Sociology*

ASSISTANT DIRECTOR:

Dale Bryan, *Peace and Justice Studies*

EXECUTIVE BOARD FACULTY:

Professor Paul Joseph, *Sociology*

Professor Susan Ostrander, *Sociology*

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Associate Professor Erin Kelly, *Philosophy*

Associate Professor Lionel McPherson, *Philosophy*

Assistant Professor David Arond, *Public Health
and Family Medicine*

Assistant Professor Gary McKissick, *Community Health*

Adjunct Associate Professor Robert Burdick, *Urban and
Environmental Policy and Planning*

Senior Lecturer Sinaia Nathanson, *Psychology*

Lecturer Steve Cohen, *Education*

Lecturer Linda Mizell, *Education*

Lecturer Matthew Gregory, *Sociology*

The Peace and Justice Studies program (PJS) provides an interdisciplinary structure for examining the obstacles, conditions, and paths to achieving a just global peace. The program brings intellectual and experiential inquiry to the fundamental interrelationship of peace and justice. Four overlapping areas are emphasized: first, study of the causes of war, the techniques of war prevention, and the conditions and structures of a just peace; second, the origins, strategies, and visions of social movements seeking social justice and ecological sustainability; third, the theory and practice of conflict resolution along a continuum from individual dis-

putes to international diplomacy; and fourth, the study of peace culture, particularly the contributions from education and literature in developing the traditions of nonviolence and ethical social behavior.

PJS nurtures an active sense of responsibility for the human condition and examines practical activities for achieving a nonviolent and peaceful future. The program encourages both experiential education, primarily through internship placements and community-service learning, and discussion of appropriate pedagogies designed to promote students' participation in their own education. The program also presents a broad range of educational events that help create an engaged intellectual climate on campus and increased social responsibility of its members. In this sense, PJS complements the university's mission and the liberal arts tradition by encouraging the student's awareness, responsibility, and active engagement in the affairs of the world. The program is administered by an executive board that includes faculty, students, and staff.

PJS offers both a major and a certificate. To fulfill the requirements for the major, a student must complete eleven courses: the introductory course (PJS 1), one intermediate course in each of five core areas, an internship (PJS 99), the integrative seminar (PJS 190), and three additional elective courses on a particular theme to be chosen in consultation with the student's adviser. Students with qualifying academic records are also encouraged to enroll in a senior honors thesis in Peace and Justice Studies (PJS 198).

To complete the certificate, a student must complete eight courses: the introductory course (PJS 1), an internship (PJS 99), the integrative seminar (PJS 190), one of two possible intermediate courses (PJS 120 or PJS 135), and four electives on a particular theme to be chosen in consultation with the student's adviser. Completion of the Peace and Justice Certificate will be noted on the student's transcript. Courses fulfilling certificate requirements may also be used, where applicable, to meet major concentration or distribution requirements.

For more detailed information, please visit the Web site <http://ase.tufts.edu/pjs> or the program office at 109 Eaton Hall.

Philosophy

Professor Mark Richard, *Chair; Philosophy of language, philosophy of linguistics, philosophical logic, metaphysics*

Professor Jody Azzouni, *Philosophy of language, philosophy of logic, philosophy of mathematics, philosophy of science*

Professor Daniel C. Dennett, *University Professor; Austin B. Fletcher Professor of Philosophy; Director, Center for Cognitive Studies; Philosophy of mind, philosophy of psychology*

Professor Ray Jackendoff, *Seth Merrin Professor; Codirector, Center for Cognitive Studies; linguistics, cognitive science*

Professor George E. Smith, *Acting Director of the Dibner Institute for the History of Science and Technology at MIT; Philosophy of science, logic*

Emeritus Professor Hugo A. Bedau, *Austin B. Fletcher Professor of Philosophy; Political and legal philosophy, ethics*

Associate Professor Nancy Bauer, *Feminism, modern European philosophy, philosophy and film*

Associate Professor Erin Kelly, *Moral philosophy, political philosophy*

Associate Professor Lionel McPherson, *Ethics, political and social philosophy*

Associate Professor Stephen L. White, *Philosophy of mind, ethics*

Assistant Professor Avner Baz, *Ethics, aesthetics, epistemology, Kant, Wittgenstein*

Assistant Professor Patrick Forber, *Philosophy of biology, philosophy of science, philosophy of probability*

Assistant Professor Kathrin Koslicki, *Metaphysics, philosophy of language, ancient philosophy*

Lecturer David Denby, *Metaphysics, philosophy of language, ethics*

Lecturer Susan Russinoff, *Director, Critical Thinking Program; Philosophy of language, logic, philosophy of logic, history of logic*

Philosophy courses are for students majoring in any field who wish to enrich their education with a deeper understanding of themselves, the world they experience, and the reality underlying this experience, by a study of speculative and critical traditions in Western thought. The philosophy major provides a means of integrating broad education in the liberal arts by systematic and historical study of problems that arise in metaphysics, ethics, and epistemology, as well as in the founda-

tions of other fields of inquiry. It is an appropriate major for those who enjoy thinking carefully and logically about basic issues and for those who seek breadth of educational experience prior to entering professional programs such as law or medicine or graduate study in some other areas. Nonmajors may engage in a philosophical study of problems and concepts from their own fields by taking the related advanced courses in philosophy, such as social philosophy, philosophy of science, philosophy of language, and philosophy of mind; or they can acquire an elementary knowledge of the field by taking a philosophy course numbered below the 100 level.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major: ten courses of which eight must be in the department, including Philosophy 1 and 33; one from among 120, 121, 131; and one seminar from among 187, 188, 191, 192, or, under appropriate circumstances, 291 or 292. (A minimum of four courses above the 100 level is required to be considered for magna or summa cum laude.) The remaining two courses must be approved, related courses in a single field, normally in a single department; additional philosophy courses may be substituted for one or both. Majors are also encouraged to take at least one course in the history of philosophy (in particular 151, 152, 161, 163, 164, 185, 187, 188).

CERTIFICATE PROGRAM IN ETHICS, LAW, AND SOCIETY

The goal of the certificate program in ethics, law, and society is to use philosophy to prepare students to be active citizens in leadership positions in government, non-governmental organizations, and the private sector. Students will learn about how moral and political philosophy relate to questions of public importance. The program focuses on how to use philosophy to think, argue, and write clearly and insightfully about these ethical questions.

Requirements for the certificate include six courses and an individual research project. The certificate program is in addition to a student's concentration (or major) and no more than half of the courses used to fulfill the certificate requirements may be used to fulfill concentration requirements.

The six courses required for the certificate are

as follows:

1. An introductory course (below 100 level) in philosophy
2. One or two upper-division courses (100 level or above) in ethical theory
3. One or two upper-division courses (100 level or above) in political philosophy or the philosophy of law
4. One or two courses in applied ethics (includes The Death Penalty; Introduction to Ethics; Justice, Equality, and Liberty; Feminist Philosophy; Bioethics; Racism and Social Inequality; Human Rights; Philosophy and Public Policy)
5. Seminar: Ethics, Law, and Society

The individual research project is initiated during the Ethics, Law, and Society seminar and extends six weeks into the spring semester.

UNDERGRADUATE MINOR PROGRAM

The Department of Philosophy offers a minor that requires the completion of six courses, including:

- a) one of Philosophy 1, 3, 6, 24, 33, 39, 43, or 48
- b) two philosophy courses at the 100 level
- c) three other philosophy courses

GRADUATE PROGRAM

The program leading to the master of arts degree in philosophy is intended primarily for the student who is considering advanced work in philosophy but who did not concentrate in philosophy as an undergraduate. Typically, students admitted to the program plan to pursue a doctorate in philosophy (Tufts itself does not offer a doctorate in the field) though some students have other career plans.

The department's offerings range across the major areas of interest in contemporary philosophy. Each year at least four seminars are offered, typically on instructors' current research interests. The department has particular strengths in the following areas: contemporary ethical theory, social and political philosophy, metaphysics and epistemology, philosophy of language and philosophical logic, philosophy of mind, and philosophy of science.

Master's candidates receive individual attention from members of the department in their specialized fields and have an opportunity to participate in the philosophical life of the department. The department has a lecture series, which brings six

to eight eminent speakers to Tufts each year, and it sponsors a departmental colloquium and a student colloquium. Students also have access to the very active philosophical community in the Boston area.

The program leading to the degree of master of arts in philosophy requires nine courses, except in cases where the logic course requirement is waived. The required courses are usually taken over three terms, and students who are not eligible for the waiver are urged to satisfy the logic requirement in their first term.

A prospective candidate must also pass a qualifying examination in four parts. The qualifying examination consists of four topical examinations, each three hours long. All exams include questions of a historical nature. Examination topics are as follows:

PART I

1. Epistemology
2. Ethics
3. Metaphysics

PART II

1. Philosophy of mind
2. Philosophy of language
3. Philosophy of science
4. Aesthetics
5. Social and political philosophy
6. Logic
7. Phenomenology and existentialism
8. Feminist philosophy
9. Philosophy of law*
10. A great philosopher**

*The faculty reserves the right to offer this examination only when, in its judgment, it is prepared to give it.

**The subject of this examination must be proposed by the student and approved by the department.

A prospective degree candidate must pass examinations on all three topics in Part I and one topic from Part II. Students are advised to take at least one exam by spring of their first year. A student can attempt to pass the same examination no more than three times.

A limited number of tuition scholarships are available. The department also offers opportunities for master's candidates to work as teaching assistants.

Applications to the program are due on January

15. A student wishing to start the program in January must submit an application by September 15. (Please note that students are admitted to the program midyear only in exceptional circumstances and only when space is available.) Applications must include, in addition to the standard GSAS form, GRE scores, a brief personal statement, a writing sample, and three recommendations.

UNDERGRADUATE COURSES

Not all courses are offered each year. Students should consult the philosophy departmental brochure, available during the preregistration period, or visit the Web site <http://www.ase.tufts.edu/philosophy>. Both describe in advance each semester's courses in fuller detail, usually including reading lists and some discussion of particular approaches and work loads.

Minor in Cognitive and Brain Science

The minor in Cognitive and Brain Sciences requires 7 courses. At least 5 of these must be in departments different from the student's major. The selection of courses must be approved by the student's advisor.

1. **PSY 9** Introduction to Cognitive and Brain Sciences
2. **PHIL 15** Introduction to Linguistics and/or **COMP 14** Computational Concepts in Biological and Cognitive Sciences
3. **PSY 195** Senior Seminar in Cognitive and Brain Sciences (full year, one course credit). Students minoring in Cognitive and Brain Sciences will be expected either to present a research paper or to participate as a Research Assistant in the presentation of research by a faculty member, a graduate student, or a senior.
4. The remainder of the 7 courses are to be selected from at least 2 of the following groups:

a. Psychology courses:

- PSY 11** Developmental Psychology
- PSY 25** Physiological Psychology or **PSY 103** Brain and Behavior
- PSY 26** Animal Learning and Cognition
- PSY 27** Perception
- PSY 28** Cognitive Psychology
- CD 51** Intellectual Development of Young Children
- PSY 129** Cognitive Neuroscience
- PSY 124** Cognitive Neuroscience of Perception
- PSY 148** Cognitive Neuroscience of Learning and Memory

- PSY 126** Origins of Cognition
PSY 140 Mathematical Psychology
PSY 144 Memory and Retention
PSY 146 Comparative Cognition and Behavior
PSY 139 Social Cognition
PSY 142 Seminar in Affective Neuroscience
PSY 154 Psychosis

b. Philosophy, linguistics and psycholinguistics courses

- PHIL 3** Language and Mind
PHIL 33 Logic
PHIL 38 Rational Choice
PHIL 103 Logic
PHIL 111 Semantics
PHIL 112 Syntactic Theory
PHIL 113/PSYC 132 Cognition of Society and Culture
PHIL 114 Topics in Logic
PHIL 117 Philosophy of Mind
PHIL 126 Theories of Human Nature
PHIL 133 Philosophy of Language
PHIL 134 Philosophy of Social Science
PHIL 186 Phenomenology and Existentialism
PSYC 149 Psychology of Language
CD 155 The Young Child's Development of Language
CD 195 Developmental Disorders in Language and Reading
ED/ML/GER 114 Linguistic Approaches to Second Language Acquisition

c. Computer Science courses

- COMP 80** Programming Languages
COMP 131 Artificial Intelligence
COMP 135 Machine Learning and Data Mining
COMP 150 Computational Learning Theory
COMP/PHIL 170 Computation Theory
COMP 171 Human Computer Interaction

Other courses may be admitted for the minor with the approval of the student's advisor and advisor notification of DARS coordinator at Student Services.

For more detailed information, please visit the Web site <http://www.ase.tufts.edu/philosophy>.

Physical Education/ Athletics

William Gehling, *Director of athletics*
Branwen Smith-King, *Assistant athletic director; physical education coordinator*
John Casey, *Assistant athletic director*
Rick Miller, *Facilities coordinator*
Paul Sweeney, *Sports information coordinator*
Michael Pimentel, *Fitness center coordinator*

COACH/LECTURERS:

Ethan Barron, *Men's track*
Kate Bayard, *Women's tennis and squash*
Carla Berube, *Women's basketball*
Nancy Bigelow, *Women's swimming*
Gary Caldwell, *Crew*
John Casey, *Baseball, football*
Michael Daly, *Men's lacrosse*
Doug Eng, *Men's tennis and squash*
Ralph Ferrigno, *Men's soccer*
Adam Hoyt, *Men's swimming*
Ken Legler, *Sailing*
Christina McDavitt, *Field hockey*
Cheryl Milligan, *Softball*
Kristen Morwick, *Women's track*
Brian Murphy, *Hockey*
Carol Rappoli, *Women's lacrosse*
Jason Sachs, *Women's fencing*
Bill Samko, *Football, baseball*
Robert Sheldon, *Men's basketball, golf*
Cora Thompson, *Women's volleyball*
John Walsh, *Assistant Football*
Martha Whiting, *Women's soccer*

TRAINER/LECTURERS:

Anita Chase, *Sports medicine*
Patricia Cordeiro, *Sports medicine*
Mark Doughtie, *Sports medicine*
Nicholas Mitropoulos, *Sports medicine*
Michael Pimentel, *Sports medicine, outdoor education*
Janet Silva, *Sports medicine*

Within the liberal arts framework at Tufts University, the physical education program offers students instruction in individual, dual, and group activities that promote lifelong fitness and enjoyment. Courses in aquatics, racquet sports, fencing, aerobics, physical fitness, and outdoor education are some examples of the diverse offerings of the department. Approximately fifty courses are

scheduled each academic year, and most courses are offered fall and spring semesters. Every effort is made to maintain limited enrollment in all courses, to provide each student with maximum personal attention from the instructors.

One-half academic credit is granted for courses that are skill-oriented, and a total of two such credits may be applied toward the total for the degree. Introductory level courses are offered on a pass-fail basis. Theory classes of one course credit are applicable toward the degree. No advanced placement or retroactive credit will be given for any physical education courses.

Athletics has been an important part of life at Tufts throughout its history. The athletic program provides students the opportunity to compete in both intercollegiate and intramural sports, and also to engage in general recreation. Tufts fields seventeen varsity teams for men and women, supports eight club sports organizations, and offers several intramural sports programs.

For more detailed information, please visit the Web site <http://ase.tufts.edu/physed/>.

Physics and Astronomy

(FOR ASTRONOMY DEGREE REQUIREMENTS, SEE ASTRONOMY.)

Professor William Oliver, *Chair; Experimental high-energy physics*

Professor Peggy Cebe, *Experimental condensed matter polymer physics*

Professor Lawrence H. Ford, *Cosmology, general relativity, astrophysics*

Professor Gary R. Goldstein, *Theoretical high-energy physics*

Professor Robert P. Guertin, *Experimental condensed-matter physics*

Professor Leon Gunther, *Theory of condensed matter*

Professor Kenneth R. Lang, *Astronomy*

Adjunct Professor George Leger, *Topology, gauge theories*

Professor W. Anthony Mann, *Experimental high-energy physics*

Professor Austin Napier, *Experimental high-energy physics*

Professor Jacob Schneps, *Vannevar Bush Chair; Experimental high-energy physics*

Professor Krzysztof Sliwa, *Experimental high-energy physics*

Professor Roger Tobin, *Experimental condensed-matter physics*

Professor Alexander Vilenkin, *Cosmology, general relativity, astrophysics*

Adjunct Associate Professor Fiorenzo Omenetto, *Optical physics*

Assistant Professor José Blanco-Pillado, *String theory cosmology, topological defects*

Assistant Professor Hugh Gallagher, *Experimental high-energy physics*

Assistant Professor Marianne Vestergaard, *Astronomy*

Research Professor Tomas Kafka, *Experimental high-energy physics*

Research Associate Professor Robert F. Willson, *Astronomy*

The laws of physics are few in number yet appear to govern all known material phenomena: physical, chemical, and biological. The science of physics involves the observation of natural processes and the formulation from these observations of general principles that may be tested further or exploited for useful ends. Majoring in physics can be a valuable part of a broad education. Students who combine mastery of the basic laws of physics with the outlook and flexibility of a liberal education will be well prepared to take on a variety of specialized roles. Men and women who majored in physics in the recent past have successfully entered careers in physics, as well as in business administration, the computer industry, law, medicine, dentistry, meteorology, public health, and teaching.

UNDERGRADUATE CONCENTRATION REQUIREMENTS— COLLEGE OF LIBERAL ARTS

Major in Physics

Eight courses in physics more advanced than Physics 2 or 12 and including Physics 13 and 64; two courses in mathematics more advanced than Mathematics 13 and 18. With the exception of Physics 13 and 64, two of the physics courses and one mathematics course may be replaced by approved advanced courses in related fields (such as astronomy, biology, chemistry, computer science, engineering, or mathematics). The ten courses required for the major must include two courses in advanced laboratory training. One of these courses must be Physics 64; the other may be Physics 31 or 41.

Major in Applied Physics

Five courses in physics more advanced than Physics 2 or 12, including Physics 13 and 64; two courses in mathematics more advanced than Mathematics 13 and 18; three courses from the concentration requirements of one of the engineering departments. With the exception of Physics 13 and 64, one of the five physics courses may be replaced by an approved course in a related field.

Major in Chemical Physics

Four courses in physics more advanced than Physics 2 or 12, including Physics 13; two courses in mathematics more advanced than Mathematics 13 and 18; four courses in chemistry more advanced than Chemistry 2 and 12 and 16. The ten courses required for the major must include one course in advanced laboratory training, either Physics 64 or Chemistry 33 and 34. One mathematics course may be replaced by approved advanced course in a related field. Faculty advisers in the chemistry and physics departments are available for consultation on the chemical physics program.

Major in Astrophysics

Four courses in physics more advanced than Physics 2 or 12, including Physics 13 and either Physics 31 or 64; two courses in mathematics more advanced than Mathematics 13 and 18; four courses in astronomy more advanced than Astronomy 9 and 10. One mathematics course, and either one physics course or one astronomy course, may be replaced by an approved advanced course in a related field. Research experience is strongly recommended.

Note to Premedical, Predental, Preveterinary Students

Students interested in entering medical, dental, or veterinary school after graduation may take advantage of the following replacement option to complete the corresponding entrance requirements as part of the physics major. With the exception of Physics 13 and 64, two of the physics courses and one mathematics course may be replaced by Chemistry 51 and 53 and 52 and 54, and one other advanced elective. Chemistry 53 and 54 will also fulfill one term of the advanced laboratory training requirement for the physics major.

UNDERGRADUATE

CONCENTRATION REQUIREMENTS—
SCHOOL OF ENGINEERING**Bachelor of Science in Engineering Physics**

A minimum of 38 credits is required: Introductory (10 credits), humanities/arts/social science (6 credits), free elective (2 credits) requirements of the School of Engineering; a foundation requirement (8 credits); and a physics/engineering concentration requirement (12 credits). The introductory requirement includes Physics 12.

The foundation requirement comprises Physics 13, Physics 32, Physics 52, Physics 41 (or ES 3 and ES 4); two courses from Engineering Science 3, 4, 5, 8, or 9; plus two other courses satisfying the foundation requirements of the School of Engineering.

Concentration requirement: four courses in physics and astronomy at the intermediate or advanced levels, which must include Physics 64; four courses from the concentration requirements of one of the engineering departments; four approved elective courses in computer science, engineering, mathematics, or science.

UNDERGRADUATE MINOR PROGRAM

The program requires the completion of five courses.

Physics Minor

The student takes Physics 11 and 12 (or 1 and 2), and Physics 13, and any two courses from the following: Physics 31, 32, 41, 42, 43, 52, 61, 62, and 64. For example, one possible minor, which emphasizes classical physics, would be Physics 11, 12, 13, 32, and 52. Another, which emphasizes quantum physics, would be Physics 11, 12, 13, 31, and 61.

Astrophysics Minor

The student takes Physics 11 and 12 (or 1 and 2) and any three courses from the following: Astronomy 21, 22, 101, 111, and 112.

GRADUATE PROGRAM

The Department of Physics and Astronomy grants two degrees: the doctor of philosophy and the master of science. The department has established qualifications to ensure that degree candidates have a broad background in experimental and theoretical physics. A faculty advisory committee is appointed for each student to supervise the program of study leading to the degree.

Master of Science

The master of science degree requires eight graduate-level courses in physics or related fields, the latter to be subject to approval by the advisory committee. These courses must include Physics 131, 145, 146, 163, and 164, and must be completed with a grade of B- or better. The student has the option of writing and defending a master's thesis, which may count as the equivalent of up to three courses.

Doctor of Philosophy

The doctoral candidate must demonstrate proficiency in the basic fields of classical physics (classical mechanics and classical electromagnetic theory) and quantum physics (quantum mechanics and statistical mechanics). Proficiency is demonstrated by earning an average of A- or better in the basic graduate courses (131, 145, 146, 153, 163, and 164), or by passing special examinations in the areas covered by these courses. Graduate courses taken at other institutions may in some cases be used to fulfill part of this requirement. The doctoral candidate is also required to complete with a grade of B- or better two courses, one each in any two of four specialized fields: condensed matter physics (173 or 174), particle physics (183 or 184), general relativity and cosmology (167 or 268), and advanced quantum mechanics (263).

Generally, in the second year the candidate chooses a field of specialization from the areas of research within the department and selects a research adviser. After completing the required course work, the candidate takes an oral examination in this specialized field. Satisfactory performance on the oral examination qualifies the candidate to undertake a program of independent research under the guidance of the research adviser, culminating in the preparation and defense of a doctoral dissertation.

The current areas of research in the department are astronomy and astrophysics, biophysics, condensed-matter physics, cosmology and general relativity, and high-energy physics.

For more detailed information, please visit the Web site <http://ase.tufts.edu/physics/>.

Political Science

Professor Robert Devigne, *Chair; Political theory*

Professor Jeffrey M. Berry, *John Richard Skuse, Class of 1941, Professor of Political Science; American politics, political behavior*

Professor James M. Glaser, *American politics, political behavior*

Professor Kent E. Portney, *Quantitative methods, public policy, political behavior*

Professor Tony Smith, *Cornelia M. Jackson Professor of Political Science; International relations, comparative politics*

Professor Vickie Sullivan, *Political theory*

Associate Professor Consuelo Cruz, *Comparative politics, Latin America*

Associate Professor Richard C. Eichenberg, *International relations, foreign policy, West Europe*

Associate Professor Marilyn T. Glater, *Constitutional law*

Associate Professor Malik Mufti, *International relations, Middle East*

Associate Professor Elizabeth Remick, *Comparative politics, East Asia*

Associate Professor Pearl T. Robinson, *Comparative politics, Africa, African-American politics*

Associate Professor Jeffrey W. Taliaferro, *International relations, security studies*

Assistant Professor David Art, *Comparative politics, political economy, international relations*

Assistant Professor Ioannis Evrigenis, *Political theory*

Assistant Professor Vincent Phillip Muñoz, *Constitutional law, political theory*

Assistant Professor Deborah J. Schildkraut, *American politics, political psychology, political behavior*

The Department of Political Science is concerned with the functions and theory of the structure and operation of government, and the nature and development of local, national, and international politics. The goals of the department are both intellectual and practical. Courses are designed to develop an understanding of the political process, and an ability to critically analyze political systems, relationships, and problems. Courses are also intended to provide a basis for intelligent citizenship, increase capacity for community service, and orient the student toward possible employment in governmental agencies on the local, state, national, or international level. The undergraduate curriculum is structured to recognize that majors in political science will have a diversity of post-college goals. The department's offerings may be regarded as a foundation for grad-

uate study preparatory to college teaching, professional government service, the law, and city and environmental planning, as well as for careers in such fields as public and business administration, journalism, secondary school teaching, nonprofit work, and social action.

**UNDERGRADUATE
CONCENTRATION REQUIREMENTS**

Major: Ten courses overall. Two political science foundation courses; eight additional political science courses. Students are required to take at least one course in each of four subfields: American government and politics (or American public policy), comparative government and politics, international relations, and political thought. Students majoring in political science must take seven political science courses at Tufts' Medford/Somerville campus. Internships and directed research courses will not fulfill a subfield requirement.

All majors must also take at least one course designated as methodologically focused. These courses incorporate material that helps students to understand the logic of social science inquiry. Because these courses will improve students' comprehension of how social science research is conducted, they are advised to fulfill this requirement early in their course of study, preferably in the sophomore year. Courses that meet this requirement are:

- Political Science 70** Acquiring Political Knowledge
 - Political Science 73** Globalization and National Politics
 - Political Science 74** Political Economy of Latin America
 - Political Science 75** Politics in the City
 - Political Science 76** Race and Class in American Politics
 - Political Science 103** Political Science Research Methods
 - Political Science 111** Political Psychology
 - Political Science 113** Nonprofits and Civil Society
 - Political Science 115** Public Opinion and Survey Research
 - Political Science 117** Politics in the American South
 - Political Science 124** Comparative Political Economy of Advanced Industrial Democracies
 - Political Science 135** Comparative Revolutions
 - Political Science 142** Interest Groups and Democratic Theory
 - Political Science 160** Force, Strategy, and Arms Control
 - Political Science 174** The Rise and Fall of Great Powers
 - Political Science 181** Public Opinion and Foreign Policy
 - Political Science 184** Analysis of International Conflict
 - Political Science 195** Politics of Sustainable Communities
- Each year, other courses will be designated as

methodologically focused and these additional options will also fulfill the requirement. Please consult the course listings published by the department prior to preregistration for a complete listing of all methodologically focused courses.

Majors are also required to take one upper-level seminar in political science at Tufts' Medford/Somerville campus. Sophomore seminars do not fulfill this requirement. Majors are expected to complete their basic courses and declare their major by the end of the sophomore year. A grade of C- or better is required for a course to count toward the major. The department publishes an Undergraduate Handbook detailing requirements, programs, and additional information about the major. The handbook can also be found on the department's Web site. New majors should familiarize themselves with this material.

UNDERGRADUATE MINOR PROGRAM

Students interested in completing a minor concentration in political science may choose from seven different options: Law and Society, Political Economy, Political Science (general), Comparative Politics, American Politics, Foreign Policy Analysis, and Political Thought.

All of these minors require five courses in political science. Each of them, however, has separate requirements and a different list of courses. No student may take two minors. A detailed listing of these requirements is contained in the Undergraduate Handbook or in a separate document, Departmental Minors, both available from the Department of Political Science in Eaton Hall.

TUFTS-IN-WASHINGTON PROGRAM

The Tufts-in-Washington program offers students an opportunity for intensive firsthand study of government and politics during a semester's residence in Washington, D.C. Undergraduates who are accepted to the program may elect either American national government, foreign policy, or economic policy as their field of concentration. Students are registered at Tufts and pay its tuition directly to Tufts, but are housed at American University in Washington, D.C., and pay American University for housing and other charges.

The Tufts-in-Washington program is administered by the Department of Political Science, but it is open to all Tufts undergraduates. A prerequisite for admission is a background in political science

and other social science courses relevant to the student's plan of study in Washington.

Central to the curriculum during the Washington semester is a series of seminars with various Washington political elites and policy activists. Students also do individual research projects and participate as interns in the government or in the private sector. The Tufts-in-Washington seminars do not fulfill the upper-level seminar requirement for the political science major, which must be taken at the Tufts' Medford/Somerville campus.

Interested students may contact Professor Phillip Muñoz at 617-627-3465.

For more detailed information, please visit the Web site <http://ase.tufts.edu/polsci>.

Program Evaluation

FACULTY ADVISER:

Associate Professor Francine Jacobs, *Child Development/Urban and Environmental Policy and Planning*

In the government and nonprofit sectors, significant resources are devoted to programs that address compelling social needs. Evaluation of these programs can help them to grow and improve their operations. Yet agencies often resist evaluation because it is seen as politically risky or technically intimidating.

Private funders and public agencies are increasingly demanding evaluation as a provision for funding. Individuals with evaluation training are needed to assist programs, sponsoring agencies, and funders in planning and carrying out evaluations to address their needs for information and analysis.

The certificate in program evaluation is designed for midcareer professionals who wish to learn about the design and implementation of effective evaluation strategies. Students learn practical skills that can be put to use in the evaluation of a wide range of social service, public health, community development, and environmental programs. Four courses and an applied practicum are required for the certificate. The certificate is offered in collaboration with the Departments of Child Development, and Urban and Environmental Policy and Planning in the School of Arts, Sciences, and Engineering, the Friedman School of Nutrition Science and Policy, the School of Medicine, and the Office of Graduate Studies.

The program is open to individuals with a bachelor's degree and three to five years of professional experience in a particular field. The program is particularly appropriate for agency directors and administrators, program managers and staff, foundation project officers, policy analysts, community organizers and advocates, human resources professionals, and educators.

For more information and/or an application, contact the Office of Graduate Studies at 617-627-3395 or visit the Web site <http://gradstudy.tufts.edu/>.

Psychology

Professor Robert Cook, *Chair; Animal cognition*

Professor Nalini Ambady, *Social cognition*

Professor Jamshed Bharucha, *Cognitive psychology of music*

Professor Emily W. Bushnell, *Developmental psychology*

Professor Richard A. Chechile, *Cognition, statistics*

Professor Joseph F. DeBold, *Endocrinology and behavior*

Professor David Harder, *Clinical psychology*

Professor Phillip J. Holcomb, *Neuropsychology*

Professor Ray Jackendoff, *Linguistics, Psychology of language*

Professor Robin Kanarek, *John Wade Professor; Physiological psychology*

Professor Klaus A. Miczek, *Moses Hunt Professor of Psychology; Psychopharmacology*

Professor Robert J. Sternberg, *Intelligence, wisdom, love and hate*

Professor Holly A. Taylor, *Cognition*

Associate Professor Gina Kuperberg, *Clinical psychology*

Associate Professor Keith B. Maddox, *Social cognition*

Associate Professor Lisa M. Shin, *Clinical psychology*

Assistant Professor Ariel Goldberg, *Cognition and language*

Assistant Professor Haline E. Schendan, *Cognitive neuroscience*

Assistant Professor Samuel R. Sommers, *Social psychology*

Assistant Professor Ayanna K. Thomas, *Cognition and aging*

Assistant Professor Heather L. Urry, *Affective neuroscience*

Assistant Professor (part-time) Harold Miller-Jacobs,
Industrial and organizational psychology

Senior Lecturer Sinaia Nathanson, *Social psychology*

Research Associate Ray Nickerson, *Applied cognition*

PART-TIME LECTURERS:

Lecturer Carolyn Cohen, *Psychopharmacology*

Lecturer Jack Fultz, *Sports psychology*

Lecturer Robert Jampel, *Clinical psychology*

Lecturer Mitchel Rose, *Clinical psychology*

Psychology concerns the processes and principles of behavior. Increased understanding of oneself and others through the study of psychology is useful in almost any endeavor. The undergraduate psychology curriculum is diverse in order to reflect the breadth of the field, from the biological bases to the social determinants of behavior. Students gain general familiarity with psychology, and have the option to emphasize specific areas in the field. Courses are geared toward the development of evaluative and analytic skills, which are indispensable to advanced study in experimental, clinical, and applied psychology. These skills, together with knowledge of the factors influencing individual and group behavior, are highly valuable for careers in such fields as public health, engineering, medicine, business, administration, law, and education.

**PSYCHOLOGY COURSES
AS DISTRIBUTION REQUIREMENTS**

Students may take Psychology 25, 26, 27, 29, 32, 40, 41, 45, 46, 48, 49, 103, 104, 112, 123, 124, 127, 128, 129, 146, or 148 toward fulfilling the natural science distribution requirements. Psychology 31, 107, 108, or 140 may be taken by majors or nonmajors toward the mathematical sciences distribution requirement. All other psychology courses may be taken toward fulfilling the social science distribution requirement. Psychology majors will normally meet the social science distribution requirement by virtue of courses they take in psychology.

**UNDERGRADUATE
CONCENTRATION REQUIREMENTS**

Major in Psychology

Eleven courses distributed as follows: Psychology 1; one course from among Psychology 11, 12, 13, 14, 15, 17, and 18; one course from among Psychology 25, 26, 27, 28, and 29; Psychology 31 and 32; one course from among Psychology 36, 37, 38, 40, 41, 46, 48, and 49 (these advanced lab courses have spe-

cific prerequisites); two other psychology courses numbered above 100; one other course offered by the psychology department; two approved advanced courses in related fields.

Courses taken to fulfill the psychology major (including related-field requirements) normally may not be taken pass-fail. No more than two independent study courses (Psychology 91 and 92, 97 and 99, 191, and 192, 197, 198 and 199) may be counted toward the concentration requirement. Successful completion of a Senior Honors Thesis chaired by a member of the department (PSY 199) may substitute for the advanced lab requirement. No more than one course taken to fulfill the 100-level requirement may be an independent study course. Biopsychology, Clinical Psychology, Cognitive & Brain Science, and Engineering Psychology majors may not double major in General Psychology or any of the other psychology majors.

Students with a score of 4 or 5 on the AP in psychology should not take Psychology 1. An AP score of 5 completely substitutes for this requirement within the major, meaning that a student needs only 10 courses to complete the major. An AP score of 4 places a student into two-digit psychology courses but the student will need to take an additional psychology course for the major in lieu of Psychology 1. Successful completion of Child Development 1 is treated in the same manner as an AP score of 4: students may substitute CD 1 for PSY 1 for prerequisite purposes, but they must take an additional psychology course in order to reach the 11 courses required for the major

Psychology 32 and the advanced lab requirements need to be completed at Tufts. Double majors in Psychology and Mathematics can take Math 162 instead of Psychology 31. Students who are double majoring in Psychology and Economics can use Econ 13 as a substitute for Psychology 31. Biopsychology majors may use either BIO 132 or PSY 31 to fulfill their statistics requirement.

In recommending students for honors, in addition to the general college requirements, the psychology department does not normally recommend students for highest honors unless they have done empirical research.

Major in Psychology/Clinical

This major is intended for students interested in entering graduate or professional schools in mental health or human services and/or working with psy-

chiatric patients. Required courses are Psychology 1, 12, 31, 38, 71, 106, 181, and 182; two electives in psychology, one of which must be at the 100 level; and two approved advanced courses in related fields. Students planning to continue in clinical work will profit from electing a course in physiological psychology.

Major in Biopsychology

The interdepartmental major for students particularly interested in neurobiology and behavior requires five courses in biology and five in psychology. These include the following: Cells and Organisms (Biology 13), General Genetics (Biology 41), Animal Behavior (Biology 130), one course in animal physiology (chosen from among Biology 75, 115, 116, 134) and an elective in biology; Statistics (Psychology 31 or Biology 132), Experimental Psychology (Psychology 32), Brain and Behavior (Psychology 103), plus two electives from among Psychology 26, 27, 29, 40, 41, 46, 48, 49, 104, 112, 123, 127, 128, 129, 146 and 154. Additional courses may be added to this list at the discretion of the chair. Biopsychology majors may not also double major in psychology or biology. Majors are encouraged to elect an advanced laboratory course in either department. Independent research is strongly encouraged, but is not counted toward this major. Consult the departments of either biology or psychology for details about this major.

Major in Cognitive and Brain Psychology

The central issue in cognitive science is how the mind works. The central conception in the field is of the brain as a biological information-processing device. Cognitive and Brain Science is an inherently interdisciplinary area, drawing on psychology, neuroscience, linguistics, philosophy of the mind, computer science, and biology. A Cognitive and Brain Science major provides an excellent preparation for careers in the sciences, computer fields, health professions, law, and education.

Students are required to take a core of courses in psychology, a basic range of courses in the other constituent disciplines, and a series of upper-level courses in which they can specialize in one or more constituent fields. Advanced students may choose to continue to be broadly interdisciplinary, or they may choose primarily to “track” within a single discipline such as psychology, philosophy, linguistics or computer science. The program is completed with a required research experience accompanied

by a senior seminar, in which students discuss current literature, the research of graduate students at Tufts, and their own research. Majors are also strongly encouraged to audit at least one semester of the senior seminar in their sophomore or junior years.

Students select their program in consultation with their advisors. Students who wish to modify the requirements below must have the approval of their advisors and the Cognitive and Brain Science Steering Committee.

This major requires 13 courses, research, Senior Seminar in Cognitive and Brain Science.

A, 6 required courses

1. **PSY 29** Intro to Cognitive and Brain Science
2. **PSY 31** Statistics (or CD140)
3. **PSY 32** Experimental Psychology
4. **PHIL 15/PSY 64** Introduction to Linguistics
5. **COMP 11** Introduction to Computer Science (or AP credit)
6. **COMP 14** Computational Concepts in Biological and Cognitive Sciences

B, 3 intermediate courses, one from each of the following groups:

1. **PSY 11** Developmental Psychology
PSY 25 (or 103) Physiological Psychology
PSY 26 Animal Learning and Cognition
PSY 27 Perception
PSY 28 Cognitive Psychology
CD 51 Intellectual Development in Young Children
2. **COMP 131** Artificial Intelligence
3. **PHIL 3** Language and Mind
PHIL 33 Logic
PHIL/PSY 151 Syntactic Theory
PHIL/PSY 150 Semantics

C. 4 advanced courses, drawn from at least two of the following groups

1. **PSY 129** Cognitive Neuroscience
PSY 124 Cognitive Neuroscience of Perception
PSY 148 Cognitive Neuroscience of Learning and Memory
PSY 112 Biological Basis of Psychopathology
PSY 127 Behavioral Endocrinology
PSY 123 Psychopharmacology
PSY 126 Origins of Cognition
PSY 140 Mathematical Psychology
PSY 144 Memory and Retention
PSY 146 Comparative Cognition and Behavior
PSY 139 Social Cognition

- PSY 142** Seminar in Affective Neuroscience
- PSY 154** Psychosis
- 2. **PSY 149** Psychology of Language
- CD 155** The Young Child's Development of Language
- CD 195** Developmental Disorders in Language and Reading
- CD 243** Reading, Dyslexia and the Brain
- 3. **COMP 80** Programming Languages
- COMP 135** Machine Learning and Data Mining
- COMP 150** Computational Learning Theory
- COMP 171** Human-Computer Interaction
- COMP 170/PHIL 170** Computation Theory
- 4. **PHIL 117** Philosophy of Mind
- PHIL 126** Theories of Human Nature
- PHIL 133** Philosophy of Language
- PHIL 134** Philosophy of Social Science
- PHIL/PSY/ANTH 132** Cognition of Society and Culture

D. Advanced research experience. 2 options, both of which involve enrolling in Senior Seminar in Cognitive and Brain Science (PSY 195), a one hour weekly, year-long meeting of all seniors in this major worth 1 course for the entire year:

1. Senior honors thesis in psychology, child development, computer science or philosophy.
2. A year-long research experience working with a faculty member from either psychology, philosophy, child development, computer science, or the neuroscience department at the medical school. Students pursuing this route will be required to complete a final write-up of their research which they must present during senior seminar.

Students considering the Cognitive and Brain Science major will be encouraged to audit the senior seminar during one semester of their sophomore year.

E. Electives. Students are encouraged, after consultation with their advisor, to augment the Cognitive and Brain Science major by taking electives drawn from the following list:

- Anthropology (ANTH 150 Human Evolution)
- Biology (Bio 13, 14, Bio 116 General Physiology, Bio 134 Neurobiology)
- Math (Math 11, 12 & 13, Math 150 Mathematical Neuroscience)
- Psychology (all courses, especially: PSY 37, 40, 41, 46, 48, 49, Psy107/108)

Students majoring in Cognitive and Brain Science

cannot double major in any other Psychology major.

MAJOR IN ENGINEERING PSYCHOLOGY

An interdisciplinary program, more commonly called human factors, is offered jointly by the departments of mechanical engineering and psychology. (See Engineering Psychology for program description and course listings.)

GRADUATE PROGRAM

The Department of Psychology offers both a master's degree and a doctor of philosophy degree in general experimental psychology. Students having a baccalaureate degree may apply for either the master's degree program or the doctoral program, although priority is given to those planning to pursue the doctorate. Students having a master's degree in psychology may apply for the doctoral program directly if their master's degree included an empirical thesis.

To be considered for graduate work in psychology, a student must have a bachelor of arts or bachelor of science degree from an accredited college or university. Most students will have majored in psychology, but this is not a requirement. The student must, however, have had at least a one-semester course in statistics and at least six semester hours of experimental psychology or comparable research experience.

Graduate students are expected to develop overall breadth in psychology, as well as an emphasis in a specialty area. Emphasis areas within the department include social psychology; cognitive psychology; developmental psychology; physiological psychology and psychopharmacology; experimental psychopathology; and cognitive neuroscience.

Considerable emphasis is placed on the student's ability to undertake research. These skills are demonstrated in connection with course work, independent research, and by the thesis and/or dissertation.

All graduate students are expected to participate in supervised research or teaching activities each semester.

General Program Requirements

The program is based around five major annual milestones:

- Year 1: A first-year research project
- Year 2: Completion of the master's thesis

Year 3: Third-year comprehensive paper/exam
Year 4: Fourth-year writing requirement
Year 5: Completion of the doctoral dissertation

There is no formal language requirement for either the master of science degree or the doctoral degree.

Master of Science

The requirements for the master of science degree include ten credits (eight course credits and two research credits) distributed as follows: completion of the graduate sequence in statistics (Psychology 107 and 108), two area core courses, two upper-level psychology courses or seminars (100 level or higher), one independent reading/research course or other course credit, one professional preparation course, and successful completion of the first-year project (one credit) and the master's thesis (one credit).

No more than two graduate-level courses, which have not been used to count toward another graduate degree, may be transferred from another institution toward the Tufts program.

The master's thesis must be an empirical research study in psychology, which will be presented in written form and on which the candidate must take an oral comprehensive examination.

A student who is able to devote full time to the graduate program may register for four courses a term and earn the master's degree in one year. Students holding Tufts' teaching and research assistantships are advised to register for five courses per year and should plan to spend more than one year in completing the degree. Only under exceptional circumstances should it require more than two years for completion. The department does not encourage part-time participation in the program.

Doctor of Philosophy

The doctoral degree requires thirteen credits (eight course credits and five research credits) beyond those required for the master's degree. These must include:

One additional core course, two 200-level seminars outside one's major area, one additional professional preparation course, four independent reading/research courses or other course credit, a third-year comprehensive paper/exam (one credit), a fourth-year publication requirement (one credit).

The doctoral candidate must submit a dissertation on his or her original empirical research and

must take an oral examination in support of the dissertation. Upon successful completion of the dissertation and the examination, the candidate will be awarded five course credits.

In general, the student's program of study is worked out with a faculty adviser, taking into account the student's interests and background.

For more detailed information, please visit the Web site <http://ase.tufts.edu/psychology>.

Quantitative Economics

(FOR DEGREE REQUIREMENTS, SEE ECONOMICS.)

Religion

Associate Professor Joseph Walsler, *Chair; Asian religions*

Assistant Professor Heather Curtis, *History of Christianity, American Religions*

Assistant Professor Kenneth Garden, *Islamic Revival and Renewal, Sufism*

Emeritus Professor Howard E. Hunter, *Religion and culture*

Adjunct Associate Professor Gary Leupp, *Japanese history and Japanese Buddhist studies*

Senior Lecturer Peggy Hutaff, *Biblical Studies and Feminist Theologies*

Senior Lecturer Elizabeth Lemons, *Religion and culture*

Senior Lecturer David O'Leary, *Catholicism, Religion & Medical Ethics*

The Department of Religion concerns the various expressions of religion encountered in human experience. The student may investigate the field of religion in both its functional and theoretical aspects. Courses are designed to give a broad cultural appreciation of the subject in accordance with the principles of a liberal arts education.

A graduate degree in religion is not offered. Religion 106, 191, 192, and 194, however, are often taken in conjunction with other programs.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Religion

Ten courses are required for the major in religion. These courses are to be distributed as follows:
a. Religion 99 (Theory and Method in Study of

Religion).

b. Diversity requirement (four courses): Students should have exposure to at least four different religious traditions. This may be accomplished through classes in which four different traditions are taught, or through four courses, each focused on a different religious tradition, or through some combination thereof. Students are to take four classes within the department to achieve the diversity requirement. The adviser and the chair of the Department of Religion must approve the courses taken to fulfill this requirement.

c. Depth requirement (three courses): Students must choose a subfield in religious studies. This may be one religious tradition, the traditions of a geographical region, or a religious textual tradition. Students must demonstrate that they have taken at least three classes in that specialty. One of the three courses must be in the doctrinal (theological and philosophical) aspects of religion. In their chosen areas of specialization, students must take two above-100 level courses. These may include an independent study or a senior thesis. The departmental adviser and the chair must approve the student's area of specialization. No course may count for both the diversity and depth requirements.

d. In addition to the above eight courses, two additional courses listed or cross-listed in religion, regardless of subject area, are required.

UNDERGRADUATE MINOR PROGRAM

Minor in Religion

Five courses, distributed as follows, are required.

a. Religion 99 (Theory and Method in Study of Religion).

b. Students should have exposure to at least three different religions traditions. This may be accomplished through classes in which three different traditions are taught, or through three courses, each focused on a different religious tradition, or through some combination thereof. The adviser and the chair of the Department of Religion must approve the courses taken to fulfill this requirement.

c. One other course numbered above 100. This course may not be counted as one of the three courses of the above requirement.

For more detailed information, please visit the Web site <http://ase.tufts.edu/religion/>.

Romance Languages

Professor José Antonio Mazzotti, *Chair; Latin American literature*

Professor Juan M. Alonso, *Nineteenth- and twentieth-century literature of Spain, Spanish American literature*

Professor Gérard Gasarian, *Nineteenth- and twentieth-century French poetry*

Professor Eglal Henein, *Seventeenth-century French literature, myth, French Canadian literature and culture*

Professor Elizabeth T. Howe, *Spanish Golden Age, medieval literature, mysticism*

Professor Isabelle H. Naginski, *Nineteenth-century French prose, Franco-Russian literary relations, women writers*

Associate Professor Nina Gerassi-Navarro, *Latin American literature*

Associate Professor Claudia Kaiser-Lenoir, *Latin American literature*

Associate Professor Brigitte Lane, *French cultural studies, contemporary French literature, film studies*

Associate Professor Vincent J. Pollina, *Medieval and Renaissance French and Italian literature*

Assistant Professor Mark Hernández, *Mexican literature and culture*

Senior Lecturer Laura Baffoni Licata, *Italian literature and culture*

Senior Lecturer Patricia DiSilvio, *Italian language coordinator*

Senior Lecturer Marta Rosso-O'Laughlin, *Spanish language coordinator*

Senior Lecturer Emese Soos, *French language coordinator*

Lecturer María-Concepción Lagunas Davis, *Spanish language course administrator*

Lecturer Charles Dietrick, *Spanish language course administrator*

Lecturer Kathleen Pollakowski, *Spanish language and literature*

Lecturer Claire Schub, *Nineteenth- and twentieth-century French literature*

Lecturer Paulette Anne Smith, *Francophone African and Caribbean literature*

Lecturer Agnès Trichard-Arany, *French language course administrator*

Adjunct Professor Angel Berenguer, *Director, Tufts-in-Madrid program*

Monique Fecteau, *Director, Tufts-in-Paris program*

Carmen Gloria Guinez, *Director, Tufts-in-Chile program*

The Romance languages all derive from the Latin spoken in different parts of the Roman Empire. Courses in French, Italian, and Spanish lead students to an understanding of the language when spoken or written, and allow them to read and appreciate each nation's literature. At all stages of instruction students may deepen their linguistic sensibilities and expand their horizons by studying, through a Romance language, a civilization different from but connected to their own. Students may major in French, in Italian, or in Spanish Studies, and may minor in Italian. A special minor for engineering students allows them to minor in French, Spanish, or Italian. The Department of Romance Languages also participates in the programs of the Experimental College.

LANGUAGE HOUSES

The Department of Romance Languages sponsors the French House and the Spanish House. The houses are open to all students interested in these languages and cultures and are not limited to majors. They offer small-group living and an opportunity to enjoy an intensive language experience, often with native speakers, and to participate in many social and cultural events.

JUNIOR YEAR ABROAD

Through the Tufts-in-Madrid, the Tufts-in-Paris, and the Tufts-in-Chile programs, the Department of Romance Languages offers undergraduate majors an unusual opportunity for study in Spain, France, and Chile during the academic year. For more information, contact the Department of Romance Languages or the Office of Tufts Programs Abroad.

Tufts-in-Paris Program

Preparation equivalent to completion of French 21 and 22 is prerequisite to the program; completion of French 31 and 32 is highly recommended. Students are registered in the University of Paris I (Panthéon-Sorbonne), the University of Paris III (Sorbonne Nouvelle), and the private *Institut Catholique* and take most of their courses at these institutions. Courses are also offered within the Tufts-in-Paris program.

Internships are available to full-year students.

Tufts-in-Madrid Program

(See Tufts Programs Abroad for description.)

Preparation equivalent to completion of Spanish 21 and 22 is prerequisite to the program; completion of Spanish 31 or 34 and 32 or 35 is highly recommended. Students are registered in the Autonomous University of Madrid or the University of Alcalá and take most of their courses in the university. Courses are also offered within the Tufts-in-Madrid program.

For more information concerning the Tufts-in-Madrid Program, write to the Department of Romance Languages or to the Office of Tufts Programs Abroad.

Tufts-in-Chile Program

(See Tufts Programs Abroad for description.)

Preparation equivalent to completion of Spanish 21 and 22 is prerequisite to the program; completion of Spanish 31 or 34 and 32 or 35 is highly recommended. Students are registered in the University of Chile in Santiago and take most of their courses in the university.

For more information concerning the Tufts-in-Chile Program, write to the Department of Romance Languages or to the Office of Tufts Programs Abroad.

Tufts University European Center

The Tufts University European Center sponsors a six-week summer study program in Talloires, on the Lac d'Annecy, in the heart of the French Alps. Students enroll for credit in two courses chosen from an array of offerings including French language, literature, and civilization. The courses, taught by members of the Tufts faculty, draw on the rich cultural and physical resources of this beautiful region of France. Classes are held in Le Prieuré (the Priory), which was formerly part of an eleventh-century Benedictine monastery. Each student lives and shares meals with a local French family; the residential component of the program adds an important dimension to the students' experience of French daily life and culture. For more information, contact the Office of the Tufts University European Center.

PLACEMENT OF ENTERING UNDERGRADUATES

All entering students who elect courses in French, Spanish, or Italian and who have previously studied the language will be placed in the appropriate course level by their scores on the SAT II Subject

Tests (formerly known as the CEEB Achievement Test), Advanced Placement Test, or the Tufts placement examination. The Tufts placement examination, which is for diagnostic purposes only, is given each September and January during the orientation period.

Students who place above French, Spanish, or Italian 3 may complete the language requirement by choosing any one of the three available options (see College of Liberal Arts Information, Foundation Requirements). One course credit equivalent to French/Spanish/Italian 21 or 22 is granted under certain conditions (see College of Liberal Arts Information, Advanced Placement and Acceleration Credit).

For further information, see the appropriate coordinator of language instruction.

UNDERGRADUATE CONCENTRATION REQUIREMENTS IN FRENCH AND SPANISH

Prospective majors in French or Spanish are advised to consult the guidelines for selecting a related field, which appear in the departmental course brochure and on the Romance Languages Web site. The department highly recommends that seniors returning from overseas programs enroll in two 100-level French or Spanish courses on the Tufts campus during their final year of study. At least one of the four 100-level literature courses must be taken during the senior year on the Tufts campus itself.

Major in French

Ten courses as follows:

French 21 and 22, or equivalent; French 31 and 32, or equivalent; four 100-level courses in literature; one 100-level course to be selected from among the various course offerings in advanced language and culture, including French 121, 122, 124, 125, or their equivalents. (Students participating in programs abroad may count toward the satisfaction of this requirement a wide range of courses in language, literature, art history, geography, history, civilization, and other areas, taught in the language of the major.) One course in a related field. No more than one credit in Independent Study may be counted toward the major. No more than two credits combining an Independent Study and an honors thesis may be counted toward the major. All courses taken for credit in the major must be completed with a grade of C- or better.

Major in Spanish

Ten courses as follows:

Spanish 22, or equivalent; Spanish 31 or 34, and 32 or 35, or equivalent; three 100-level courses in literature; four 100-level course to be selected from among the various course offerings in advanced language and culture, including Spanish 121, 122, 124, 130, 140, 150, or their equivalents. One course may be in English. (Students participating in programs abroad may count toward the satisfaction of this requirement a wide range of courses in language, literature, art history, geography, history, civilization, and other areas, taught in the language of the major.) No more than one credit in Independent Study may be counted toward the major. No more than two credits combining an Independent Study and an honors thesis may be counted toward the major. All courses taken for credit in the major must be completed with a grade of C- or better.

UNDERGRADUATE CONCENTRATION REQUIREMENTS IN ITALIAN STUDIES

Prospective majors in Italian studies are advised to consult the list of courses exclusively devoted to Italian culture, taught in departments other than Romance Languages, which count toward the Italian Studies major. The list appears in the departmental course brochure and on the Romance Languages Web site. It is highly recommended that seniors returning from overseas programs enroll in an appropriate Italian course in the Department of Romance Languages during their final year of study. Interested students should consult the designated adviser for the major.

Major in Italian Studies

Ten courses distributed as follows among Categories A, B, and C:

Category A: Five courses taught in Italian in the Department of Romance Languages: Italian 21 and 22, or equivalent; Italian 31 and 32, or equivalent; one 100-level course, such as Italian 121, 177, 191, or 192. Category B: Two courses taught in English in the Department of Romance Languages, such as Italian 51, 52, 55, or 75. Category C: Any three courses from one or more of the following groups: Category A, above; Category B, above; courses in Latin language or literature, with readings in the original, above the level of Latin 3; courses in Latin literature or culture, with readings

in English translation; courses devoted exclusively to Italian culture (as attested by course description and syllabus), taught in departments other than Romance Languages. Courses taken in other departments must be approved by the Department of Romance Languages for credit in the major. No more than one credit in Independent Study may be counted toward the major. No more than two credits combining an Independent Study and an honors thesis may be counted toward the major. All courses taken for credit in the major must be completed with a grade of C- or better.

UNDERGRADUATE MINOR PROGRAMS

Minor in Italian

Five courses as follows:

Four courses in Italian language, literature, and/or culture above the intermediate level (Italian 3-4), one of which must be in literature. These courses must be taught in Italian. One course chosen from among the following: a) a course, taught in English translation, on Italian literature or civilization (e.g., Italian 41, 42, 51, 52, 55, 75); b) one of the Italian culture courses listed in this bulletin at the end of the College of Liberal Arts Information section; c) one further course in Italian language, literature, and/or culture, taught in Italian on the Medford/Somerville campus; d) an upper-level course, completed in Italy, in one of a variety of disciplines. No more than one credit in Independent Study may be counted toward the minor.

It is highly recommended that seniors returning from overseas programs enroll in an appropriate Italian course in the Department of Romance Languages during their final year of study.

Interested students should consult the designated adviser for the minor.

Special Minors for Engineering Students

The humanities and/or arts and social sciences requirements for students in the School of Engineering may be satisfied by a special minor in French, Spanish, or Italian language and culture comprising a total of six credits. Please note the following stipulations:

- 1) Of the five credits taken in the Department of Romance Languages, no more than one credit may be taken in English.
- 2) Students must determine their level of proficiency in the language by examination (placement

test at Tufts, Advanced Placement Test score, or CEEB SAT II Subject Test score).

- 3) Students cannot receive credit toward the minor for courses taken below this initial placement.
- 4) Students must consult with the designated adviser for the special minor in the Department of Romance Languages.
- 5) Independent Studies will not be available.

FRENCH OR SPANISH

Five credits above French 3 or Spanish 3.

The sixth credit must be taken in the social sciences, concentrating on the area in which the target language is spoken.

ITALIAN

Five credits above Italian 2.

The sixth credit must be taken in the social sciences, concentrating on the area in which the target language is spoken.

DEPARTMENTAL HONORS

The departmental honors program provides the opportunity for majors in French, in Spanish, or in Italian Studies—in close cooperation with a faculty adviser—to write a senior honors thesis for one or two course credits. Each such credit may count toward the major as a 100-level literature course. No more than two credits combining an Independent Study and an honors thesis may be counted toward the major. Near the end of the spring term the thesis is defended before a committee of three readers, who determine whether the degree with highest honors in thesis, with high honors in thesis, or with honors in thesis is to be awarded at commencement. The applicant's name must have appeared on the Dean's List prior to the first term of the senior year. Interested students should consult with the potential adviser and with the chair of the department toward the end of the junior year.

GRADUATE PROGRAM

Master's Degree

A master of arts degree is offered in French language and literature. Preference is given to students who have a strong undergraduate major in French.

To qualify for the master's degree, a student completes an approved program of at least ten courses, including a general examination. A student is expected to show evidence of scholarly

ROMANCE LANGUAGES >
RUSSIAN >
SCHOOL PSYCHOLOGY >
SOCIOLOGY >
SPANISH >

attainment both in course work and in the general examination.

Application forms are available from the Office of Graduate Studies in Ballou Hall.

For more detailed information, please visit the Web site <http://ase.tufts.edu/romlang>.

Russian

(FOR DEGREE REQUIREMENTS, SEE GERMAN, RUSSIAN, AND ASIAN LANGUAGES AND LITERATURES.)

School Psychology

(FOR DEGREE REQUIREMENTS, SEE EDUCATION.)

Sociology

Associate Professor Paula Aymer, *Chair; Race and ethnic relations, family, religion, immigration*

Professor John E. Conklin, *Criminology, sociology of law, sexual behavior*

Professor Paul Joseph, *Sociology of war and peace, political sociology*

Professor Susan Ostrander, *Gender/feminist theory, nonprofit organizations, social inequalities, field research methods, social action/public service*

Associate Professor James Ennis, *Sociological theory, quantitative research methods, social movements, social networks, sociology of art and artists*

Associate Professor Rosemary C. R. Taylor, *Political sociology, social policy, medical sociology, organizations, qualitative research*

Assistant Professor Ryan Centner, *Environmental, globalization, urban sociology*

Assistant Professor Sarah Sobieraj, *Mass media, political sociology, civil society and the public sphere, sociology of culture, social movements*

Lecturer Matthew Gregory, *Social movements*

Sociology is the systematic study of social interactions, institutions, and identities. It considers how our selves, actions, and relationships are shaped by society, and how society itself is structured and changed in turn. Social categories such as class, race, and gender are of central concern, along with such institutions as law, the family, religion, the media, medicine, education, the military, business,

nonprofit organizations, professions, science, and the arts. Sociology students learn theories and research techniques for understanding social structures and solving social problems. Techniques of critical and comparative analysis, along with alternative visions of society, are fostered.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Sociology

Eleven courses in the department (of which at least six must be taken at Tufts), including: an introductory overview of the discipline (Sociology 1), one course in quantitative methods (Sociology 101), one course in qualitative methods (Sociology 102), one course in sociological theory (Sociology 103), and seven additional courses in sociology, including at least one seminar numbered 180 or above. At least two of the core courses (Sociology 1, 101, 102, 103) must be taken within the Sociology Department on the Tufts Medford Campus.

UNDERGRADUATE MINOR PROGRAM

Minor in Sociology

The minor requires the completion of six courses; none may be taken pass-fail. One required course: Sociology 1; one methods course: either Sociology 101, 102, or 105; three interrelated mid-level courses approved by the minor adviser (examples include race, ethnicity, and immigration; local and global social change; law and crime; media and culture; poverty, wealth, and social inequalities; gender and feminist perspectives; sexuality; state politics and power; or one proposed by the student) or Sociology 99, Internship in Sociology; one course numbered 180 or above in the common area selected by the student. Details are available from the department. Students should declare their minor by junior year.

For more detailed information, please visit the Web site <http://ase.tufts.edu/sociology>.

Spanish

(FOR DEGREE REQUIREMENTS, SEE ROMANCE LANGUAGES.)

Urban and Environmental Policy and Planning

Associate Professor Julian Agyeman, *Chair; Sustainability policy, environmental justice*

Professor Lawrence Bacow, *Environmental policy and regulation, facility siting, environmental dispute resolution*

Professor Rachel G. Bratt, *Housing and community development*

Professor James Jennings, *Urban and neighborhood politics, social welfare, community development*

Professor Sheldon Krimsky, *Environmental policy and environmental ethics*

Associate Professor Francine Jacobs, *Child and family policy, program evaluation*

Assistant Professor Mary E. Davis, *Environmental health*

Assistant Professor Justin Hollander, *Urban planning and policy development*

Lecturer Laurie Goldman, *Social welfare and housing policy, policy implementation, and public and nonprofit management*

Lecturer Barbara Parmenter, *Geographic information systems*

Lecturer Ann Rappaport, *Environmental management, environmental policy*

Lecturer Robert Russell, *Environmental law*

Lecturer Jon Witten, *Land use planning*

Adjunct Professor William Lockeretz, *Agricultural systems*

Adjunct Professor William Moomaw, *International environmental policy*

PART-TIME FACULTY:

Lecturer Margaret Barringer, *Economic development*

Lecturer Alix Cantave, *Real estate development and finance*

Lecturer Mark Chase, *Transportation planning, entrepreneurship and advocacy*

Lecturer Christine Cousineau, *Environmental design, land use history*

Lecturer Louise Dunlap, *Writing and public communication*

Lecturer Stephen Estes-Smargiassi, *Environmental impact assessment*

Lecturer Scott Horsley, *Land use planning*

Lecturer Karen Kelley, *Public and nonprofit management, finance, economics*

Lecturer Penn S. Loh, *Environmental justice*

Lecturer James Maughan, *Environmental impact assessment*

Lecturer Ingar Palmlund, *International environmental policy*

Lecturer Roberta Rubin, *Homelessness, housing policy*

Adjunct Associate Professor Robert Burdick, *Negotiation and conflict resolution*

The Department of Urban and Environmental Policy and Planning offers a graduate public policy and planning program culminating in either a master of arts (M.A.) degree or a master of public policy (M.P.P.) degree. Our goal is the education of a new generation of leaders, “practical visionaries,” who will contribute to the development of more just and sustainable communities. A key step toward this is making our institutions more responsive to child, adult, and ultimately community well-being by helping them understand, empathize with, and respond to the social, economic, and environmental needs of individuals and communities.

AFFILIATED CENTERS AND INSTITUTES

Center for Interdisciplinary Studies— Environmental Studies Program

The Department of Urban and Environmental Policy and Planning is one of three Tufts departments that oversees the undergraduate environmental studies program. The environment and society track, for which UEP serves as the host department, examines the sociopolitical, humanistic, economic, and cultural aspects of managing environmental problems.

Global Development and Environment Institute (GDAE)

The Global Development and Environment Institute (GDAE) was established to gain a new understanding of how nations and societies at differing stages of economic development can pursue that development in an environmentally and socially sustainable manner, and to assist the public and private sectors in applying this knowledge through appropriate policies that promote sustainability. Through research, curriculum development, a visiting scholars’ program, conferences, and faculty seminars, the institute offers opportunities for shared activities between the Fletcher School and Graduate and Professional Studies. It also provides employment opportunities for graduate students.

Tufts Institute of the Environment (TIE)

Created in 1998, the Tufts Institute of the Environ-

ment (TIE) is an interdisciplinary, university-wide education and research entity that facilitates and coordinates environmental programs at the university. TIE is devoted to advancing and disseminating knowledge about the many ways human interactions affect the environment. It meets this goal by assisting faculty to create new environmental courses; developing interdisciplinary research initiatives; coordinating efforts among existing departmental programs; supporting speakers and visitors; involving alumni; producing books, articles, reports, conferences, and other outreach activities; and supporting and recognizing outstanding Tufts students. TIE focuses its activities on environmental research, technology, policy development, and education to improve environmental quality as it relates to human health. Within TIE, the Tufts Climate Initiative (TCI) focuses on taking actions at the university to reduce our emissions of greenhouse gases. Student research projects play a key role in informing university decisions such as building renovation, equipment selection, and policy development.

Tufts University Center for Children (TUCC)

The Tufts University Center for Children (TUCC) is a resource for affiliated faculty with interests in child and family policy. TUCC catalyzes and facilitates interdisciplinary research, service, education, training, and social action to advance the well-being of children, their families and their communities. Through its various activities, TUCC seeks to increase the quality and quantity of research and scholarship on child development, health and policy; heighten public awareness of the needs of children and their families; increase community involvement in meeting the needs of children and families; and influence public opinion and public policy.

Jonathan M. Tisch College of Citizenship and Public Service (Tisch College)

Tufts University is explicitly committed to fostering an attitude of "giving back," including promoting an understanding that active citizen participation is essential to freedom and democracy. The mission of the Jonathan M. Tisch College of Citizenship and Public Service (Tisch College) is to prepare Tufts undergraduate and graduate students for lifetimes of active citizenship, and to make public service an important dimension of their lives and work. Program activities designed to

fulfill this mission include faculty and curriculum development, student leadership development, an information and resource clearinghouse, and seed grants for faculty and student initiatives. The Lincoln Filene Center, a component of Tisch College, increases knowledge about citizen action and community building, enhances public-service education and research at Tufts, and informs public decision making. The center acts as a catalyst to connect people and resources in new ways, and to develop new approaches to public problems.

GRADUATE PROGRAMS

UEP students focus on public problems in the broad areas of urban and social policy and planning, or environmental policy and planning, as well as on issues linking these various concerns. UEP's goal is the education of a new generation of leaders, "practical visionaries" who will contribute to the development of more just and sustainable communities. A key step toward this is making our institutions more responsive to child, adult and ultimately community wellbeing by helping them understand, empathize with and respond to the social, economic and environmental needs of individuals and communities.

We offer two graduate programs in public policy and planning. A master of arts (M.A.) degree in urban and environmental policy and planning which is accredited by the Planning Accreditation Board a master of public policy (M.P.P.) degree. Both degrees equip public-spirited individuals for rewarding careers in government, nonprofit organizations, citizen advocacy groups, and the private sector.

UEP has a flexible MA and MPP curriculum built around a set of six core values:

- An appreciation of the inextricable linkages between social, economic and environmental issues and the ability to make policy and planning recommendations accordingly;
- An appreciation of the role of values in policy formation and planning and the ethical/social responsibility of policy and planning professionals to act accordingly;
- An appreciation of the deeply embedded nature of gender, age, race, class, dis/ability, culture and sexual orientation in all aspects of public policy and planning;
- An appreciation of the centrality of spatial, social and environmental justice to all aspects of public

policy and planning;

- An appreciation of the need to understand the role of individual and community rights and responsibilities in public policy and planning;
- An appreciation of the need to move society toward the development of sustainable communities where there is a high quality of human life; delivered in a just and equitable manner while respecting the limits of supporting ecosystems.

And, for the MA a set of competencies based on three areas:

1) Knowledge – upon completion of the MA program, students should have basic familiarity with:

- The evolution, structures and functions of cities and metropolitan regions;
- The relationship between the ‘Market’ and the ‘Polis’ in economics, policy and planning;
- The role(s) of government, governance, citizenship and NGOs
- The history, theory and processes of both policy making and planning together with Implementation procedures and practices;
- The administrative, legal and political aspects of policy and plan-making;
- Areas of specific policy or planning content-based knowledge related to your professional interest(s) and an in-depth knowledge of one policy or planning domain through thesis or other terminal project.

2) Skills – upon completion of the MA program, students should have basic skills in the following:

- Critical thinking;
- Individual problem Identification and research methodology selection and primary and secondary data gathering and analysis;
- Quantitative analysis, computer proficiency and spatial analysis;
- Written, oral and graphic communication;
- Collaborative problem solving, negotiation and mediation;
- Synthesis and application of policy and planning content-based knowledge from theory into practice;

3) Policy and Planning in Practice – The MA program will provide the following professional opportunities:

- At least 150 hours, supervised, in a organization relevant to your interests;

- Demonstrate through the Internship Agreement and Learning Assessment that your Internship gave opportunity for significant learning in a field relevant to your interests and meets at least one of your career goals;
- Reflections on the role of ethics in professional policy and planning processes, practices and behavior.

MASTER OF ARTS

The Master of Arts (M.A.) requires completion of twelve courses plus a thesis for a total of fourteen credits. Each semester-long course at Tufts receives one credit. The program normally takes the equivalent of two years of full-time study, although it is possible to be enrolled in the program on a part-time basis.

Degree Requirements

The requirements for the master of arts degree are as follows:

- Five required core courses covering theoretical foundations of policy and planning, and the development of relevant professional skills;
- Seven elective courses approved by student’s advisor;
- An internship in public policy or planning;
- A master’s thesis.

Students select courses from the department’s offerings, other Tufts departments and schools, and Boston-area consortium universities. To receive credit for a course, graduate students must attain a grade of B- or better.

Core courses

A required core curriculum exposes students to methods of policy analysis and planning and helps them develop the competencies listed above, for effective professional practice.

The five required core courses are:

- 1) Foundations of Public Policy and Planning
- 2) Economics for Planning and Policy Analysis
- 3) Quantitative Reasoning for Policy and Planning (introductory or intermediate)
- 4) Field Projects: Planning and Practice
- 5) Cities in Space, Place and Time

Electives

In addition to the core curriculum, students choose

courses that meet their particular objectives and provide a strong grounding in basic methods and approaches to public policy and planning. UEP recognizes the need for the policy and planning specialist, the person who wants to plan for landscape, ecological or watershed management, or develop child and/or family or other social welfare policies. However, UEP also recognizes the inextricable interconnections between and across different policy and planning areas whether a student's interest is primarily environmental or social, urban or rural, local or global. Accordingly, a student's choice of classes can be narrower (on the public policy and planning challenges in one policy or planning area) or broader (on sustainable development which looks at these issues and their interrelationships as a whole), depending ultimately on the student's goals.

At UEP, faculty and student interests and course offerings cluster around the following:

- Sustainable communities
- Environmental justice
- Community development and housing
- Race, class, and social welfare policy
- Child and family policy
- Land use planning
- Natural resource management
- Science/technology, ethics, and environmental policy
- Environmental risk
- Corporate responsibility and the environment
- Climate change
- International environmental policy
- Environmental education
- Program evaluation
- Applied research methods
- Planning tools, techniques, and strategies
- Non-profit organization
- Citizen roles in policy and planning

Internship

An internship (minimum 150 hours) is usually completed between the two academic years. Most internships are based in a public or nonprofit agency, and are usually paid. Alternatively, students may elect a research internship, working on a university-based or research institution-based project. Although faculty provide assistance and advice, students are expected to secure their own internship placements.

Thesis

The thesis requirement provides students the opportunity to become proficient in framing a research question and carrying out an independent investigation on a topic of the student's choosing. Building on competencies developed through course work, students present a well-reasoned analysis of a significant policy or planning problem. Theses may be technical studies, policy analyses, theoretical papers, research studies, or planning documents.

MASTER OF PUBLIC POLICY

The Master of Public Policy (M.P.P.) is designed for individuals with at least seven years of significant, relevant professional experience, who are interested in expanding their knowledge of public policy within urban, social, and environmental domains -- or across these domains, such as programs and policies related to sustainable communities. This degree program offers students the opportunity to strengthen their critical thinking, policy analysis, and communication skills; improve their professional practice in areas such as mediation, land use planning, or financial management; and establish close professional relationships and networks among faculty, affiliated agencies, and other students. Full-time students may complete this nine-credit degree in one year; part-time enrollment options are also available. The requirements for the M.P.P. are as follows:

Degree Requirements

- Four required core courses;
- Four elective courses in a public policy area;
- Two additional elective courses in policy and planning fields or professional skills;
- A required core curriculum enables students to reflect on their professional practice, examine dominant theories and themes in the public policy literature, and further refine and consolidate their perspectives on their career paths.

The four core courses are:

- 1) Economics for Planning and Policy Analysis
- 2) Quantitative Reasoning for Policy and Planning (introductory or intermediate)
- 3) Reflections on Public Policy Practice (one-half credit, fall, in the first semester of student's program)
- 4) Integrative Seminar (one-half credit, spring, in

the last semester of the student's program, or in the semester prior to the completion of no more than two credits)

The M.P.P. seminar is composed of the two half-credit courses. It helps students examine their own professional experiences in the context of prevailing theories about policy and program development implementation, and evaluation. The M.P.P. seminar is for M.P.P. degree students only. All other courses are taken with students in the M.A. in urban and environmental policy and planning program. Up to two courses may be selected from course offerings in other Tufts' departments and schools, as long as they relate to public policy and are approved by the student's adviser in addition to one class at a consortium school in the second semester. Transfer credits will not be accepted. Students with significant background in economics or statistics may, with faculty approval, waive the relevant required courses and substitute electives of their choosing.

Public Policy Areas

Each student, working closely with his or her academic advisor, identifies an area of public policy interest(s). The student then selects four policy courses that deepen his/her theoretical and practical understanding of policy within their area(s) of interest.

All our courses focus on urban, social and/or environmental policy issues. You can choose from one or more of these areas or you can choose to focus on the intersection(s) between these areas, namely the arena of sustainable development.

Examples of Public Policy Courses

- U.S. Social Welfare Policy;
- Social Policy for Children and Families;
- Race, Class and Public Policy;
- Community Development, Planning and Politics;
- Community Economic Development;
- Real Estate Development and Finance;
- Climate Change Policy, Planning and Action;
- Environmental Law;
- Chemicals, Health and the Environment;
- Methods in Environmental Impact Assessment;
- Water Resources Policy and Planning and Watershed Management;
- Corporate Management of Environmental

Issues;

- Developing Sustainable Communities;
- Environmental Justice, Security and Sustainability.

Professional Practice Electives

Students also have opportunities to enroll in courses that enhance their professional practice skills, such as:

- Leadership and Organizational Development;
- Nonprofits, States and Markets;
- Financial Analysis and Management;
- Philanthropy and Fundraising;
- Negotiation, Mediation, and Conflict Resolution;
- Program Evaluation.

Inquiries and requests for application materials for either the M.A. or M.P.P. degree program should be addressed to the Department of Urban and Environmental Policy and Planning, 97 Talbot Avenue, Tufts University, Medford, Massachusetts 02155, or call 617-627-3394. The application deadline for the M.A. program is January 15; the deadline for the M.P.P. program is April 30. Late applications may be considered.

INTERDISCIPLINARY DOCTORATE

The department participates in Tufts' interdisciplinary doctoral program, which accepts a limited number of Ph.D. candidates (applicants must have completed a master's degree) who design an individualized program of study. Students interested in this degree should address their inquiries to the Office of Graduate Studies. (See Interdisciplinary Doctorate in this bulletin for program description.)

COMBINED- AND COLLABORATIVE-DEGREES PROGRAMS

The Department of Urban and Environmental Policy and Planning offers joint master's degree programs with the Departments of Biology, Child Development, Civil and Environmental Engineering, and Economics. Students complete core requirements in UEP and one of the affiliated departments to receive a single master's degree (M.A. or M.S.). It is possible to complete joint-degree requirements in two years. Interested students should check with individual departments regarding specific program requirements and appli-

cation procedure. UEP also offers dual-degree programs with the Fletcher School of Law and Diplomacy, the Department of Civil and Environmental Engineering in the School of Engineering, and the Friedman School of Nutrition Science and Policy.

Please note: these programs are not available to students in the M.P.P. program.

UEP and Biology

The joint master's degree in urban and environmental policy and planning/biology responds to the need for biological literacy by professionals working in policy areas. The program is designed for individuals who are interested in understanding the technical side of policy and planning, including the implementation of policy (e.g., regulations), and the formulation of policy (e.g., legislation), and accounting for biological aspects of land-use issues (e.g., working with governmental and nongovernmental conservation and planning organizations). Students have the choice of receiving the M.A. or M.S. degree.

UEP and Child Development

UEP and the Eliot-Pearson Department of Child Development offer a joint master's degree program in child and family policy. The degree is designed for individuals interested in child and family program development, program evaluation, public and private agency administration and planning, policy-oriented research, child advocacy, and community organizing around child and family issues.

UEP and Civil and Environmental Engineering

UEP students may pursue either a joint- or dual-degree program with the Department of Civil and Environmental Engineering in the School of Engineering. Both programs respond to the need for environmental professionals who are skilled in both a technical and policy perspective in the analysis, planning, and implementation of environmental management and health activities. The programs combine policy study skills with more technical training in civil engineering. The joint-degree program results in the M.S. degree, while the dual-degree program results in both the M.A. and M.S. degrees. The former requires twelve course credits, plus a thesis, while the latter requires seventeen course credits, plus a thesis, and

can be completed in five semesters. The following programs within the Department of Civil and Environmental Engineering may be joined with the UEP degree: Environmental Engineering, Environmental Health, Environmental and Water Resources Engineering, and Water Resources Engineering.

UEP and Economics

Economics and public policy and planning are inextricably intertwined. Public policy issues have motivated some of the classic studies in economics and the tools of economic analysis can be applied to a wide variety of policy and planning questions. The joint-degree program between UEP and the Department of Economics provides students with an opportunity to explore these long-standing linkages and to develop skills in policy analysis and planning based in economics.

UEP and the Fletcher School

The Fletcher School offers a broad program of professional education in international affairs. Its curriculum addresses international law and organization, diplomatic history and international political relations, international economic relations, and international political institutions and systems. UEP and the Fletcher School offer a dual-degree program focusing on international environmental policy. This program provides an opportunity for a limited number of highly qualified students to earn both the master of arts degree in urban and environmental policy and planning and the master of arts in law and diplomacy (M.A.L.D.) at the Fletcher School. By combining the two programs, the dual degree can be completed in three instead of four years.

Interested students must submit separate applications to each program indicating a preference for the dual degree. Each school reviews candidates based on its own requirements and criteria. The candidate's admission to UEP is not affected by the decision of the Fletcher School. The dual-degree program responds to growing student and professional demand for graduate education in international environmental policy. It is designed to prepare students for careers in economic and development institutions, government agencies, and nonprofit organizations concerned with international problems affecting the physical environment such as acid rain, offshore oil drilling, soil

erosion, deforestation, biodiversity, waterways pollution, and chemical contamination.

UEP and the Friedman School of Nutrition Science and Policy

The dual-degree program with the Agriculture, Food, and Environment Program of the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy is meant for students interested in the connection between environmental effects of food production and supply, and who want to become active participants in policy and planning debates. Students pursuing this program are interested in deepening their knowledge of policy analysis and planning, and understanding how food policy fits into larger public policy and planning issues—including environmental problem solving and community development. By combining the two programs, the dual degree can be completed in three instead of four years. Students receive both a master of arts degree in urban and environmental policy and planning and a master of science degree in agriculture, food, and environment.

CERTIFICATE PROGRAMS

In addition to the master's programs, the Department of Urban and Environmental Policy and Planning offers two certificate programs in community sustainability. The certificates in management of community organizations and community environmental studies emphasize participatory strategies for community self-determination and sustainability. These flexible programs enable working adults to gain the vital management and environmental skills necessary to enhance existing careers or to move into new professional work. A third certificate in program evaluation is offered in collaboration with the Department of Child Development, the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy, and the School of Medicine.

To earn a certificate, students successfully complete four courses for credit. The certificate in program evaluation also requires completion of an applied practicum. Courses for the certificate programs are drawn from the curriculum of the master's program. It is possible to complete a certificate program in as little as one year or to extend it over several years. The certificate programs are open to students with a bachelor's degree. For more information, contact the Office

of Graduate Studies at 617-627-3395 or visit <http://gradstudy.tufts.edu/>.

Certificate Program in Community Environmental Studies

The certificate in community environmental studies provides professional training for careers in the rapidly growing and changing environmental field. The program offers a rich and varied selection of environmental courses in planning, policy, economics, engineering, and science complemented by courses in negotiation, law, and nonprofit management. This program is designed for citizen advocates seeking to promote environmentally sustainable communities, environmental specialists in companies who interact with community leaders, and public agency personnel. (See Community Environmental Studies in this bulletin for description.)

This certificate requires four courses.

CES Core Courses

Select at least one core course from the following:

UEP 201 Land Use Planning II (Spring)

UEP 207 Environmental Law (Fall)

UEP 267 Methods in Environmental Impact Assessment (Spring)

UEP 279 Water Resources Policy, Planning, and Watershed Management (Fall)

Course descriptions for these core courses can be found on the UEP website

CES Course Electives

Select up to three skills and environmental policy electives from the following:

UEP 161A Writing and Public Communication (Summer)

UEP 166A International Environmental Policy (Summer)

UEP 174A Clean Air and Clean Water Policy (Summer)

UEP 193CA Environmental Policy Research (Summer)

UEP 200 Land Use Planning: Nonregulatory Tools and Techniques (Fall)

UEP 205 Urban Planning and Design (Fall)

UEP 221 Climate Change Policy, Planning, and Action (Spring)

UEP 222 Biotechnology: Social and Environmental Issues (Spring)

UEP 230 Negotiation, Mediation, and Conflict Resolution (Fall and Spring)

UEP 232 Introduction to Geographic Information Systems (Fall and Spring)

UEP 263 Natural Resource Policy and Planning (Fall)

UEP 265 Corporate Management of Environmental Issues (Fall)

UEP 278 Environmental Justice, Security, and Sustainability (Fall)

UEP 281 Chemicals, Health, and the Environment (Spring)

UEP 284 Developing Sustainable Communities (Spring)

UEP 290 Integrated Water Resources Management (Spring)

(Students may substitute other Tufts graduate courses, subject to the approval of the certificate advisor.)

Certificate Program in Management of Community Organizations

The certificate in management of community organizations offers professional management training within the framework of the social, economic, and political values that shape the nonprofit sector. The program's goal is to train people with a commitment to social concerns and effective management who wish to work at the community level. Participants share a commitment to working to improve the housing, employment, environment, health, and overall quality of life for low-income groups and communities. (See Management of Community Organizations in this bulletin for description.)

This certificate requires four courses.

MCO Core Courses

Select at least one core course from the following:

UEP 253 Financial Analysis and Management (Spring)

UEP 256 Program Evaluation (Fall and Spring)

UEP 273 Nonprofits, States, and Markets (Fall)

Course descriptions for these core courses can be found on the UEP website

MCO Course Electives

Select up to three skills and urban and social policy electives from the following:

UEP 161A Writing and Public Communication (Summer)

UEP 182 Social Policy for Children and Families (Fall)

UEP 188 Seminar on Government and the Family (Spring)

UEP 205 Urban Planning and Design (Fall)

UEP 213 Housing and Community Development (Fall)

UEP 230 Negotiation, Mediation, and Conflict Resolution (Fall and Spring)

UEP 240 U.S. Social Welfare Policy (Spring)

UEP 242 Race, Class, and Public Policy (Fall)

UEP 261 Community Development, Planning, and Politics (Spring)

UEP 271 Community Economic Development (Fall)

UEP 284 Developing Sustainable Communities (Spring)

(Students may substitute other Tufts graduate courses, subject to the approval of the certificate advisor.)

Certificate Program in Program Evaluation

Private funders and public agencies are increasingly demanding evaluation as a requirement for funding. Individuals with evaluation training are needed to assist programs, sponsoring agencies, and funders in planning and carrying out evaluations to address their needs for information and analysis. The certificate in program evaluation is designed for midcareer professionals who wish to learn about the design and implementation of effective evaluation strategies. Students learn practical skills that can be put to use in the evaluation of a wide range of social service, public health, community development, and environmental programs. In addition to a bachelor's degree, applicants are expected to have three to five years of professional experience in a particular field. (See Program Evaluation in this bulletin for description.)

This certificate requires four courses and an applied practicum (format code: UEP = Urban and Environmental Policy and Planning; CD = Child Development, PSY = Psychology; NUTR = Nutrition; SOC = Sociology; OTS: Occupational Therapy; ED = Education; MPH = Public Health). Courses in statistics, data analysis, and research methods are offered by several departments. Course substitutions can be made with the approval of the certificate faculty adviser.

1. Foundation course: Program Evaluation (UEP 256) (also CD 247)
2. One course in applied statistics and data analysis, for example: Problems of Research: Statistics (CD 140) Advanced Statistics (PSY 107/108) Principles of Biostatistics (MPH 205) Statistical Methods for Nutrition Research (NUTR 209) Nutrition Data Analysis (NUTR 211) Quantitative Research Methods (SOC 101) Quantitative Reasoning for Policy and Planning (UEP 254)
3. One course in research methods, for example:

Problems of Research: Methods and Design (CD 142)

Principles of Epidemiology (MPH 201)

Methods of Educational Research (ED 271)

Survey Research in Nutrition (NUTR 210)

Field Research (SOC 105)

Research Methods (OTS 210)

4. One elective in your area of interest or expertise: education, child development, nonprofit management, social or environmental policy, nutrition, or public health.

5.. Practicum: Undertaken once coursework is completed, the practicum gives you an opportunity to design an evaluation and put into practice data collection and analysis skills.

For more detailed information, please visit the Web site <http://ase.tufts.edu/uep/>.

Urban Studies

FACULTY COORDINATOR:

Lecturer Jon Witten, *Urban and Environmental Policy and Planning*

Escalating housing costs, racial conflicts, fiscal crises of city governments, deteriorating physical infrastructure—these are all current and vital issues. The interdisciplinary minor in urban studies provides an opportunity to understand the causes of pressing urban problems and to compare alternative ways of improving urban conditions. The minor may be of interest to students contemplating graduate work in urban planning, public administration, public policy, law, or social work. It can also be an intellectually exciting focus for interdisciplinary exploration, because understanding urban phenomena requires synthesizing knowledge from a broad range of the social sciences and humanities.

Five credits with at least one course from each of three different departments are required. In addition to the five credits, a student is required to complete an appropriate project, such as a thesis, an oral presentation, or a performance, which integrates the knowledge and methodologies of the disciplines involved. (See Interdisciplinary Minor Program for details.)

Interested students should consult the faculty coordinator for more information about specific courses that can be counted toward the minor.

For more detailed information, please visit the Web site <http://ase.tufts.edu/cis/UrbanStudies.htm>.

Water: Systems, Science, and Society

Paul Kirshen, *Cochair; Department of Civil and Environmental Engineering*

Beatrice Rogers, *Cochair; Friedman School of Nutrition Science and Policy*

PROGRAM DESCRIPTION

The objective of WSSS is to train a new kind of professional who understands the causes and dynamics of water-related problems from multiple points of view, yet has the skills to be an expert in one discipline. To ensure sufficient depth and expertise in a particular discipline, students in the WSSS program must be accepted by and obtain their graduate degrees from an existing school or department. Tufts schools participating in WSSS include Arts and Sciences, Engineering, Medicine, Veterinary Medicine, the Friedman School of Nutrition Science and Policy, and the Fletcher School of Law and Diplomacy.

WSSS students take the four WSSS core courses as part of their course requirements for their degree, participate in one set of consecutive fall and spring semester workshops and seminars specific to WSSS, undertake a Interdisciplinary Professional Experience (IPE), and write an interdisciplinary research thesis. Upon completion of these activities, students receive a Certificate in Water: Systems, Science, and Society as well as their departmental graduate degree. The courses and other activities are designed to ensure that students have a degree of mastery of the range of methodological tools used by the different specialties and, most importantly, gain experience in their application within an interdisciplinary framework. Through the use of electives and cross-listed courses, the WSSS program usually will not add time on to a graduate degree.

WSSS students conduct interdisciplinary research in four areas where Tufts has well-established research programs: Water, Climate and Environment Change; Water and Public Health; Urban Watershed Restoration and Management; and Water, Food, and Livelihood Security. A fifth emerging area is also included: Water and National

and International Security, which includes trans-boundary water issues.

PROGRAM REQUIREMENTS

Courses

The four required core courses include material the WSSS Program deems necessary for integrated analysis of water issues. These courses are designed to impart a solid understanding of a discipline for nonspecialists. Each core course focuses on a set of related skills, tools, and knowledge areas. One innovation is that the four courses are integrated with each other through the use of common case studies that are analyzed from the perspectives of each course and then discussed as a whole in the seminar series described below. By working on the same case studies in each course, students also gain the experience of working with people who have different expertise, skill levels, and perspectives. Current faculty and student research in relevant areas also forms a part of each course and demonstrates the links between classroom learning and research. At least two WSSS faculty members from different disciplines participate in each course to ensure the representation of varied perspectives.

Seminar Series

WSSS seminars are given on Fridays at 4-5:30 p.m., three times per month during September, October, November, February, March, and April and are hosted by various schools.

Workshops

Students are required to participate in one year of the workshops designed to develop skills in leadership, public speaking, teaching, development of research and program proposals, project management and budgeting, and the ethical conduct of research. They are given on occasional Friday afternoons when the seminar series does not meet.

Interdisciplinary Professional Experience (IPE)

The objective of this activity is for a student to gain some interdisciplinary professional experience in resolving or managing a water resources issue. It is to be of three months duration and related to one of the ongoing WSSS program research areas. Typically a student will undertake it during the summer after the first year of graduate school. Examples include an internship with an international nongovernmental organization or govern-

ment agency, on- or off- campus research experience, and temporary employment in a consulting firm or other organization. IPEs must be approved by the relevant school's WSSS coordinator. All WSSS-affiliated faculty members are available to help identify potential IPE opportunities.

Thesis

Both M.S./M.A. and Ph.D. theses must be interdisciplinary and have committees with faculty members from at least two WSSS participating schools. While it is encouraged that the topic be chosen from one of the five WSSS research areas, other topics may be considered with consent of the thesis committee.

Note: There occasionally may be modifications to the requirements over time; therefore, please confirm with school coordinators or program cochairs at time of application.

For more information, please contact Paul.Kirshen@tufts.edu, 617-627-5589 or Beatrice.Rogers@tufts.edu, 617-636-3703.

For more detailed information, please visit the Web site <http://www.tufts.edu/water/>.

Women's Studies

DIRECTOR:

Associate Professor Modhumita Roy, *English*

PROGRAM ADMINISTRATOR:

Aileen Kounaves

CORE FACULTY:

Professor Jane Bernstein, *Music*

Professor Madeline Caviness, *Art and Art History*

Professor Virginia Drachman, *History*

Professor Lee Edelman, *English*

Professor Carol Flynn, *English*

Professor Isabelle Naginski, *Romance Languages*

Professor Susan Ostrander, *Sociology*

Professor Laurence Senelick, *Drama and Dance*

Professor Kathleen Weiler, *Education*

Associate Professor Gloria Ascher, *German, Russian, and Asian Languages and Literatures*

Associate Professor Paula Aymer, *Sociology*

Associate Professor Ina Baghdiantz-McCabe, *History*

Associate Professor Linda Bamber, *English*

Associate Professor Cristelle Baskins, *Art and Art History*

Associate Professor Nancy Bauer, *Philosophy*
Associate Professor Marilyn Glater, *Political Science*
Associate Professor Judith Haber, *English*
Associate Professor Sonia Hofkosh, *English*
Associate Professor Ikumi Kaminishi, *Art and Art History*
Associate Professor Jeanne Penvenne, *History*
Associate Professor Elizabeth Remick, *Political Science*
Associate Professor Pearl Robinson, *Political Science*
Associate Professor Modhumita Roy, *English*
Associate Professor Christina Sharpe, *English*
Associate Professor David Sloane, *German, Russian, and Asian Languages and Literatures*
Associate Professor Xueping Zhong, *German, Russian, and Asian Languages and Literatures*
Assistant Professor Sarah Pinto, *Anthropology*
Assistant Professor Lecia Rosenthal, *English*
Assistant Professor Paulette Anne Smith, *Romance Languages*
Assistant Professor Adriana Zavala, *Art and Art History*
Lecturer Laura Baffoni Licata, *Romance Languages*
Lecturer Betsey Halpern, *Classics*
Lecturer Peggy Hutaff, *Religion*
Lecturer Linda Mizell, *Education*
Lecturer Claire Schub, *Romance Languages*
Lecturer Dona Yarbrough, *Women's Studies*

Women's studies is an interdisciplinary field focusing on women in diverse contexts. Women's studies scholarship analyzes the various historical and political circumstances, socioeconomic forces, and cultural representations that shape gendered lives. Women's studies emphasizes the local and global interconnections across categories such as gender, race, ethnicity, class, and sexuality.

Feminist inquiry is a rigorous intellectual enterprise that fundamentally transforms traditional disciplinary assumptions and theories, creates new models for teaching and research, and develops practices for challenging systems of power. Each semester, Women's Studies at Tufts lists at least twenty courses in a range of departments and programs that are feminist in perspective and make use of recent scholarship on women and gender.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The major in Women's Studies offers students a flexible and focused concentration in the study of women and/or gender across many disciplines. Students pursuing the major take three interdisciplinary courses offered by Women's Studies (72, 190,

and 193); two core courses within specific departments that explore the foundational feminist arguments in the disciplines; and five electives (from at least three different departments) that study women and/or gender in the context of particular issues, histories, materials, or cultures. Of the five electives, students choose three to cluster in a topic area that provides the framework for the culminating project in the senior year. The director of Women's Studies advises on topic areas, approves clustered courses, and meets with all students undertaking senior projects. With the director's approval, one internship for academic credit may substitute for one of the electives. All courses must be taken for a letter grade.

INTERDISCIPLINARY MINOR

Students pursuing the interdisciplinary minor in Women's Studies take a total of six courses, including three interdisciplinary courses offered by Women's Studies (72, 190, 193). In addition, students choose three electives (from at least two different departments) that study women and/or gender in specific contexts. The director of Women's Studies advises on course selection to fit each student's interests and to establish a basis for the culminating project in the senior year. The minor allows a focus on women and/or gender to complement a major concentration and provides an interdisciplinary framework for the independent work of the project. All courses must be taken for a letter grade. (See Interdisciplinary Minor Program for details.)

GRADUATE COURSES

Tufts is one of the eight participating institutions in the Graduate Consortium in Women's Studies which offers various interdisciplinary, team-taught courses for credit toward a Tufts graduate degree (with adviser approval). The courses have a Tufts registration number. For more information about the application process and other consortium programs for graduate students, contact the director of Women's Studies, call the consortium at 617-642-3485, or visit <http://mit.edu/gcws/>.

WOMEN'S STUDIES CURRICULUM

The Women's Studies curriculum at Tufts consists of many courses offered in a wide range of departments each semester.

WOMEN'S STUDIES >
WORLD CIVILIZATIONS >
WORLD LITERATURE >
WRITING ACROSS THE CURRICULUM >

For more detailed information, please visit the Web site <http://ase.tufts.edu/womenstudies/>.

World Civilizations

DIRECTOR:

Professor Vida T. Johnson, *German, Russian, and Asian Languages and Literatures*

The program provides an interdisciplinary introduction to the world's cultural traditions. In each course a central theme is examined chronologically in representative societies. Every class is team-taught by faculty from various disciplines.

The courses offer a comparative approach to the development of world cultures. Interactions between societies and the role played by various social groups in the creation of each civilization are emphasized.

The program imparts basic knowledge of the cultures that have flourished on the planet, while fostering an awareness of the past and its impact on the present. It proceeds from the conviction that all parts of the university and all parts of the globe can speak to the same fundamental issues.

For more information on the program, call 617-627-3442. The World Civilizations office is located in the Department of German, Russian, and Asian Languages and Literatures, Olin Building, Room 326.

World Literature

The nine world literature courses listed below are taught in English, with readings in translation. World literature also includes departmental offerings in literature in translation, and in literary theory, also listed below. At the discretion of individual departments, or the Committee on Plans of Study, these courses may be accepted toward fulfillment of concentration requirements. Students interested in the major in international letters and visual studies should see the requirements under that listing.

For more information about world literature, contact Professor Joel Rosenberg, Department of German, Russian, and Asian Languages and Literatures, Olin Center.

COURSE OFFERINGS IN WORLD LITERATURE

The course offerings are intended to provide an overview of world literatures at Tufts, including courses incorporating literature, arts, cultural history, and/or contemporary cultural experience or courses otherwise highly useful to students of literature. See appropriate departmental listings for course descriptions. For fuller listing of literature courses in the Anglo-American tradition, see listings in the following departments and programs: American Studies, Drama, English.

For world literatures in their original languages, see listings in the following departments: Classics; German, Russian, and Asian Languages and Literatures; Romance Languages.

Writing Across the Curriculum

DIRECTORS: **Professor Jan Pechenik**, *Biology*

Writingworkshop (ww) courses are part of the Writing-Across-the-Curriculum program at Tufts. Each semester, the program sponsors approximately twenty courses; many departments offer several ww courses each year. Writing workshop courses emphasize informal (ungraded) writing and revision: writing is a tool that lets us examine, refine, clarify, and share our ideas and our questions.

Writing workshops stress exploratory, getting-started stages of papers, proposals, or reports. As part of their instruction in ww courses, students work closely with each other and the instructor as they define topics and revise drafts. In addition, ww courses offer students the opportunity to develop their public speaking skills; writing clearly and convincingly on any subject is easier after talking it through. Students will always find an attentive audience in a writing workshop.

Writing workshop courses meet for an additional fifty minutes each week. Students do not earn additional course credit for taking a writing workshop but receive recognition on their transcripts. Most importantly, students learn important skills that are less frequently emphasized in other course formats. Enrollment is limited to twenty students, but most classes are smaller.

Except in certain mathematics and engineering courses, prerequisites are English 1 and 2, or their equivalents. Additionally, some courses have prerequisites specified by the department.

For complete course descriptions, see the writing workshop course booklet published each semester three weeks prior to registration. Course offerings vary each semester. If you have any questions about specific courses, contact the instructor or your advisor.

The program office is located in Dowling Hall, Suite 720, 617-627-2052. For more information, visit <http://ase.tufts.edu/wac>.

Research and Educational Centers

Bioengineering Center

Professor David Kaplan, *Director*
Dr. Bruce Panilaitis, *Program Coordinator*

The center is located in the Science and Technology Center, 4 Colby Street. For more information, call 617-627-3607.

Center for Applied Child Development

Lynn Schade, *Director*

The center is located at 177 College Avenue. For more information, visit http://ase.tufts.edu/cacd_outreach or call 617-627-2892.

Center for Cognitive Studies

University Professor and Austin B. Fletcher
Professor of Philosophy Daniel C. Dennett,
Codirector
Seth Merrin Chair in the Humanities and Professor of Philosophy Ray Jackendoff, *Codirector*

The center is located in 111 Miner Hall. For more information, visit <http://ase.tufts.edu/cogstud> or call 617-627-3297.

Center for Engineering Educational Outreach

Professor Chris Rogers, *Director*

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The center is located in 102 East Hall. For more information, call 617-627-2133 or e-mail ayesha.jalal@tufts.edu.

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For more information, visit www.tufts.edu/as/tampl/, e-mail pwong@tufts.edu, or call 617-627-5162.

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Placido Arango, M.A., A81P, A84P (1987–1996)
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 M79P, M82P (1981–1991)**
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Edward H. Budd, B.S., J80P, J86P (1993–2003)
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**Allan D. Callow, B.S., M.S., M.D., Ph.D. Sc.D., J55P, J71P,
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**Warren Ellis Carley, B.A., LL.B, A62P, J64P, D66P
 (1964–1981)**
Robert S. Cohen, B.A., M.S., Ph.D., L.H.D. (1984–1993)
**William S. Cummings, B.A., D.P.S., M97P, A97P
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 Robert Legvold, B.A., M.A., **M.A.L.D., Ph.D.** (1991–2001)
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 Inez Smith Reid, B.A., LL.B., M.A., Ph.D. (1988–1998)
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 Jane R. Scanlan, B.A., M.B.A. (1990–2002)
 William W. Sellers, B.S., **D.M.D, J84P** (1985–2000)
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- Daniel M. Abramson**, A.B., M.A., Ph.D., Harvard University, Associate Professor of Art History (1998)
- Linda M. Abriola**, B.S., M.S., M.A., Ph.D., Professor of Civil and Environmental Engineering (2003)
- Mohammed Afsar**, B.S., M.S., Ph.D., University of London, Professor of Electrical Engineering (1987)
- Julian Agyeman**, B.Sc., M.A., Ph.D., University of London, Associate Professor of Urban and Environmental Policy and Planning (1999)
- Astier Almedom**, B.A., M.A., D.Phil., Oxford University, Professor of Practice in International Humanitarian Policy and Public Health, The Fletcher School, and inaugural Fellow, Institute for Global Leadership (2007)
- Juan M. Alonso**, B.A., M.A., Ph.D., Brown University, Professor of Spanish (1962)
- Mohammed Alwan**, B.A., M.A., Ph.D., Indiana University, Lecturer in Arabic (1996)
- Nalini Ambady**, Ph.D., Harvard University, Professor of Psychology (2004)
- Elizabeth Ammons**, B.A., M.A., Ph.D., University of Illinois, Harriet H. Fay Professor of Literature, Professor of English (1976)
- Valerie Anishchenkova**, B.A., M.A., Ph.D., University of Michigan, Lecturer in Arabic (2004)
- David Art**, B.A., Ph.D., MIT, Assistant Professor of Political Science (2006)
- Gloria Joyce Ascher**, B.A., M.A., Ph.D., Yale University, Associate Professor of German (1966)
- Joseph Auner**, B.A., M.A., Ph.D., University of Chicago, Professor of Music (2006)
- Paula Aymer**, B.Sc., M.A., Ph.D., Northeastern University, Associate Professor of Sociology (1990)
- Jody Azzouni**, B.A., M.A., M.S., Ph.D., City University of New York, Professor of Philosophy (1985)
- Laura Baffoni Licata**, Dottorato, University of Bologna (Italy); Ph.D., University of Connecticut, Senior Lecturer in Italian (1998)
- Diana Bailey**, M.Ed., Ed.D., OTR, Northeastern University, Associate Professor of Occupational Therapy (1986)
- Stephen M. Bailey**, B.A., M.A., Ph.D., University of Michigan, Associate Professor of Anthropology (1979)
- Laurie G. Baise**, B.S.E., M.S., Ph.D., University of California at Berkeley, Assistant Professor of Civil and Environmental Engineering (2000)
- Linda Bamber**, B.A., M.A., Ph.D., Tufts University, Associate Professor of English (1974)
- Cristelle Baskins**, B.A., Ph.D., University of California at Berkeley, Associate Professor of Art History (1997)
- Nancy Bauer**, A.B., M.T.S., Ph.D., Harvard University, Associate Professor of Philosophy (1999)
- Avner Baz**, M.A., Ph.D., University of Illinois at Chicago, Assistant Professor of Philosophy (2004)
- Linda Beardsley**, B.A., M.A., M.Ed., Tufts University, Lecturer in Education (1997)
- Gary Bedell**, B.S., M.A., Ph.D., OT, New York University, Assistant Professor of Occupational Therapy (2003)
- Jacob S. Benner**, B.A., M.S., University of Utah, Senior Lecturer in Geology (2002)
- Peter Bergethon**, B.A., M.D., Jefferson Medical College, Adjunct Associate Professor of Biomedical Engineering (2005)
- Harry Bernheim**, B.S., M.S., Ph.D., University of Michigan, Associate Professor of Biology (1979)
- Jane Bernstein**, B.A., M.Mus., Ph.D., University of California at Berkeley, Fletcher Professor of Music (1976)
- Jeffrey Berry**, A.B., M.A., Ph.D., Johns Hopkins University, John Richard Skuse, Class of 1941, Professor of Political Science (1974)
- Marina Umaschi Bers**, B.A., M.Ed., M.S., Ph.D., Massachusetts Institute of Technology, Assistant Professor of Child Development (2002)
- Jamshed Bharucha**, B.A., M.A., Ph.D., Harvard University, Professor of Psychology (2002)
- Marcelo Bianconi**, B.A., M.A., Ph.D., University of Illinois at Champaign-Urbana, Associate Professor of Economics (1989)
- Gretchen Biesecker**, B.A., Ph.D., Tufts University, Lecturer in Child Development (2007)
- Amahl Bishara**, A.B., M.A., Ph.D., New York University, Assistant Professor of Anthropology (2008)
- Emma Blake**, B.S., M.S., Ph.D., Cambridge University, Assistant Professor of Classics (2005)
- Jose Juan Blanco**, B.S., M.S., Ph.D., Tufts University, Assistant Professor of Physics and Astronomy (2006)
- Anselm C. Blumer**, B.A., M.Sc., Ph.D., University of Illinois at Champaign-Urbana, Associate Professor of Computer Science (1986)

- Bruce Boghosian**, B.S., M.S., Ph.D., University of California at Davis, Professor of Mathematics (2000)
- Christoph Börgers**, Ph.D., Courant Institute of Mathematical Sciences, New York University, Professor of Mathematics (1994)
- Rachel Bratt**, B.A., Ph.D., Massachusetts Institute of Technology, Professor of Urban and Environmental Policy and Planning (1976)
- Brian Brenner**, B.S., M.S., Massachusetts Institute of Technology, Professor of the Practice, Civil and Environmental Engineering (2004)
- Bárbara M. Brizuela**, M.A., Ed.D., Harvard University, Associate Professor in Education (2001)
- Carla Brodley**, B.A., M.S., Ph.D., University of Massachusetts at Amherst, Professor of Computer Science (2004)
- Daniel Brown**, A.B., M.A., Ph.D., Brown University, Associate Professor of German (1975)
- Drusilla Brown**, B.A., M.A., Ph.D., University of Michigan, Associate Professor of Economics (1983)
- Linfield Cutter Brown**, B.S., M.S., Ph.D., University of Wisconsin, Professor of Civil and Environmental Engineering (1970)
- Emily W. Bushnell**, B.A., Ph.D., University of Minnesota, Professor of Psychology (1979)
- Kathleen Camara**, B.A., M.A., Ph.D., Stanford University, Associate Professor of Child Development (1979)
- Christopher Cannizzaro**, Ph.D., Research Assistant Professor of Biomedical Engineering (2008)
- Alfred Jay Cantor**, B.A., Ph.D., University of California at Santa Cruz, Professor of English (1977)
- Caroline G. L. Cao**, B.Sc., M.Sc., Ph.D., University of Toronto, Associate Professor of Mechanical Engineering (2001)
- Gregory Carleton**, B.A., M.A., Ph.D., University of Michigan, Associate Professor of Russian (1992)
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- Janet Curran-Brooks**, B.S., M.Ed., OTR, Lecturer in Occupational Therapy (1995)
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- Joseph DeBold**, B.A., M.A., Ph.D., University of California, Professor of Psychology (1979)
- Rajeev Dehejia**, B.A., A.M., Ph.D., Harvard University, Associate Professor of Economics (2006)
- David Denby**, B.A., B.Phil., Ph.D., University of Massachusetts at Amherst, Lecturer in Philosophy (2003)

FACULTY >

Daniel C. Dennett, B.A., D.Phil., University of Oxford, University Professor, Fletcher Professor of Philosophy (1971)

Robert Devigne, B.A., M.A., M.Phil., Ph.D., Columbia University, Professor of Political Science (1991)

Robert Reinhold Dewald, B.S., Ph.D., Michigan State University, Professor of Chemistry (1965)

Deborah Digges, B.A., M.A., M.F.A., University of Iowa, Professor of Poetry (1986)

Patricia Foley DiSilvio, B.A., M.A., Dottorato, University of Florence (Italy); Ph.D., University of North Carolina, Senior Lecturer in Italian (2000)

Louis Dorfmann, B.S., M.S., Ph.D., University of California at Los Angeles, Associate Professor of Civil Engineering (2005)

Thomas A. Downes, B.A., M.A., Ph.D., Stanford University, Associate Professor of Economics (1994)

Virginia Drachman, B.A., M.A., Ph.D., SUNY at Buffalo, Arthur Jr. and Lenore Stern Chair in American History and Professor of History (1977)

Barbara Driscoll, B.A., M.A., Ph.D., University of Notre Dame, Lecturer in History (2004)

Kevin Dunn, B.A., M.A., Ph.D., Yale University, Associate Professor of English (1995)

John L. Durant, B.S., M.S., Ph.D., Massachusetts Institute of Technology, Associate Professor of Civil and Environmental Engineering (1996)

Veronica Eady, B.A., J.D., Hastings College of Law at the University of California, Lecturer in Urban and Environmental Policy and Planning (2002)

Ann Easterbrooks, B.A., M.S., Ph.D., University of Michigan, Professor of Child Development (1985)

Lee Charles Edelman, B.A., M.A., M.Phil., Ph.D., Yale University, Professor of English (1979)

Lewis Edgers, B.S.C.E., M.S., Ph.D., Massachusetts Institute of Technology, Professor of Civil and Environmental Engineering (1972)

Aurelie Edwards, Ph.D., Massachusetts Institute of Technology, Research Associate Professor of Chemical Engineering (2000)

Richard Cornelius Eichenberg, B.A., M.A., Ph.D., University of Michigan, Associate Professor of Political Science (1984)

Mary Eisenberg, B.A., M.S., Ph.D., Bank Street College of Education, Lecturer in Child Development (2007)

David Elkind, B.A., Ph.D., University of California at Los Angeles, Professor of Child Development (1978)

George Ellmore, B.A., M.A., Ph.D., University of California at Berkeley, Draupner Ring Scholar, Associate Professor of Biology (1980)

Sheila Emerson, B.A., M.A., Ph.D., Rutgers University, Associate Professor of English (1985)

Amira El-Zein, B.A., M.A., D.E.A., M.A., Ph.D., Georgetown University, Assistant Professor of Arabic (2001)

James G. Ennis, B.A., M.A., Ph.D., Harvard University, Associate Professor of Sociology (1983)

Susan G. Ernst, B.A., Ph.D., University of Massachusetts at Amherst, Professor of Biology (1979)

Ioannis Evrigenis, B.A., M.Sc., A.M., Ph.D., Harvard University, Assistant Professor of Political Science (2005)

Leila Fawaz, B.A., M.A., Ph.D., Harvard University, Issam M. Fares Chair in Lebanese and Eastern Mediterranean Studies, Professor of History (1978)

Sergio Fantini, Ph.D., University of Florence, Professor of Biomedical Engineering (1999)

Ross S. Feldberg, B.S., M.S., Ph.D., University of Michigan, Associate Professor of Biology (1975)

David Henry Feldman, A.B., Ed.M., Ph.D., Stanford University, Professor of Child Development (1974)

Jianping Feng, B.A., M.A., Ph.D., SUNY Albany, Lecturer in Chinese (2006)

Denis William Fermentat, B.S., M.S., Ph.D., Northeastern University, Associate Professor of Electrical Engineering (1958)

Felipe Fernandez-Armesto, B.A., M.A., Ph.D., Magdalen and St John's Colleges, Oxford University, Prince of Asturias Chair in Spanish Culture and Civilization, Professor of History (2005)

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Liliane Arnet, M.A., Lecturer in French

John Arata, Ph.D., Lecturer in Mechanical Engineering

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Margaret Barringer, M.C.P., Lecturer in Urban and Environmental Policy and Planning

Daniela Bartalesi-Graf, M.A., Lecturer in Italian

Nina Barwell, B.M., Lecturer in Music

Carl Beckman, M.F.A., Lecturer in English

Aida Belansky, B.A., Lecturer in Spanish

Angel Berenguer, Ph.D., Adjunct Professor of Spanish

Juliana Berte, M.A., Lecturer in Spanish

David D. Boas, Ph.D., Research Assistant Professor of Electrical Engineering

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Virginia Brereton, Ph.D., Lecturer in English

Hazel V. Bright, M.A., Lecturer in English

Robert Burdick, J.D., Adjunct Associate Professor of Urban and Environmental Policy and Planning

Edward Butler, M.D., Clinical Associate Professor of Community Health

Brian Brenner, M.S., Lecturer in Civil and Environmental Engineering

Molly Campbell, M.S., Lecturer in Occupational Therapy

Alix Cantave, M.S., Lecturer in Urban and Environmental Policy and Planning

Anne Cantú, M.A., Lecturer in Spanish

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- Allan Chase**, M.A., Lecturer in Music
Bonnie Chakravorty, Ph.D., Lecturer in Community Health
Mary Lee Cirella, B.M., Lecturer in Music
Terrell Clark, Ph.D., Lecturer in Child Development
Allan Clemow, M.S., Lecturer in Mechanical Engineering
Carolyn Cohen, Ph.D., Lecturer in Psychology
Larry Cohen, M.S., Lecturer in Civil and Environmental Engineering
Yael Cohen, B.A., Lecturer in Hebrew
Ellen S. Cohn, M.Ed., Lecturer in Occupational Therapy
Kerri Conditto, M.A., Lecturer in French
Thomas Connolly, Ph.D., Lecturer in Drama
Mary Costello, B.M., Lecturer in Music
Christine Cousineau, Arch.A.S./M.C.P., Lecturer in Urban and Environmental Policy and Planning
Janet Curran-Brooks, Ed.M., Lecturer in Occupational Therapy
Margery Davies, Ph.D., Lecturer in Child Development
Teresa Davis, Ed.D., Lecturer in Education
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Mark Doughtie, B.S., University of Massachusetts (1978)
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Cornelius Putnam, B.A., M.Ed., Springfield College (1984)
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Paul J. Sweeney, B.A., University of New Hampshire (1993)
Cora Thompson, B.S., M.Ed., Tufts University (2001)
John M. Walsh, B.S., Amherst College (2001)
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EMERITI/AE FACULTY AND STAFF

Daniel Cary Abbott, A.M., Emeritus Associate Professor of Music (1958–1997)
Gustavo Alfaro, Ph.D., Emeritus Professor of Romance Languages (1978–2001)
Thomas J. Anderson, Jr., Ph.D., Emeritus Fletcher Professor of Music (1972–1990)
Sylvan Barnett, Ph.D., Emeritus Fletcher Professor of English Literature (1954–1992)
Hugo Adam Bedau, Ph.D., Emeritus Fletcher Professor of Philosophy (1966–1999)
Gregory Dionysios Botsaris, Ph.D., Emeritus Professor of Chemical Engineering (1965–2004)
Helen Morris Cartwright, Ph.D., Emerita Professor of Philosophy (1968–1998)

Rocco John Carzo, M.Ed., Emeritus Professor of Physical Education, Director of Athletics, and Commencement Marshal (1966–1999)
Madeline Harrison Caviness, Ph.D., Mary Richardson Emeritus Professor of Art History (1972–2007)
David Cavitch, Ph.D., Emeritus Professor of English (1972–2001)
Li-Li Ch'en, Ph.D., Emerita Professor of Chinese (1972–1994)
Alan J. Clayton, Ph.D., Emeritus Professor of French (1965–1986)
Teruko Craig, B.A., Emerita Senior Lecturer in Japanese (1984–1995)
William J. Crochetiere, Ph.D., Emeritus Professor of Mechanical Engineering (1967–2003)
Benjamin Dane, Ph.D., Emeritus Professor of Biology (1966–2002)
Mark DeVoto, Ph.D., Emeritus Professor of Music (1981–2000)
Allen Edward Everett, Ph.D., Emeritus Professor of Physics (1960–2003)
Sylvia Gruber Feinburg, Ed.D., Emerita Professor of Child Development (1964–1999)
Mary Ella Feinleib, Ph.D., Emerita Professor of Biology (1965–1995) **Michael Fixler**, Ph.D., Emeritus Professor of English (1961–1994)
Ivan Galantic, Ph.D., Emeritus Professor of Art History (1971–1989)
Vlasios Georgian, Ph.D., Emeritus Associate Professor of Chemistry (1960–1990)
Thomas R. P. Gibb, Jr., Ph.D., Emeritus Professor of Chemistry (1952–1981)
John Schuyler Gibson, Ph.D., Emeritus Professor of Political Science (1963–1995)
Ronald B. Goldner, Ph.D., Emeritus Professor of Electrical Engineering (1964–2005)
Robert Gonsalves, Ph.D., Emeritus Professor of Electrical Engineering (1985–2004)
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Nancie Greenman, Ed.M., Emerita Associate Professor of Occupational Therapy (1971–1992)
Robert Greif, Ph.D., Emeritus Professor of Mechanical Engineering (1966–2008)
N. Bruce Hanes, Ph.D., Emeritus Professor of Civil Engineering (1961–1992)
Edward Shilling Hodgson, Ph.D. Emeritus Professor of Biology (1968–1989)
F. Sheppard Holt, Ph.D., Emeritus Professor of Mathematics (1955–1985)
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William Francis Reynolds, Ph.D., Emeritus William Walker Professor of Mathematics (1957–1998)

Philip Bowen Sampson, Ph.D., Emeritus Moses Hunt Professor of Psychology (1955–1992)

James William Schlesinger, Ph.D., Emeritus Associate Professor of Mathematics (1964–2000)

Bradbury Seasholes, Ph.D., Emeritus Associate Professor of Political Science (1963–1995)

Lynda Norene Shaffer, Ph.D., Emerita Professor of History (1972–2002)

Yaacov Shapira, Ph.D., Emeritus Professor of Physics (1987–2007)

Saul Abraham Slapikoff, Ph.D., Emeritus Associate Professor of Biology and American Studies (1966–1998)

Howard Mitchell Solomon, Ph.D., Emeritus Professor of History (1971–2003)

G. Robert Stange, Ph.D., Emeritus Harriet H. Fay Professor of English Literature (1967–1984)

Charles Edward Stearns, Ph.D., LL.D., Emeritus Henry Bromfield Pearson Professor of Natural Science (1954–1987)

Rudolf Francis Storch, Ph.D., Emeritus Associate Professor of English (1965–1988)

Mary Ann Sturtevant, M.Ed., Emerita Professor of Physical Education (1962–1994)

Leila Aline Sussman, Ph.D., Emerita Professor of Sociology (1966–1992)

Samuel Sutcliffe, Ph.D., Emeritus Associate Professor of Civil and Environmental Engineering (1964–1994)

Sarah Meiklejohn Terry, Ph.D., Emerita Associate Professor of Political Science (1978–2002)

Jack Robert Tessman, Ph.D., Emeritus Professor of Physics (1955–1986)

Elizabeth Ahn Toupin, M.A., Emerita Associate Dean of Undergraduate Education (1968–1994)

Arthur Uhlir, Jr., Ph.D., Emeritus Professor of Electrical Engineering (1948–1994)

Albert Ullman, Ph.D., Emeritus Professor of Sociology (1946–1983)

Grant Urry, Ph.D., Emeritus Professor of Chemistry (1968–1994)

C. Burleigh Wellington, Ed.D., Emeritus Professor of Education (1952–1985)

John C. Wells, Ph.D., Emeritus Professor of German (1947–1983)

Barbara Ehrlich White, Ph.D., Emerita Adjunct Professor of Art History (1965–2002)

Kathleen Whitehead, Ph.D., Emerita Assistant Professor of Mathematics (1959–1985)

Ruth Whittredge, Ph.D., Emerita Professor of Romance Languages (1949–1974)

Stephen S. Winter, Ph.D., Emeritus Professor of Education (1971–1991)

Mary Frances Wright, B.S., M.Ed., Emerita Associate Professor of Physical Education (1945–1987)

John William Zarker, Ph.D., Emeritus Professor of Classics (1971–1989)

Marie Shack, B.A., M.S., Lecturer in Art Education

Tina Wasserman, B.A., M.A., Ph.D., Lecturer in Art History
Arts, Sciences, and Engineering Librarians

Miriam H. Allman, Associate Librarian, Science Bibliographer.

Christopher Barbour, Associate Librarian, Humanities Bibliographer

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Michael Rogan, Librarian, Music Librarian

Beth Rohloff, Assistant Librarian, Reference

Laurie Sabol, Librarian, Reference

Laura R. Walters, Associate Librarian, Assistant Director for Teaching and Research;

Head of Reference and Collections

SCHOOL OF THE MUSEUM OF FINE ARTS

Administration

Deborah Dluhy, B.A., Ph.D., Dean of the School, Deputy Director of Education

Loren Falk, B.S., Dean of the Faculty

Susan Lush, B.A., M.Ed., Associate Dean of Academic Affairs

David Brown, B.F.A., M.F.A., Associate Dean of Academic Affairs

Faculty

Hilary Binda, B.A., M.A., Ph.D., Lecturer in English

Pamela Bower, B.A., Lecturer in Art Education

Richard A. Brown, B.A., M.S., Ph.D., Lecturer in Psychology

Frederic Buehner, Diploma, Graduate Certificate, Lecturer in Art History

Patrick Carter, B.F.A., M.F.A., Coordinator, Tufts studio courses

Susan A. Denker, B.A., M.A., Lecturer in Art History

James Dow, B.F.A., M.F.A., Lecturer in Art History

Eulogio Guzman, B.A., M.A., Ph.D., Lecturer in Art History

Megan Hughes, B.A., Lecturer in Art History

Diane O'Donoghue, B.A., M.A., Ph.D., Lecturer in Art History

College of Liberal Arts and Jackson College

The College of Liberal Arts and Jackson College have a coordinate relationship and together offer courses of study leading to the degrees of bachelor of arts and bachelor of science. From the student's point of view the two colleges are coeducational and indistinguishable. All references to the College of Liberal Arts in this bulletin are to these two combined colleges.

School of Engineering

The School of Engineering offers undergraduate and graduate degrees in several areas of engineering and computer science. The school offers courses leading to degrees of bachelor of science, master of science, master of engineering, master of science in engineering management, and doctor of philosophy. There are also combined programs with the School of Arts and Sciences, the School of Medicine, the School of Dental Medicine, the Fletcher School of Law and Diplomacy, and the Gordon Institute.

Graduate School of Arts and Sciences

The Graduate School of Arts and Sciences offers programs of study leading to the degrees of master of arts, master of science, master of fine arts, master of arts in teaching, master of public policy, doctor of philosophy, and doctor of occupational therapy.

College of Special Studies

The College of Special Studies, in conjunction with the School of the Museum of Fine Arts, Boston, offers courses of study leading to the degree of bachelor of fine arts. The college also offers continuing education programs in liberal arts and engineering fields through the Office of Graduate Studies.

ACCREDITATION OF TUFTS UNIVERSITY

A privately endowed New England institution founded in 1852.

Faculty of Arts, Sciences, and Engineering

Colleges of Liberal Arts and Jackson, Graduate School of Arts and Sciences, and College of Special Studies: New England Association of Schools and Colleges
November 2003

School of Engineering

Accreditation Board for Engineering and Technology, Inc.
July 2006

Boston School of Occupational Therapy

Professional Entry Level Occupational Therapy Program: Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA)
April 2005

The Fletcher School of Law and Diplomacy

New England Association of Schools and Colleges
November 2003

School of Dental Medicine

Commission on Dental Accreditation of the American Dental Association
July 2001

School of Medicine

Liaison Committee on Medical Education of the American Medical Association and the Association of American Medical Colleges
June 2006

Graduate Programs in Public Health:

Council on Education for Public Health
October 2002

Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy

New England Association of Schools and Colleges
November 2003

Sackler School of Graduate Biomedical Sciences

New England Association of Schools and Colleges
November 2003

Cummings School of Veterinary Medicine

American Veterinary Medical Association
March 2005

Scholarship Funds

University scholarship funds available to students in the College of Liberal Arts, Jackson College, and the School of Engineering are listed in this section. The endowment of the university's scholarship funds has been invested and the income is used to provide financial aid to students as described in the financial aid section.

Scholarship funds intended solely for Jackson College are preceded by an asterisk.

All of these funds are awarded based on financial need and the recipients are chosen by the financial aid office. No separate application is necessary.

The Alireza Family International Scholarship, established in 2000 to provide scholarships for highly qualified Muslim students who need financial assistance to be able to enroll at Tufts.

The Lizzie P. Allen Scholarship, founded in 1900 by Lizzie P. Allen, of Derby Line, Vermont.

The Alpha Sigma Phi Fraternity Fund, founded in 1981. Preference is given to descendants of alumni who were members of Alpha Sigma Phi at Tufts.

The Alfred E. Anderson Scholarship, established in 2002 to provide scholarship awards to United States citizens.

The Anderson Scholarship, founded in 1890 by John M. Anderson, of Salem, in the name of John M. and Rebecca Anderson.

The Arthur J. Anderson Scholarship, established in 1954 by Arthur J. Anderson of the Class of 1912.

The Gilbert A. and Robena J. Andrew Scholarship Fund, established in 1985 by the estate of Dr. Norman W. Andrew in honor of his parents to aid students in the field of premedical studies.

The Norman W. Andrew Scholarship Fund, established in 1985 by the estate of Norman W. Andrew to aid students in the field of biology.

The Jesse Moses Aronson Scholarship, established in 1951 by Jesse Moses Aronson of the Class of 1918, to be awarded each year to an outstanding applicant for admission to the School of Engineering who needs financial help to attend college.

***The Association of Tufts Alumnae, Inc. Scholarship**, established in 1957 for an annual scholarship to be awarded to a Jackson student who has completed one year successfully and is selected by a university committee, with the approval of the dean of Jackson College.

The Jack and Myrtle Atlas Scholarship, established in 1987 to provide financial aid to needy undergraduates, with preference to students from California.

The Eugene Averell and Elizabeth Harlow Averell Scholarship, established in 1952 by provision in the will of Eugene Averell of the Class of 1895, the income to be paid annually to a meritorious student.

The Cyrus V. Bacon and Ada B. W. Bacon Scholarship, founded in 1915 by Mrs. Ada B. W. Bacon, of Hingham, Massachusetts.

The Mitchell and Ruth Bacow Endowed Scholarship Fund, established in 2003 as part of the Pritzker Challenge to benefit outstanding undergraduate students of African American, Hispanic American, and Native American heritage.

The Crosby F. Baker Memorial Scholarship, established in 1955 by colleagues, friends, former students, and family in memory of Crosby F. Baker of the Class of 1910, member of the faculty from 1900 to 1954.

The Balfour Scholarship Fund, established in 1989 by a generous grant from the L. G. Balfour Foundation to aid talented minority students in need of financial assistance.

The George Stevens Ballard Scholarship, founded in 1910 by Caroline D. M. Ballard, of Augusta, Maine.

The Almon Ballou, Carolyn Clark Scholarship, established in 1954 by Carolyn Clark Bigelow of the Class of 1900 in memory of her grandfather, Almon Ballou.

The Hosea Ballou II Memorial Scholarship, founded in 1891 by Mrs. Mary T. Goddard, of Newton, Massachusetts.

The Latimer W. Ballou Scholarship, founded in 1898 by Latimer W. Ballou, of Woonsocket, Rhode Island.

The Barnard Scholarships, founded in 1897 by Mrs. Caroline M. Barnard, of Everett, Massachusetts.

The John K. and Margaret G. Baronian Scholarship, established in 1977 by John Baronian, A'50, in memory of his parents, who provided the inspiration for his pursuit of education. It was with the desire to help others to pursue their educational goals that this memorial scholarship was given.

The Henry F. Barrows Scholarship, founded in 1891 by Henry F. Barrows, of North Attleboro, Massachusetts.

The Nancy Bartlett Scholarship, founded in 1897 by Mrs. Nancy Bartlett, of Milford, Massachusetts.

The BayBank Middlesex Scholarship, founded in 1980 by BayBank Middlesex of Burlington, Massachusetts.

The Walter P. Beckwith Scholarship Fund, established in 1947 under the will of Hira R. Beckwith, of Claremont, New Hampshire, the income to be used to assist worthy young men in acquiring a college education.

The Beelzebub Silver Anniversary Scholarship Fund, established in 1988 by the Beelzebub Alumni Association to provide scholarship to needy undergraduates who are members of the Beelzebubs.

The Rose Bendetson Memorial Scholarship Fund.

This fund has been established by Mr. and Mrs. Norris Bendetson as a memorial to the mother of Norris Bendetson, A'41. The gift is to be used for needy and deserving students, with preference given to those who are residents of Haverhill, Massachusetts.

The Bendheim Family Scholarship, founded in 1985 by the family of Thomas L. Bendheim, A'85, of Scarsdale, New York, to enrich the diversity of the student body in the College of Liberal Arts and Jackson by supporting a student of high scholastic standing and limited means, with preference to students from the five boroughs of New York City.

The Bendheim Family Study Abroad Scholarship, established in 1999 to provide financial support to Tufts students studying abroad.

The Dr. Karl T. Benedict Sr. and Daisy Benedict Scholarship Fund, established in 2004 to provide financial aid to students in the Tufts College of Liberal Arts.

The Andrea Caponigro Berthel Scholarship, established in 1990 by friends and family of Andrea Caponigro Berthel, a former member of the Tufts University trustees' office. This is the first scholarship in Tufts' history to be named in honor of a staff member. The income from this fund will be awarded annually to two deserving students who are graduates of Medford and Malden high schools. The scholarship is to be based on merit as well as need.

The Ronald Blackburn Scholarship, established in 1986 in memory of Ronald Blackburn to provide financial assistance to African-American students. Selection of the recipients will be based on record of achievement, potential for leadership, and demonstrated financial need.

The John Twiss Blake Fund, established in 1990 by the estate of John Twiss Blake to assist students in the School of Engineering.

The Newman Peter and Genevieve Blane Birk Scholarship, for worthy, deserving, and able students in the College of Liberal Arts and Jackson. Founded in 1984 in memory of two Braker Fellows who became distinguished professors of English at Tufts.

The Sophie and Arthur Blecker University Scholarship Fund, established in 1989 by Susan Blecker Cohen, J'66; George Cohen; Marcia Zaroff Blecker, J'69; and Robert Blecker, T'69, is awarded to a student entering the College of Liberal Arts and Jackson who has financial need, and who holds the promise of superior achievement as an undergraduate.

The Joseph A. Boccino Boston Post Society of Military Engineers Scholarship, established in 2007 to assist in finding the education of a student residing in

Massachusetts, Northeastern Connecticut, Northern Rhode Island or Southern New Hampshire, enrolled in the civil or environmental engineering program.

The Elizabeth Warren Bond Scholarship Fund, founded in 1933 for deserving Jackson students.

The Margaret Helen Bond Scholarship, founded in 1933 for deserving Jackson students.

The Charles and Fannie A. Miner Booth Scholarship, founded in 1900 by Charles Booth, of Springfield, Vermont.

The Kennison T. Bosquet Scholarship Fund, established in 1977 by the bequest of the late Mr. Bosquet, whose wife Elizabeth was a member of the Jackson College Class of 1931. The income is to be awarded for scholarships at the discretion of the university.

The Laurie Bove Scholarship, established in 1996 in memory of Laurie Bove of the Class of 1984 by her family and friends, to provide financial aid to female residents of Medford, who come to Tufts with an interest in occupational therapy.

The Ellen F. Bragg Scholarship Fund, founded in 1928 to provide scholarships for students in the College of Letters showing the greatest intellectual and moral excellence.

The Henry W. Bragg Fund Scholarships, founded in 1936 by Henry W. Bragg.

The Dr. and Mrs. William F. Brennan and Family Scholarship, established in 2002 to provide aid to worthy and promising undergraduate students who are determined to be in need of scholarship funds.

The Ron Brinn Scholarship Fund, established in 1999 in honor of Ron Brinn, A'58, Tufts Director of Alumni Relations for sixteen years, to provide financial aid to needy students of the College of Liberal Arts and Jackson and the School of Engineering.

Budd Family Scholarship, established in 1996 by Edward H. Budd, A'55, and his family, to aid junior and seniors with a GPA of 3.0 or better who have demonstrated involvement in and dedication to enriching campus life at Tufts.

The Wellington Burnham Fund Scholarships, created by a bequest from Wellington Burnham of the Class of 1931.

The Edith Linwood Bush Scholarship, established during the Second Century Fund campaign by classmates, former students, and friends in honor of Edith Linwood Bush of the Class of 1903, member of the faculty from 1920 to 1952, and dean of Jackson College from 1925 to 1952.

The Richard Perry Bush Scholarships, founded in 1910 by Mrs. Caroline M. Barnard, of Everett, Massachusetts.

The Francis Buttrick Fund for Scholarships, preferably for men from Waltham, Massachusetts.

The Godfrey Lowell Cabot Scholarship, established in 1951 by the Cabot Carbon Company in honor of Godfrey Lowell Cabot, the income to be used as a yearly scholarship to a deserving student of the School of Engineering.

The Cabot Corporation Scholarship Fund, established in 1955 by Godfrey L. Cabot, Inc., of Boston, the income to be used for scholarship aid for deserving students in any school or department of the university. In making the awards, preference is to be given to an otherwise qualified son or daughter of an employee of Godfrey L. Cabot, Inc., and its subsidiary companies.

The Calef Permanent Fund, given by Ira C. Calef in 1917 to provide scholarships for young men or women.

The Callahan-Lee Scholarship Fund, established in 1993 to provide scholarships to undergraduate students in need of financial aid with preference given to students from Swampscott and Gardner, Massachusetts, and Windham, New Hampshire.

The John A. Cataldo Scholarship, established in 1989 by Mr. Cataldo, E'46, to provide a full-tuition scholarship to be awarded annually to one or two meritorious students in the Department of Civil and Environmental Engineering.

The Lucille Cesari, J'52, Endowed Scholarship, established in 2000 to provide scholarships to Tufts undergraduate students with financial need.

The Annie, Leon, and Madeline Chalfen Fund, endowed in 1963 for undergraduate scholarships.

The Edwin H. Chapin Memorial Scholarship, founded in 1891 by friends of Edwin Hubbell Chapin, D.D., of New York City.

The Ralph Stillman Charles, Jr., Scholarship, established in 1960 by Ralph S. Charles of the Class of 1923 and Mary Grant Charles, Jackson Class of 1920, in memory of their eldest son (1924–1934), for the benefit of any deserving students in any of the three colleges—Liberal Arts, Engineering, or Jackson—at the discretion of the college authorities.

The Kathryn Cassell Chenault J'77 Scholarship, established in 2002 to help attract, retain, and prepare talented African American students who will make important leadership contributions to Tufts and to our global community. The Chenault Scholarship is part of the Jay Pritzker family of scholarships.

The Joseph R. Churchill and Anna Quincy Churchill Scholarship Funds, established in 1971 under the will of Mary C. Churchill to honor her husband and her daughter, Dr. Anna Quincy Churchill, M'17, Assistant Professor of Anatomy *Emerita*, to provide scholarships

to students of biology (preferably botany).

The Charles P. Ciaffone and Lloyd W. Pote Scholarship, established in 1982 by Charles Ciaffone of the Class of 1941 and Lloyd Pote of the Class of 1937, the owners, and other employees of CPC Engineering of Sturbridge, Massachusetts. The income from this fund is to be awarded yearly to a deserving engineering student as determined by the faculty of the School of Engineering.

The Centennial Class of 1952 Endowed Scholarship, established in 2004, to be awarded to an undergraduate student, man or woman, from the School of Arts and Sciences or the School of Engineering. Recipients should meet the following criteria: commitment to community service, high academic standing, and demonstrated financial need. It is the hope of the Centennial Class of 1952 that recipients will always be loyal to their alma mater and will respond to the needs of the university by giving back in time and substance.

The Andrew J. Clark Memorial Scholarship, founded in 1891 by Mrs. Abbie B. Clark, of Orange, Massachusetts.

The Class of 1904 Scholarships, founded in 1930 and substantially increased during the Second Century Fund campaign by the men and women of the Class of 1904.

The Class of 1911 Scholarships. The 1911 Class Scholarships are awarded from the Class of 1911 Fund.

***The Class of 1913 Women's Memorial Scholarship Fund**, established in 1925 by the women of the Class of 1913 to be used for Jackson undergraduates who need financial assistance at a time of emergency and need.

The Class of 1919 Scholarship, established at the fiftieth reunion of the Class of 1919 in honor of Dean George S. Miller, A'06. The income from this fund is to be awarded annually to an undergraduate in the College of Liberal Arts and Jackson or the School of Engineering in accordance with Tufts's student aid policies.

The Class of 1920 Scholarship Fund, established by the members of the Class of 1920, Liberal Arts, Engineering, and Jackson College, on the occasion of the fiftieth anniversary of their graduation from Tufts. The fund aids deserving undergraduates with demonstrated financial need, as determined by the university's financial aid office. The terms of the Class of 1920 Scholarship Fund stipulate that a woman undergraduate must be among the recipients of the fund's benefaction not less than once every three years.

The Class of 1923 Scholarship Fund, to be awarded as directed by officers of the class.

The Class of 1926 Scholarship, founded in 1951 by the men and women of the Class of 1926, as their twenty-fifth reunion gift to the college, to be awarded in rotation to students in the College of Liberal Arts one

year, Jackson College the next year, and the School of Engineering the third year.

The Class of 1928 Scholarship, founded in 1955 by the men and women of the Class of 1928, the income to be awarded to deserving students in Tufts College or Jackson College.

The Class of 1933 Scholarship Fund, established in 1990 by members of the Class of 1933 to provide scholarship funds for future students.

The Class of 1935 Scholarship, established in 1996 by members of the Class of 1935 to provide financial aid to deserving undergraduate students.

The Class of 1939 Memorial Scholarship, established in 1948 by the men and women of the class in memory of their classmates who gave their lives in World War II.

The Class of 1940 Memorial Scholarship, established in 1956 by the men and women of the Class of 1940, the income to be awarded on the joint bases of merit and need to undergraduate students, preference being given to descendants of the Class of 1940 who are otherwise qualified.

The Class of 1943 Scholarship, established in 1996 by members of the Class of 1943 to provide scholarship aid for future Tufts students.

The Class of 1944 Scholarship, established in 2000 by men and women of the Class of 1944 to be awarded annually to an undergraduate in the College of Liberal Arts, Jackson College, or the School of Engineering on the basis of need and merit as shown by outstanding scholarship and qualities of leadership in student and community activities. Preference is given to descendants of the Class of 1944 or other legacies whenever possible.

The Class of 1947 Victor Prather Scholarship Fund, established by the Class of 1947 on the occasion of their twenty-fifth reunion to memorialize a respected friend and classmate. Victor A. Prather, Jr., A'47, M'52, was a flight surgeon assigned to aviation and space medicine research when he lost his life at the end of a high-altitude flight in a strato-lab balloon designed for space equipment testing. He was a scholar devoted to the advancement of knowledge, and he was a leader uncompromising in his ideals. Financial assistance is awarded to students who meet the university's criteria for need and who demonstrate in their studies the same enthusiasm for learning that Victor Prather did in his lifetime.

The Class of 1952 Endowed Scholarship, established in 2004, to be awarded to an undergraduate student, man or woman, from the School of Arts and Sciences or the School of Engineering. Recipients should meet the following criteria: commitment to community service, high

academic standing, and demonstrated financial need. It is the hope of the Centennial Class of 1952 that recipients will always be loyal to their alma mater and will respond to the needs of the university by giving back in time and substance.

The Class of 1957 Scholarship, established in 2002 to be awarded to a Tufts undergraduate with good moral character, community service experience, high academic standing, and demonstrated financial need.

The Class of 1958 Scholarship Fund, established in 2003 for the benefit of Tufts students of the Faculty of Arts and Sciences.

The Class of 1959 Scholarship, established in 1984 for the benefit of future generations of Tufts students. This special endowment fund represented one of the major gifts made to Tufts by members of the Class of 1959 on the occasion of their twenty-fifth reunion, and it has been substantially increased by classmates on a continuing basis over the years thereafter. Income from this fund is to be awarded annually on a combined basis of merit and need to one or more deserving undergraduate students in accordance with Tufts financial aid policies, with preference to be given to descendants of the Class of 1959 who are otherwise deemed to be fully qualified.

The Class of 1960 Scholarship, established by members of the Tufts Class of 1960 to provide aid to a deserving student who is an undergraduate.

The Class of 1961 Scholarship, established in 2001 by members of the Tufts Class of 1961 to provide financial aid to worthy and promising students with financial need, with preference to students who have demonstrated service to the community.

The Class of 1962 Scholarship, established in 1962, to provide scholarships to undergraduate students in the Faculty of Arts and Sciences. First preference is given to students who are direct descendants of members of the Class of 1962.

The Class of 1963 Scholarship Fund, established in 2003 in honor of the Class of 1963 and in memory of those who are no longer with us, will be awarded to an undergraduate student who is of good character, with proven academic achievement, a commitment to active citizenship, and demonstrated financial need. The Class of 1963 is especially committed to helping individuals who have overcome significant obstacles in order to attend Tufts University. It is their hope that the recipients of this scholarship will form lifelong connection with the university and through their service and support become role models for others.

The Class of 2000 Scholarship, established in 2000 by

members of the Class of 2000 to provide scholarships to Tufts undergraduate students with financial need.

The Henry E. Cobb Scholarship, founded in 1891 by Henry E. Cobb, of Boston.

The Lloyd H. and Ruth M. Coffin Scholarship, established in 1952 by Mr. and Mrs. Lloyd H. Coffin, of Marblehead, Massachusetts.

The Monte Cohen Scholarship Fund, established in 1972 in honor and memory of industrialist Monte Cohen, of West Newton, Massachusetts, by his son Leon H. Cohen of the Liberal Arts Class of 1948 and other members of the family. The income each year is distributed to an undergraduate student deemed worthy of such aid by the financial aid office.

The Ricky and Peter Cohen Family Scholarship Fund, established in 2003 as part of the Pritzker Challenge to be used to help Tufts attract, retain, and prepare talented African American, Hispanic American, and Native American students who will make important contributions to Tufts and to our global community.

The Sarah Rebecca and Myer Cohen Memorial Scholarship, established in 1951 in memory of Sarah Rebecca and Myer Cohen by Edward I. Cohen of the Class of 1919, his daughters Sandra and Jacquelyn Cohen, and James Cohen of the Class of 1921.

The Harold E. Collins Scholarship Fund, established by the will of Harold E. Collins, A'17, to assist needy and worthy students.

The Sherwood Collins Scholarship Fund, established in 1990 by an anonymous donor. Awarded to graduate students in drama.

The Conti-Dicken Family Scholarship Fund, established in 2004 to be awarded with preference to female students at Jackson College with limited means who possess high academic potential and a demonstrated commitment to achieving scholastic excellence in the study of arts and sciences.

The Katherine E. Coogan Scholarship, established in 1994 by Ruth E. Coogan in memory of her daughter, Katherine E. Coogan, Class of 1964, to be used for scholarships in economics for native-born Americans.

The Davis Cook Scholarship, founded in 1904 by Davis Cook, of Cumberland, Rhode Island.

The James M. and Emily Cook Scholarship, founded in 1903 by Henrietta J. States, of Boston.

The William Oscar Cornell Scholarship, founded in 1890 by William Oscar Cornell, of Providence, Rhode Island.

Cornfeld Scholars Program, established in 1989 by Dr. Robert M. Cornfeld, D'55, to provide financial assistance to undergraduate students who show exceptional promise to become future biomedical researchers.

The Sanda Countway Scholarship Fund, established by bequest of Sanda Countway, WA 1904. The income from this fund is to be used to provide financial assistance to deserving undergraduate students in Jackson College, the College of Liberal Arts, and/or the School of Engineering of Tufts University.

The Cousens Scholarship, founded in 1891 by John E. Cousens, of Brookline, Massachusetts, in the name of John E. and Sara C. Cousens.

The Howard E. Cousins Scholarship, established as a bequest in 1966 by the late Howard E. Cousins, of Arlington, Massachusetts, member of the College of Engineering, Class of 1909. The income from the invested principal shall be used to provide financial aid to students enrolled in the School of Engineering and qualifying for such aid, with preference to be given to residents of Salem and Arlington, Massachusetts.

The Stephen and Bessie Cowey Scholarship, established in 1990 by Thelma Cowey Swain, J'31, to honor her parents and to provide lasting assistance for Tufts students from the state of Maine.

The Annie L. Cox Scholarship Fund, established in 1946.

The George Howland Cox Scholarship, established in 1949 for the benefit of students of high scholastic standing who are in need of financial aid.

The Reverend Austin Crowe Scholarship Fund, established in 1987 in memory of Austin Crowe (brother of Blanche Haslam and father of Austin Crowe, Jr., A'61) to provide funds to aid worthy and needy students.

The Waldo O. Cummings Memorial Scholarship Fund gives preference to residents of Tyngsborough, Massachusetts.

The William M. Currier Scholarship Fund, established under the will of William M. Currier, of Quincy, Massachusetts. Preference given to residents of Georgetown or Danvers, Massachusetts.

The James O. Curtis Scholarship, founded in 1915 by Betsy B. Curtis, of Medford, Massachusetts.

The Isabella C. Cutler Scholarship Fund, established in 1985, in memory of Isabella Cutler, J'14, of Lexington, Massachusetts. Scholarships from the income of this fund are given to aid needy students, as requested by the donor.

The Florence D. Cwirko Scholarship, established in 1978 in memory of Florence D. Cwirko, J'47, by her mother Mrs. Julia Cwirko. Income is to be used to provide financial assistance to students in the undergraduate college.

The Boryana Damyanova International Students Scholarship Fund, established in 2006 to honor the memory of Boryana Damyanova, Class of 2006. The fund will provide scholarships for highly qualified interna-

tional students who need financial assistance to be able to enroll at Tufts.

The Benjamin H. Davis Scholarship, founded in 1897 by the Reverend B. H. Davis, of Weymouth, Massachusetts, for the benefit of students of the College of Liberal Arts who are preparing to enter the Christian ministry.

The Stephen G. Demirjian Scholarship, established in 2001 to provide aid to needy students of Armenian heritage first and secondarily to students of Greek heritage.

The Moses Day Scholarship, founded in 1880 by Moses Day, of Roxbury, Massachusetts.

The Dewar Scholarship, established in 1990 by the Dewar Foundation. Preference in awarding the scholarship is given to graduates of Oneonta Senior High School, Oneonta, New York.

***The Cora Polk Dewick Scholarship**, established during the Second Century Fund campaign by classmates and friends in honor of Cora Polk Dewick of the Class of 1896, Alumni Trustee 1920–1940.

The Catherine P. and Arland A. Dirlam Scholarship, established in 1949 by Catherine Price Dirlam, Class of 1927, and Arland A. Dirlam, of the Class of 1926, the income to be awarded in alternate years to a student in Jackson College and to a student in the School of Engineering.

The Leon E. Dix Memorial Scholarship.

The Frank C. Doble Scholarship, established in 1997 in memory of Frank Currier Doble, founder of the Doble Engineering Company, and a recipient of two Tufts degrees: bachelor of science in electrical engineering in 1911, and an honorary doctor of science in 1962. The income is awarded to worthy undergraduate students in the Department of Electrical and Computer Engineering.

The Doherty Family Scholarship, awarded with preference to students from Medford, Massachusetts. If in a given year no qualified students from Medford can be identified, preference will be given to students from surrounding communities. Preference will also be given to students who have wide-ranging interests and have proven themselves to be driven, energetic, and of high leadership potential.

The Abraham and Marianna Dranetz Endowed Scholarship, established in 2004 to provide scholarship to students in the Tufts School of Engineering who demonstrate financial need and high academic achievement. Preference is given to students enrolled in biomedical research programs in the engineering school.

The John Druker and Bertram A. Druker Scholarship Fund, the income to be used for scholarships or loans as determined by the director of the Office of Financial Aid.

The Priscilla N. Dunne Scholarship Fund, established in

1980 by Ms. Dunne, J'75, for students demonstrating need. Preference is given to those majoring in psychology.

The Elizabeth and Maxwell W. Dybiec Endowed Scholarship Fund, established in 1999 to be used for educational and scholarship purposes.

The William F. Eastwood A65 Scholarship, established on the occasion of his retirement in 2002, in honor of Bill Eastwood, A65, who worked in the Tufts Financial Aid Office for thirty-four years and who served as Director of Financial Aid for fifteen of those years. Preference shall be given to students with financial need from the North Shore of Massachusetts or the Upper Valley of Vermont and New Hampshire

The George W. Eaton Fund, established in 1942 by bequest of George W. Eaton, of Peabody, Massachusetts, the income to be expended in aiding poor and worthy students to secure an education at Tufts College.

The Carlos P. Echeverria Scholarship, established in 1951 by Carlos P. Echeverria of the Class of 1912.

The Thomas R. B. Edmands and Abbie Whittmore Edmands Scholarship Fund, established in 1973 by Anne Edmands Hall in memory of her parents.

The Eliot-Pearson Scholarship, awarded to a student major in the Eliot-Pearson Department of Child Development.

The Susan F. Emerson Scholarship, established by provision in the will of Susan F. Emerson, of Boston. To be awarded annually to a student in Tufts College who attains distinction in athletics as well as in scholarship.

The Frederick J. Emmett Scholarship, established in 1991 to benefit students in the Tufts School of Engineering.

The Environmental Engineering Scholarship, was established in 1990 by Martha M. Wyckoff E'77 to provide scholarships for undergraduate engineering students who are pursuing an interdisciplinary approach to the study of the environment."

The David R. and Betsy Banks Epstein Endowed Scholarship, established in 2005 to provide need based financial aid to Tufts undergraduate students studying theatre.

The Steven B. and Deborah Epstein Endowed Scholarship, established in 2006 to provide financial aid to African American, Native American, and Hispanic American students with financial need.

The James H. Farrell, Jr., Scholarship, founded in 1986 by James H. Farrell, Jr., of the Engineering Class of 1959, for the benefit of deserving students in need of financial aid. Income from the fund is to be awarded annually to one or more undergraduates in the College of Liberal Arts, Jackson College, or the School of Engineering.

Where feasible, the scholarship will be awarded with pref-

SCHOLARSHIP FUNDS >

erence given to graduates of Boston College High School.

***The Wilton B. and Helen R. Fay Memorial Fund**, established in 1979 by Helen R. Fay, the income of which shall be used to assist deserving needy students of Jackson College in acquiring a college education; preference to be given to young women whose homes shall be in Middlesex County, Massachusetts.

The Robert L. Feldman Scholarship, established in 1989 by Mr. Feldman, A'69, to aid worthy students in need of assistance in meeting their educational costs.

The Edward W. Fickett Scholarship, established in 1963 by bequest of Bertha D. Chellis in memory of the late Edward W. Fickett of the Class of 1896, the income to be awarded to a deserving student.

The Fickett Scholarship, established in 1944 under the will of the late Edward W. Fickett, of Somerville, as "The Fickett Scholarship in memory of my sister, M. Grace Fickett of the Class of 1896, the income of this fund to be awarded annually to a deserving student, either male or female, who is majoring in the Department of Education."

The Benjamin and Alice Finn Memorial Scholarship Fund, established in memory of the parents of Philip H. Finn of the Class of 1942 and Alvan D. Finn of the Class of 1945. Income from this fund is to be awarded on the basis of merit and need to an undergraduate, and every fourth year to a Fletcher School of Law and Diplomacy student.

***The Ella Bowker Flagg, Class of 1905 Scholarship Fund**, established in 1972 under the will of Ella Bowker Flagg of the Class of 1905 for the benefit of students in Jackson College.

The Austin B. Fletcher Scholarship, founded in 1905 by Austin Barclay Fletcher, of New York City.

The Morris and Freda Fraidin Scholarship Fund, established in 1986 by Stephen Fraidin in honor of his parents, to aid worthy students in the arts and sciences.

The Frischkorn Family Scholarship Fund, established in 2003 to provide financial aid to worthy and promising undergraduates who are actively engaged in the study of German or Economics

***The Volney Sewell Fulham Scholarships** for women of Jackson College.

The Parisis J. and Bessie Georgian Student Aid Fund, established in 1971 by gift of Parisis J. Georgian, to aid undergraduate students of Tufts University.

The Leona and John Ghublikian Educational Fund, established in 1989 by Leona and John R. Ghublikian, E'39, to provide scholarships to deserving students enrolled in the Department of Chemical and Biological Engineering.

The Luther Gilbert Scholarship, founded in 1902 by Mrs. Luther Gilbert, of Roxbury, Massachusetts.

***The Mary and Luther Gilbert Scholarships**, founded in 1902 and 1904 by Mrs. Mary C. Knight, of Roxbury, Massachusetts, for the benefit of women students.

The Calmon and Hortense Ginsberg Scholarship, founded in 1964 by Mr. and Mrs. Calmon Ginsberg, of New York City, for the benefit of worthy students in Tufts University.

The Herbert D. Goff Scholarship Fund, established in 1944 under the will of the late Herbert D. Goff, of Cranston, Rhode Island.

The Dr. James Laurence Golden and Helen Murphy Golden Scholarship Fund, established in 1982 by Maurene L. Golden of the Class of 1959, the income to be used to aid undergraduate students of proven academic promise and dedication in the arts and sciences, who have also displayed exceptional leadership and service within their hometowns or communities.

The Martha Goldthwaite Memorial Scholarship, founded in 1890 by Willard Goldthwaite, of Salem, Massachusetts.

The Alfred J. and Beverly Green Scholarship, founded in 1961 by Alfred J. and Beverly Green, of New York, the income to be awarded to an undergraduate or graduate student who needs financial aid.

The Mary Sheldon Green Scholarship, established in 2002 to provide financial aid to Tufts' undergraduate students.

The Mortimer Griffith Scholarship Fund, established to provide financial aid to needy students in the School of Engineering.

The Willis Wentworth Griffiths Scholarship, established in 1951 by William H. Griffiths of the Class of 1928, in memory of his father, Willis Wentworth Griffiths of the Class of 1899, to be awarded on the basis of need to a senior who has demonstrated leadership in worthwhile extracurricular activities.

The Mary L. Groce Scholarship, founded in 1906 by Mary L. Groce, of Roxbury, Massachusetts.

The Morris H. and Ethel M. Gudwin Scholarship Fund, established in 1999 by the will of Morris H. Gudwin.

The Emily E. Guild Scholarship, funded by the donor, of Brattleboro, Vermont, in 1964.

Marcy and Robert Haber Scholarship Fund, established in 1997 by Marcy and Robert Haber, E'79, G'80, to provide scholarships to students in the School of Engineering with immigrant parents.

The David N. Hadad Memorial Scholarship, founded in 1985 by his family and friends from the Class of 1980. Preference is given to students in the School of Engineering who come from greater Lawrence, Massachusetts.

The Frank Oliver Hall Memorial Scholarship, established in 1954 by the people of the Universalist Church of the Divine Paternity in the city of New York, in memory of Reverend Frank Oliver Hall, D.D., of the Class of 1884, Minister of the Universalist Church of the Divine Paternity from 1902 to 1918 and from 1929 to 1938, Professor of Homiletics in Tufts School of Religion from 1918 to 1929. The income of this fund is to be awarded annually, preference being given to a graduate student who is a member of the Church of the Divine Paternity.

The William J. Halligan Scholarship, established in 1953 by William J. Halligan of the Class of 1923, to be awarded annually to worthy students in the School of Engineering.

The Ronald E. Halvorsen Scholarship Fund, established in 1988 to provide scholarships to deserving students in the School of Engineering.

The George H. Hammond Memorial Scholarship, established in 1999 by colleagues, friends, and former students of Professor G. H. Hammond, E'35, in honor of his loyal service to Tufts for over 40 years as an outstanding teacher and mentor. The income is awarded to worthy undergraduates in the Department of Electrical Engineering and Computer Science.

The Roland Hammond Scholarship Fund, established in 1978 by Dr. Roland Hammond, A'98, H'39, in memory of his father, Roland Hammond, Class of 1868. Income shall be used only toward the payment of tuition or other charges of such worthy student or students as the officers of the college may select.

The Edward W. and Patricia C. Hanley Scholarship Fund, founded in 1983 to aid an appreciative undergraduate student at Tufts University.

The Hervey A. Hanscom Scholarship, established in 1954 by Hervey A. Hanscom, of Medford, Massachusetts. The income is to be used each year to aid a deserving boy, preferably a country boy from the state of Maine and/or the children of employees of Hervey A. Hanscom.

The Harold and Ruth Haskell Scholarships, established in 1951 by Harold and Ruth Sibley Haskell, both of the Class of 1906. The income from the fund is to be given to deserving students from the states of Delaware, Maine, and Massachusetts, in this order if possible.

***The Marian Titus Hayford Scholarship Fund**, established in 1977 by the late Mrs. F. Leslie Hayford, a graduate of the Women of Arts, Class of 1902, the income to be used for scholarships to one or more undergraduate women.

The William Randolph Hearst Endowed Scholarship, established in 1994 to provide scholarships for participants in training programs at the Lincoln Filene Center.

The Herbert and Elaine N. Heller Student Scholarship

Fund, established in 2003 to benefit underprivileged Jewish students at the School of Arts and Sciences and the School of Engineering.

***The Heptorean Club Scholarship**, founded in 1898 by the Heptorean Club of Somerville, and including the Gerta Colby Donnelly Fund. Awarded annually to a graduate of the Somerville High School who is already attending Tufts.

The Captain Charles C. Hersey Scholarship, established in 1989 under the will of Captain Hersey, A'30, to aid qualified students at Tufts College.

The Morris and Sid Heyman Memorial Fund, founded by Mrs. Sid L. Heyman in 1980 in memory of her late husband, Morris Heyman, Class of 1918. Awards are made to deserving students in the undergraduate electrical engineering program.

The Frederick Sherman Hickok Scholarship, established in 1963 under the will of Conde Wilson Hickok for the benefit of engineering students.

The Martin J. Higgins Memorial Scholarship Fund, established in 1987 by William Dougherty of the Class of 1960, in memory of Martin J. Higgins, student leader, outstanding athlete, enthusiastic alumnus, and respected colleague. The income from this fund is to be awarded annually to a deserving undergraduate student in the College of Liberal Arts or Jackson College.

The Clara Bell Hight Scholarship Fund, established under the provisions of the Clara Bell Hight Trust as a permanent scholarship fund. The income generated from the principal is to be used for financial assistance to needy and deserving students enrolled in Tufts University.

The Samuel Greeley Hilborn Scholarship, founded in 1940 under the will of Grace Hilborn Webster.

The Hill Faculty/Staff Scholarship Fund, established through payroll deductions from Tufts faculty and staff to provide financial aid to needy undergraduate students.

The Ralph and Rachel G. Hill Scholarship, established through the estate of Rachel G. Hill in memory of her parents, to provide financial aid to deserving students in the Faculty of Arts, Sciences, and Engineering with preference given to undergraduates studying in the fields of engineering or biology.

The Robert W. Hill Scholarship, established in 1955 by the late Judge Robert W. Hill of the Class of 1904, for many years a trustee of Tufts College.

The Warren Nesbit Holbrook Memorial Scholarship, founded in memory of his brother by Charles R. Holbrook of Framingham, Massachusetts, in 1971.

The Clarence P. and Henry C. Houston Scholarship,

established in 1953 by classmates, friends, and former students of Clarence P. Houston of the Class of 1914 and Henry C. Houston of the Class of 1910.

The Albert S. Hovannesian Scholarship, endowed in 1978 by Albert S. Hovannesian, a graduate of the College of Engineering, Class of 1946, provides financial assistance to students in the undergraduate colleges. His own personal understanding of the special problems which underfinanced students and their families experience is the reason why he chose to fund this scholarship. Preference is given to needy students who are industrious and who also work part-time to help defray their educational expenses.

The Hovannesian-Howorth Scholarship Fund, established in 1989 in honor of Mrs. Claire L. Howorth of Stoneham, Massachusetts, to provide aid to electrical/mechanical engineering students whose particular interests are in microwave technology degree work.

The Howland Scholarship, established in 1865 from the income of the bequest of Edwin Howland, of South Africa.

The Paul O. Huntington Scholarship (E'13) is given to a student in the academic or engineering program in memory of the husband of Harriet S. Huntington.

***The Hunton Scholarship**, founded in 1921 by Mrs. Gertrude Hunton Sweet, of Attleboro, Massachusetts, for the benefit of women.

***The Lydia Glidden Hutchinson Scholarship Fund**, founded in 1985 by Lydia Glidden, Jackson '28, for deserving women attending Jackson College.

The Hye-Hovannesian Scholarship, endowed in 1981 by Albert S. Hovannesian of the Class of 1946. Preference is given to undergraduates of Armenian-American descent.

The Ives Memorial Scholarship, founded in 1966 by Harriet Raillon Ives of Woodstock, New York, in memory of her family.

Haig Jafarian Memorial Scholarship Fund, established in 1992 by Ethel J. Duffett and Dana Paul Bowie in memory of their beloved brother and uncle, Haig Jafarian. The income is to provide scholarships to students in the College of Liberal Arts and Jackson, with preference to students of Armenian ancestry who have expressed interest in the course known as "A Survey of Armenian History."

The Paul and Alice Darakjian Jafarian Memorial Scholarship, established in 1990 by Ethel J. Duffett in memory of her parents, to provide scholarship assistance to students in the College of Liberal Arts and Jackson. Preference will be given to students of Armenian ancestry who have expressed an interest in Armenian studies.

The Christine Jankowski Graduate Fellowship for Romance Languages, established in memory of Christine Jankowski of the Class of 1970, awarded to a graduate student in the field of romance languages.

The Japha Family Scholarship, established in 2001 to provide scholarships to students with a record of above-average academic performance and contributions of earnest service to and/or beyond the Tufts community.

The Jephson Educational Trust Endowment Fund, established in 1999 for aid to undergraduate students who show exceptional promise but whose families are particularly disadvantaged.

The Raymond L. Johnson Scholarship Fund, established in 1999 by the will of Raymond L. Johnson.

The Arnold S. Katz Scholarship. A member of the class of 1963, Mr. Katz founded this scholarship in 1981 to aid students in the College of Liberal Arts and Jackson.

Preference is given to students from York County, Maine.

The Elsa Orent Keiles Scholarship Fund, established in 1996 by the will of Elsa Orent Keiles, J'25.

The Michael T. Kelleher Scholarship, established in 1951 in honor of Michael T. Kelleher, of Boston, the income to aid each year an outstanding young man who needs help in order to go to college.

The Andrew P. Kerr/Adam F. Kerr Scholarship, established in 1988 by Andrew P. Kerr, Class of 1960. This scholarship benefits students who are in need of financial aid and who are in good academic standing in the College of Liberal Arts and Jackson.

The Kier-Wain Family Scholarship, established in 2000 to provide financial aid to Tufts students with financial need. First preference in selection will be given to an undergraduate woman of Cuban-American heritage. If a Cuban-American woman is not available for the scholarship, preference will be given to a woman of other Hispanic heritage.

Killam Canadian Fund, established in 1997 in memory of Isaac Walton Killam of Nova Scotia by his Massachusetts sisters through their testamentary trusts, to help Canadian students with limited financial circumstances enroll at Tufts University.

The Elson T. Killam Memorial Scholarship Fund, established by a bequest made in trust in memory of the late Elson T. Killam, a 1922 graduate of the College of Engineering. The income from the principal is to be used for general scholarship needs of the university.

Kimball University Scholarship, established in 1994 by David N. Kimball, A'68, to provide financial aid to students of high achievement who show promise of future success.

***The Dr. Barbara Knight-Meyers Scholarship**, estab-

lished in 1963 by Dr. and Mrs. Edward R. Knight. This scholarship is to provide financial aid to a deserving student in Jackson College.

The George T. Knight Memorial Scholarship, established in 1951 by classmates, former students, friends, and family in memory of George Thompson Knight of the class of 1872, professor in the Crane Theological School from 1883 to 1910, member of the faculty 1875–1910.

Mabel Hoyle Knipe Scholarship Fund, established in 1998 from the estate of Mabel Hoyle Knipe, J'28, with preference given to graduates of Fairhaven High School.

The Robert A. Kolankiewicz Scholarship Fund, established in living memory by the family, classmates, and friends of the late Robert A. Kolankiewicz, Liberal Arts graduate of the Class of 1952 and husband of Cynthia (Reynolds) Kolankiewicz Foss, Jackson College, Class of 1953. The scholarship income is to benefit deserving undergraduates in the College of Liberal Arts and Jackson.

The Kovler Family Scholarship Fund, established in 1987 by the Blum-Kovler Foundation at the request of Jonathan and Peter Kovler, for the benefit of undergraduate students in need of financial assistance.

The Frieda Kress Scholarship, established in 2006 to provide need based undergraduate financial aid to promote diversity at Tufts.

The Michael Kuhn Memorial Financial Aid Fund, established in 2001 to provide aid to Tufts students with financial need.

The Rosewell B. Lawrence Scholarship, founded in 1922 by Rosewell B. Lawrence, of Medford, for scholarships and loans for worthy students. Preference is given to graduates of Medford High School already attending Tufts.

The Dr. Howard L. and Mary McCarthy Leary Scholarship Fund, established in 1987 by Mrs. Leary for qualified premedical students in the College of Liberal Arts and Jackson.

The Jack and Lorraine Lee University Scholarship, established in 2001 to provide financial aid to needy undergraduate students who are residents of New Hampshire, with preference to students who are in their second year of employment at a New Hampshire golf course.

The Maud Amelia Leighton Scholarship Gift, the income from a Trust Fund established by George A. Leighton, of Los Angeles, California, for the benefit of engineering students.

The Henry Leir International Scholarship, established in 1999 to provide financial aid for outstanding Tufts undergraduate students who wish to study abroad or

who demonstrate commitment to the study of international affairs.

The Alvin Levin Scholarship, established in 1994 to provide scholarships to women of color enrolled in the Urban and Environmental Policy program.

The Louis Levin Scholarship Fund, a scholarship fund established in 1961 by William A. Levin of the Class of 1943 in memory of his father. Income from the fund provides financial aid for undergraduates, with preference given to students majoring in one of the sciences.

The Freda Lewis Scholarship, established in 2002 to provide scholarships for students attending Jackson College, preference being given to students who are members of or affiliated with a Universalist Church.

The Blanche M. Lewis Scholarship, established by Gerald Lewis of the Class of 1954 in honor of his mother, awarded annually with preference for a young woman showing promise in literature or fine arts, who would be unable to attend Tufts without financial assistance.

The Frank T. Lewis Scholarship Fund benefits engineering students with preference to those majoring in mechanical engineering.

The Leo Rich Lewis Memorial Scholarship, established in 1950 by classmates, former students, family, and friends in memory of Leo Rich Lewis of the Class of 1887, Fletcher Professor of Music and member of the faculty from 1892 to 1945. Preference is given to students majoring in music.

The Jacob Lewiton Scholarship, established in 2000 by bequest of Jacob Lewiton, Trustee Emeritus. The scholarship fund is for needy students who commute to Tufts College. It is the hope of the family that further contributions will be made from time to time to this scholarship fund.

The Edwin A. Locke Scholarship, established under the will of Edwin A. Locke of the Engineering Class of 1915, the income to be used to award scholarships to engineering students.

The William L. Locke Scholarship, established in 1961 by Mrs. William L. Locke in memory of her husband of the Class of 1900. The income from this gift is to provide financial aid to a junior or senior in the Department of Civil and Environmental Engineering.

The Jerome T. Loeb Scholarship, established in 1989 by Mr. Loeb, A'62, is awarded annually to an undergraduate, with preference for students from St. Louis, Missouri, and surrounding communities.

The Loomis Scholarship Fund, founded in 1985 in memory of Samuel Loomis, A'15, and his wife Bernice C. Loomis. Seventy-five percent of the annual income is to be used for scholarships and the remainder is to be

added to the principal of the fund annually.

The Norman E. and Marjorie W. MacCuspie Scholarship, established in 1981 to provide financial aid to qualified men and women at Tufts College and Jackson College.

The Frances Booth MacGowan Endowed Scholarship Fund, established in 1999, with preference that awards from the fund be granted to female students in the College of Liberal Arts and Jackson.

The Elmore I. and Etta P. MacPhie Scholarship, established in 1956 by Etta Phillips MacPhie of the Class of 1913 in memory of her husband, Elmore I. MacPhie, of the Class of 1911, the income to be used for the benefit of deserving students in the College of Liberal Arts or Jackson College.

The Leslie and Bruce Male University Scholars Fund, established in 1990 by Leslie and Bruce Male, A'63, to provide financial aid to students of high achievement who show promise of future success.

The Frank Marcucella Scholarship, established in 1953 by Frank Marcucella, of Medford, Massachusetts.

The Nathan Margolis, A31, G34 Memorial Scholarship, established in 2005 by Esther Margolis to promote excellence in teacher training. The Margolis Fund will be awarded annually to one or more students engaged in the study of Education, with a preference for students pursuing a Master of Arts in Teaching degree.

The Myron W. Marr Scholarship, established in 1956 by Dr. Myron W. Marr of the Class of 1904 and the Medical School Class of 1907.

The Laurence K. Marshall Scholarship, established in 1977. This scholarship exists to help others fulfill their educational objectives while encouraging them to explore and to excel. Awards are made annually to students in the School of Engineering who demonstrate academic excellence, who have financial need, and who have areas of interest and accomplishment outside of their major fields of study.

The Marvin Scholarship, established in 1952 by Reignold Kent Marvin, of Boston, Massachusetts. The income of this fund is to be used for the benefit of descendants of Thomas E. O. Marvin, or any student excelling in scholarship and athletics, in that order.

The Arthur E. Mason Memorial Scholarship, established in 1954 by Mrs. Arthur E. Mason, of Newton, Massachusetts, in memory of her husband, Arthur E. Mason, for many years treasurer and trustee of Tufts College. The income from this fund is to be awarded annually to a student residing in New England.

The David Lee Maulsby Memorial Scholarship,

established in 1951 by classmates, former students, family, and friends in memory of David Lee Maulsby and the Class of 1887. Dr. Maulsby was professor of Oratory and English Literature from 1891 to 1910.

The Wallace Mayo Scholarship, founded in 1925 by Wallace Mayo, of Dayton, Ohio.

The Edward J. McCabe Scholarship, established in 1994 to provide scholarships for worthy students attending the School of Engineering.

The Kathryn A. McCarthy J'45 Endowed Scholarship, established in 2002 to provide scholarships to deserving and financially needy undergraduates who have good scholastic achievement as well as qualities of leadership and citizenship within the community.

The Kathryn A. McCarthy Special Endowed Scholarship, established in 2004 to benefit African American, Hispanic, or Native American students with preference to such students from North Cambridge High School.

***The Sarah Nelson McFarlane Scholarship**, established in 1959. To be awarded to a member of any class in Jackson College who, in the opinion of the dean or other qualified person, is worthy and in need of financial assistance.

The Jean Griswold Mead Scholarship, established in 1968 in memory of Mrs. Leonard C. Mead by her family and friends.

The Memorials Scholarship, established in 1956 to provide suitable recognition of contributions made in memory of beloved Tufts people. Income from this fund is used for scholarships for needy students.

The Alex Mendell Memorial Scholarship is awarded annually to a sophomore or junior who, through his or her leadership in a variety of campus activities, brings together students representing a broad spectrum of the community. Like the student in whose memory the award is made, the recipient should demonstrate a generosity of spirit and character that both contribute to the self esteem of others and to their love of Tufts.

The Richard Mergendahl Memorial Scholarship, established in 1951 by classmates, friends, and family in memory of Richard Mergendahl of the Class of 1944.

Guy Rindge and Alice Barbour Merrill Scholarship, established in 1997 to provide financial aid for undergraduate students.

The Merrin Family Scholarship, established in 1997 to provide financial aid to students from the five boroughs of the City of New York who demonstrate academic promise and financial need.

The Frank Merritt Scholarship. Preference will be given to direct descendants of Mr. Frank Merritt of the Class of

1879, founder of the scholarship. Next in preference shall be some worthy student of the engineering school. For each recipient the founder has this message: "Loyalty and patriotism are akin and are noble qualities. It is hoped that the persons receiving benefits from this scholarship will always be true and loyal to their Alma Mater, and if fortune should smile upon them at some future time they will respond to the needs of the college."

The Robert W. and Gladys S. Meserve Scholarship Fund, established in 1995 in memory of Robert W. and Gladys S. Meserve by family and friends to provide financial aid to students from Waltham High School and Medford High School. Robert W. Meserve was an Alumni Trustee (1955–59), a Life Trustee (1959–79), Chairman of the Board of Trustees (1964–69), and Trustee Emeritus (1979–95).

The McMahon Memorial Fund, established by the friends and family of William A. McMahon, Esq. in his memory. The fund provides scholarships to undergraduate students in the School of Arts and Sciences.

The Charles L. Miller Fund, established as a bequest in 1969 by the late Charles L. Miller, of Greenwich, Connecticut, as an endowed scholarship fund with the income only to be used for the purpose of providing financial aid to worthy and needy students of the university.

The George Stewart Miller Scholarship, established in 1951 by classmates, former students, and friends of George S. Miller of the Class of 1906, acting president 1937–1938, vice president 1939–1951, member of the faculty and administration, 1916–1956, and president of the Tufts Alumni Association, 1954–1960.

The Marion Stratton Miller Scholarship, established in 1976 in memory of Marion Stratton Miller, for many years an active and loyal member of the Tufts community. In awarding the income of this scholarship, preference is to be given to her direct descendants.

The A. A. Miner Scholarships, founded in 1864 and 1890 by Alonzo Ames Miner, D.D., of Boston.

The Adelbert H. Morrison Fund, founded in 1958 under the will of Helen C. Morrison for the benefit of needy and worthy students majoring in engineering, preferably graduates of Boston Technical High School already attending Tufts.

The Joseph W. Morton Memorial Scholarship, established in 1956 by the men and women of the Class of 1931 as their twenty-fifth reunion gift, to be awarded annually to a student in one of the undergraduate schools of Tufts University, preference being given to descendants of members of the Class of 1931 who are otherwise qualified. Named in honor of Joseph W. Morton, A'11, H'56, alumni secretary, 1924–1956.

The Hannah S. Moulton Scholarships, founded in 1914 by Hannah S. Moulton, of Kensington, New Hampshire.

The John Martin Mugar Scholarship Fund, established in 2007, to provide need based financial aid to create an intentional, intellectual, and broadly diverse community of scholars. Proceeds of this fund will be awarded to first generation college-bound students.

The Frederick S. and Marie E. Mullen Scholarship, established in 1989 by Robert F. Mullen, Class of 1965, in honor of his parents.

The Louis Sutcliffe Murphy Fund, established in 1977 by Mrs. Louis S. Murphy, Alexandria, Virginia, in memory of her husband, Liberal Arts Class of 1901. The fund is also in memory of her son Louis S. Murphy, Jr., who attended Tufts. The income is available to undergraduate students who display need and academic qualification to the appropriate university officials.

The Michael and Josephine Nackel Scholars Fund, established in 2000 to provide scholarships for undergraduate students of Arab-American heritage or students from the Medford community.

Rosamond Najjar Scholarship Fund, established in 1998 to offer scholarships with preference to graduates of Medford High School.

The Neubauer Scholars Program, established in 2000 by Trustee Joseph Neubauer. The program attracts and enrolls intellectually talented students from across the country and around the world. Neubauer scholars are encouraged to take advantage of research, internship, and study abroad opportunities to broaden their experience and perspectives. The Neubauer Scholars Advisory Committee assists the scholars in the pursuit of scholarly activities.

The Newhouse Scholarship, established in 1997 to offer financial support to low-income students from New York City.

Murdock H. Newman Scholarship Fund, established in 1997 from the estate of Catherine H. Newman in memory of her husband Murdock H. Newman, A'31, to provide financial assistance to deserving students, with preference given to students from Grafton Country, New Hampshire.

The New York City Scholarship, established by a private charitable foundation in 1996 to provide financial aid for needy undergraduate students from New York City high schools.

***The A. Florence Nichols Scholarship Fund**, founded in 1960 under the will of A. Florence Nichols of the Class of 1899, the income from which is to be given annually to some needy and deserving young woman who is working her way through college.

The Fred P. Nickless, Jr., Scholarship Fund, established by the Alumni Association in honor of Fred P. Nickless, Jr., A'48, G'49, for his long and loyal service to Tufts as alumni secretary for thirty years. The income is to be awarded annually to a deserving undergraduate or graduate student(s) in the Colleges of Arts and Sciences. Preference is to be given to Tufts alumni and their children.

The Eugene M. Niles Scholarship Fund, founded in 1927 for scholarships and other student aid.

The Norcross Scholarship, founded in 1890 by James A. and Mary E. Norcross, of Worcester.

The Ronald F. Noreen Scholarship, established in 2007 to benefit students in the School of Arts and Sciences and to increase the diversity, broadly defined, of the Tufts student body.

The North Shore Tufts Club Scholarship, founded in 1969 for the benefit of students of Tufts University. Preference is given to students whose homes are in the communities served by the club on the North Shore of Massachusetts.

The O'Connor-Birmingham Family Endowed Scholarship, established in 2006 to provide scholarship funds to increase the diversity of the Tufts student body. Preference will be given to students who have completed the "Step up to Excellence" program, or students who have graduated from public high schools in culturally diverse communities and who have demonstrated personal responsibility and community leadership.

The Offer Family Scholarship Fund, established in 1983 by Mr. Charles Offer, Sr., to aid worthy and appreciative students.

The Susan and Richard Pallan Scholarship, established in 1989 to benefit any full-time undergraduate student in need of financial aid.

The Charles A. Pappas Endowed Scholarship, established in 1990 by the Thomas Anthony Pappas Charitable Foundation, Inc., for needy students possessing high scholastic abilities at the College of Liberal Arts and Jackson College.

The Parets Family Scholarship, established in 2005 to provide financial aid to Tufts students, with preference to students of limited financial means who possess high academic potential and a demonstrated commitment to achieving scholastic excellence in the study of arts and sciences.

The Theodore L. and Ruth B. Parrella Scholarship Fund, established in 2007 by Carol L. Parrella E85 in memory of her parents, to support undergraduates in the School of Engineering with preference given to a female student majoring in Mechanical Engineering.

The Adoniram J. and Jane L. Patterson Scholarship,

founded in 1920 by Adoniram J. Patterson, of Roxbury, Massachusetts.

The Ethel L. Peabody Scholarship Fund, established in 1975 by Miss Ethel L. Peabody of the Jackson College Class of 1915. Preference is given to former students of the Fitchburg, Massachusetts, High School already attending Tufts.

The Ellery E. Peck Memorial Scholarship, founded in 1891 by Henry Rollins, of Bangor, Maine.

The Dorothy Penniman Latin Scholarship, established in 1979 through the generosity of Dorothy Penniman Hubbard of the Jackson Class of 1925. The donor studied Latin at Tufts, later taught Latin, and understands the lasting and multiple benefits of knowledge of the subject. She has established this fund in the hope that it will encourage other students to pursue the study of Latin. First preference at all times is given to students in need of financial aid enrolled in Latin courses in the Department of Classics.

The Penniman Scholarship, established in 1944 by Dorothy Penniman Hubbard and Ruth Penniman Ware in memory of their parents, Dr. and Mrs. George Wallace Penniman, the income from which is to be used annually to aid some deserving student with preference to students majoring in religion.

The Ralph Wentworth Penniman Memorial Scholarship, established in 1982 by Dorothy Penniman Hubbard of the Jackson Class of 1925 in memory of her brother, who was a graduate of the Tufts College Class of 1910. Income from the fund is restricted to students in the College of Liberal Arts, with preference to students majoring in history.

The Louis and Mary Perito Memorial Scholarship, established in 1982 by Paul L. Perito of the Class of 1959, in memory of his parents. The income from this fund is to be awarded annually to a deserving student in the College of Liberal Arts or Jackson College.

The John B. Perkins Scholarship, founded in 1866 by James D. Perkins, of New Rochelle, New York.

The John Perkins Scholarship, founded in 1896 by Ann Maria Perkins, of Medford, Massachusetts.

The Nancy Tabb Pfannenstiehl Memorial Scholarship Fund, established in 1993 by her family and friends, given with preference to undergraduate women majoring in romance languages.

The Joseph D. Pierce Memorial Scholarship, founded in 1898 by the children and other relatives of J. D. Pierce, D.D., of Attleboro, Massachusetts.

The Julius Pinkus Scholarships, founded in 1987 from the estate of Julius Pinkus in memory of Barney and Tobey Pinkus, Dr. Louis Pinkus, M'25, and Julius Pinkus.

The income is divided equally among the School of Medicine, the College of Liberal Arts, and the Department of Music to be used as scholarship aid to worthy students.

The Percy J. Pitkin Scholarship, founded in 1983 by Percy J. Pitkin of the Class of 1923.

The Frank W. Pote Memorial Fund, established in 1982 in memory of Frank W. Pote, professor of physics at Tufts from 1912 to 1953, by his family and friends. The income from this fund is to be utilized to help deserving students who are majoring in physics.

The Marion S. Potter Scholarship Fund, founded in 1958 under the will of Marion S. Potter, to be used to provide scholarships for worthy students in the College of Liberal Arts of Tufts University.

The Theresa Winsor Pratt Endowed Scholarship, established in 2000 in memory of Theresa Pratt to provide financial aid for undergraduate students in the Resumed Education for Adult Learners (REAL) Program.

The David and Ethel Presson Scholarship, established in 1956 by David Presson, of Boston.

The John William Priesing and Carl William Priesing Scholarship, established in 1950 by Carl W. Priesing of the Class of 1921, in memory of his father. The name of Carl W. Priesing was added in 1976 in honor of Mr. Priesing's fifty-fifth reunion year by his son.

The Jay Pritzker Scholarship, established in 2002 as a matching challenge grant to support need-based financial aid that will be awarded to promote the achievement of the educational benefits of diversity at Tufts. Scholars are named for Jay Pritzker, Howard Hunter, or the names chosen by donors of qualifying gifts.

The Paul Pryor Scholarship Fund, established in 1988 by the estate of Paul I. Pryor, A'18, for the benefit of deserving male students in the College of Liberal Arts with preference given to those active in extracurricular activities.

The Carolyn Fraser Pulling Scholarship Fund, established in 1980 to aid worthy students by bequest of Mrs. Arthur (Carolyn Fraser) Pulling, Women of Arts, Class of 1908.

The Saul C. Ravitch Memorial Scholarship, established in 1952 by Mrs. Sylvia Ravitch in memory of her husband Saul C. Ravitch of the Class of 1922.

The Joel Reed Memorial Scholarship, established in 1988 to provide a scholarship fund for commuting students who exemplify Joel Reed's academic diligence and community service, thereby encouraging this effort and ensuring that Joel's name and spirit live on.

The Resnek Family Scholarship Fund, established in 1988 by Frank, Barbara, and Paul Resnek, A'97, to

provide tuition assistance for talented students attending Tufts University, with preference to citizens of the United States.

The Joel W. and Marion Newhall Reynolds Scholarship, established in 1951 by Joel W. Reynolds, Jr., of the Class of 1923 and Marion Newhall Reynolds, Jackson Class of 1924. The income from this fund is to be divided equally each year between a student of the School of Engineering and a student of Jackson College.

The Rhode Island Scholarship, founded in 1899 by several persons in Rhode Island.

The Mary A. Richardson Scholarship, founded in 1904 by Mrs. Mary A. Richardson, of Worcester, Massachusetts.

The William B. Richardson Scholarship, established in 1952 by William B. Richardson of the Class of 1915.

The Rittenburg Family Scholarship Fund, established in 1989 by members of the Rittenburg family to provide scholarships to deserving students of the School of Engineering. Scholarships shall be awarded by the Dean and the Office of Financial Aid.

The Pilar Crespi Robert Scholarship Fund, established in 2003 as part of the Pritzker Challenge to benefit outstanding undergraduate students of African American, Hispanic American, and Native American heritage.

The Rebecca T. Robinson Scholarship, founded in 1890 by Charles Robinson, LL.D., of Newton, Massachusetts.

The Emily Graham Rose Memorial Scholarship, established in 1965, for the benefit of deserving students in Jackson College and Tufts College.

The Gertrude Rubel Scholarship, established in 1998 to provide financial aid for undergraduate students from Medford and Somerville, Massachusetts.

The Elbridge Rust Scholarship Fund, founded in 1926 by Elbridge Rust, of Peabody, Massachusetts.

David and Gertrude M. Saklad Fund, established in 1990 under the will of David Saklad, E'21, to provide scholarships to students in engineering science and computer science who have completed freshman year, have shown academic skill, and require financial assistance.

The Lori Winters Samuels and Ted Samuels Family Scholarship, established in 2006 to provide need based undergraduate financial aid to promote diversity at Tufts.

The Herbert J. and Harriet S. Sandberg Family Scholarship, established in 2004 to provide scholarship to African American, Native American, and Hispanic American students with financial need. Preference is given to students meeting these criteria who have graduated from Medford High School in Medford,

SCHOLARSHIP FUNDS >

Massachusetts.

The Albert W. Sayles Scholarship, founded in 1899 by Albert W. Sayles, of Lowell, Massachusetts.

The Sarah E. Sayles Memorial Scholarship, founded in 1891 by Albert W. Sayles, of Lowell, Massachusetts.

The Scaramucci Family Endowed Scholarship, established in 2006 to support need based aid to undergraduate students who are either African American, Native American or Hispanic American.

The Irving and Hannah Schwartz Scholarship, established in 1951 by Joseph and Irving Schwartz of the Class of 1937, in honor of their parents and in honor of Dr. Siegfried Thannhauser.

The William and Lillian Schwartz Student Scholarship, founded in 1984 for the benefit of needy and worthy students.

The Scott Fund, established in 1932 by the will of Augustus E. Scott, of Lexington, Massachusetts.

The Laura A. Scott Scholarship, founded in 1890 by Mrs. Laura A. Scott, of Ridgefield, Connecticut.

The Segalas Family Endowed Scholarship Fund, established in 2007, to offer need based financial aid to increase the diversity of the Tufts undergraduate student body.

The Margaret and Donald Segur Scholarship, established in 2000 to provide support to students from Armenia at the Fletcher School of Law and Diplomacy or at the College of Liberal Arts and Jackson College, who are studying political science, economics, prelaw, or journalism. Second preference goes to students of Armenian descent at the Fletcher School, and third preference goes to undergraduate students of Armenian descent at the College of Liberal Arts and Jackson College, who are studying political science, economics, prelaw, or journalism.

The William J. Sen Scholarship Fund, established in 1982 by William J. Sen, E'40. The income of this fund is to be used annually to aid students of the School of Engineering, with preference to undergraduates and minority students.

The Frank S. and Eva A. Shapiro Scholarship Fund, established in 1955 by Frank S. Shapiro of the Class of 1916, the income to assist worthy undergraduate students with preference being given to students interested in chemistry.

The Mildred and Sumner Shapiro Scholarship, established in 1997 to provide financial assistance to students in the Tufts College of Liberal Arts.

The Edwin A. Shaw Memorial Scholarship, established in 1952 by former students, family, and friends in memory of Edwin Adams Shaw of the Class of 1898

and professor of education, 1919–1950.

The Henry J. and Louise O. Shea Scholarship, established in 1987 to provide scholarships to needy and deserving students.

The William H. Sherman Scholarship, founded in 1903 by William H. Sherman, of Cambridge, Massachusetts.

The A. Shuman Scholarship, founded in 1923 by A. Shuman of Boston.

***The Hettie Lang Shuman Memorial Fund** was founded in 1905 by Mr. A. Shuman in memory of his wife. The interest of this fund is expended annually in aiding deserving women students.

The Seymour and Marcia Simches Scholarship Fund, established in 1986 by friends and family members of Professor Seymour Simches. This fund will be awarded annually to an outstanding student in financial need who is majoring in one of the humanities.

The Simmons Scholarships, founded in 1895 by Robert F. Simmons, of Attleboro, in the name of Mary F. and Robert F. Simmons.

The Miriam Charef Simonds Scholarship Fund, established by her sister, Pauline Charef Simonds, Jackson '54, with assistance from family, friends, and colleagues. An ardent student of American political life, Mimi Simonds possessed, to an exceptional degree, an ability to respond creatively and effectively to the social and political issues of her time. She performed outstanding public service at the community, state, and national levels. In keeping with the compelling interests of her life, it is the family's wish that the annual income from this scholarship fund be awarded to a student in the graduate Program in Public Policy and Citizen Participation who is deemed both financially and academically worthy of this recognition and who has completed one year of study. For Mimi Simonds, hope for the future was a premise that sustained her until her death. It is the intent of this scholarship to provide a living legacy of that hope and a memorial to the commitment which she brought to public service.

The Simons Family Scholarship, established in 1987 to provide a partial scholarship in the College of Liberal Arts.

The Simons Memorial Scholarship, founded in 1891 by Mrs. Mary A. Simons, of Manchester, New Hampshire, in memory of Hiram H. Augustus and Frank Simons.

***The Charles A. and Cornelia B. Skinner Scholarship**, founded in 1907 by the Reverend Charles A. Skinner, D.D., and Mrs. Cornelia B. Skinner, of Cambridge, Massachusetts.

The John Richard Skuse, Class of 1941, Memorial Scholarship, established in 1999 by the bequest of

John Richard Skuse to provide financial aid to Tufts students based on ability, achievement, and need. First preference is given to students from the town of Exeter, New Hampshire.

The Abraham and Sonya Slifka Scholarship Fund, established in 1991 to provide financial aid for undergraduate students.

The Charles E. Smith Scholarship, established in 1952 by Charles Eugene Smith of the Class of 1922, the income to be awarded to a young man in the College of Liberal Arts.

***The Rena Greenwood Smith Scholarship Fund**, established in 1986 by the Richard Ilsey Smith Trust to benefit a worthy student of Jackson College.

The Richard Ilsey Smith Scholarship Fund, established in 1986 to benefit a worthy student of the university.

The Simeon C. Smith and Emily A. Smith Scholarship Gift. The income from a trust fund established by Simeon C. Smith to be known as the Simeon C. Smith and Emily A. Smith Fund, allocated by the trustees for scholarship purposes.

The George A. Spencer Scholarship, established in 2000 to benefit deserving students from the School of Engineering at Tufts University.

The Virginia Nold Spencer Memorial Scholarship, established in 1996 to help ensure a Tufts engineering education to the most qualified students regardless of their financial capabilities.

The John Murray Sprague and Eliza Fletcher Sprague Scholarship, founded in 1908 by John Sprague, of Lowell, Massachusetts.

The Miriam Carleton Squires Scholarship, established in 1971 under the will of Miriam Carleton Squires, of Broken Bow, Nebraska, a member of the Class of 1908.

The Marjorie Cohen Stanzler Scholarship Fund, established in 2002 to provide financial aid to needy students who are citizens of the United States.

The Edwin Carter Starr Memorial Scholarship, established in 1980 by Mrs. Paul (Catherine S.) Phenix in memory of her father. The income is awarded annually to benefit students in the field of child development.

The State Scholarships, established in 1859 in accordance with a resolve of the Commonwealth of Massachusetts.

The William and Mary-Jane Sterling Scholarship, founded in 1985 by William C. Sterling, Jr., of the Class of 1959 to aid worthy undergraduates in obtaining the benefits of education.

The Stern Family Endowed Scholarship, established in 2000 to benefit outstanding undergraduate students.

The Dale Stevens Scholarship, founded in memory of

the late Dale Stevens, of North Andover. Awarded to a student majoring in the Eliot-Pearson Department of Child Development. Preference is given to undergraduates at Tufts from North Andover, Massachusetts, or other communities in the Merrimack Valley.

The Stowe Scholarship, founded in 1890 by Mrs. Eugenia D. Stowe, of Meriden, Connecticut.

The Frederick W. Storck Memorial Fund, established in 1989. The income to be used for undergraduate financial aid at the university.

***The John and Lucy H. Stowe Fund**, founded in 1902 by bequest of Mrs. Stowe of Lawrence, Massachusetts, "for the benefit of the lady students department."

The Harry Louis Strecker Scholarship, established in 1969 as a bequest by the late Harry L. Strecker, Class of 1913, of Livingston, New Jersey. The income thereof is to be used to assist a worthy student in the electrical engineering department.

The Carl and Alice Stroehmann Scholarship, established in 1953 by Carl F. Stroehmann of the Class of 1919.

The Carl Lars Svensen Scholarship, established in 1952 by Carl Lars Svensen of the Class of 1907, the income to be given to a student in the School of Engineering.

The Ellen G. Sullivan Scholarship, established in 2002 to provide financial aid to needy undergraduate Black American students majoring in Child Development.

The Dorothy Sulloway Sweet Scholarship, founded in 1933 by Joseph L. Sweet and Florence M. Sweet.

The Judith P. Sulzberger Scholarship, established in 1997 to provide funds to particularly needy underrepresented minority students from New York City.

The Elbridge Sweet Scholarship, founded in 1933 by Joseph L. Sweet and Florence H. Sweet.

The Talbot Scholarship, founded in 1890 by Newton Talbot, of Boston.

The Lloyd H. Taylor Scholarship, established in 1984 to aid qualified students in the School of Engineering.

The Paul E. Thissell Scholarship, in memory of Paul Thissell of the class of 1921 and Bernice Tilden Kidder. Preference is given to a Massachusetts-born student majoring in French.

The George C. Thomas Scholarship, founded in 1899 by George S. Thomas, of Philadelphia, Pennsylvania.

The Frederick W. Tibbets Memorial Fund, established in 1942 by bequest of M. Helen Tibbets, late of Gloucester, Massachusetts, as a memorial to her late brother Frederick W. Tibbets of the Class of 1879. Income is used to aid worthy and needy students.

The Walter V. Towle Scholarship Fund, established in 1963 by bequest of Grace H. Towle, the income to be used to assist students of the highest scholastic standing.

The Travelli Scholarship, founded in 1890 by Mrs. Emma R. Travelli, of Newton.

The Hyman S. and Edith Rieva M. Trilling Scholarship, founded in 1984 to benefit students in the College of Liberal Arts and Jackson College.

The Tufts Kinsmen Scholarship, for aid to students with preference to Tufts family descendants. Awards from income are made on basis of need and achievement to those who have completed one year or more at Tufts.

***The Betsy Houses Twombly Scholarship**, established in 1993 to provide assistance toward tuition, room, and board for a worthy and needy female student in either Tufts or Jackson College.

The A. Raymond and Eileen Tye Scholarship, established in 1994 to provide financial aid and to assist with the tuition of qualified undergraduates who are pursuing their educational goals.

The Tyler Scholarship, founded in 1919 by Susan E. Tyler, of Lowell, Massachusetts.

The Irving Usen Scholarship, established in 1952 by Irvin Usen in memory of W. A. Carroll. The income is to be available for a qualified, needy young man or young woman whose parents are fishermen residing in New England and preferably residents of Gloucester, Massachusetts, or Portland, Maine.

The Albert Whittier Vanderhoof Scholarship, established in 1959 in honor of Albert W. Vanderhoof of the Class of 1924.

The Villamil-Davis Family Scholarship, established in 2004 to attract, retain, and prepare under-represented minority students who will make important leadership contributions to Tufts and to our global community.

The Teri Volpert '84 and Barry Volpert Endowed Scholarship, established in 2005, awarded to students with demonstrated financial need who have excelled in the classroom.

The Peter J. Wade Scholarship, established in 1999 to provide scholarships to students pursuing studies in studio art or graphic design. Preference is given to juniors or seniors who have shown excellence in some area of studio art or graphic design and who are enrolled in the five-year, dual-degree program with the Museum School of the Museum of Fine Arts, Boston.

The Joseph H. Walker Scholarship, founded in 1898 by Joseph H. Walker, of Worcester, Massachusetts.

The Walker Mathematical Scholarship, established in 1865 in honor of William J. Walker, M.D., of Newport, Rhode Island, and payable from the income of the Walker Fund.

The Julia Ward Scholarship, established in 2007 to further Tufts' efforts to create an intentional, intellectual

and broadly diverse community of scholars, to include students from a wide variety of socio-economic, geographic, cultural, ethnic, and political backgrounds.

The Mary Ann Ward Scholarship, founded in 1892 by Sylvester L. Ward, of Boston.

The Warren Educational Fund Scholarship. The income for the benefit of a worthy student, preference being given to students from St. Paul's Universalist Church, Springfield, Massachusetts.

The Warren Scholarship, founded in 1905 by Dr. Ira Warren, of Boston.

***The Sarah A. Watson Scholarship Fund**, founded in 1958 under the will of Sarah A. Watson for the benefit of Jackson College, the income and interest to be expended for the aid of a deserving student who would not otherwise have the benefits of further education.

The Alice Weeks-Jesse Dowse Endowment Fund, established in 1990 by the estate of Albert W. Weeks in memory of Alice M. Weeks and her mother, Jesse Dowse, both graduates in mathematics at Tufts, to provide financial aid to students attending Tufts College or the Graduate School of Arts and Sciences.

The Mark Weisberg Scholarship Fund, founded in 1948 by Mark Weisberg of the Class of 1918.

The J. Frank Wellington Scholarship, established in 1931.

The Jonas Clark Wellington Scholarship, founded in 1906 by Mrs. Sarah C. Fisher Wellington, of Cambridge, Massachusetts.

The West Medford Woman's Club Scholarship, established to provide scholarship assistance to students in Jackson College and Tufts College, with preference given, when possible, to a resident of Medford, Massachusetts.

The Joshua S. and Harriet N. White Scholarship, founded in 1896 by Joshua S. White, of Pawtucket, Rhode Island.

The Nathaniel White Scholarship, founded in 1899 by Armenia S. White, of Concord, New Hampshire.

The Amasa and Hannah L. Whiting Scholarship, founded in 1890 by Mrs. Hannah L. Whiting, of Hingham, Massachusetts.

The Whittier Scholarship, founded in 1890 by Charles Whittier, of Roxbury, Massachusetts, in the name of Charles and Eliza Isabel Whittier.

The Allton T. and Dorothea Danver Williams Scholarship, established in 1989 by Kenneth D. Williams in honor of his parents, Allton T., A'19, and Dorothea Danver Williams, J'18, to support students in good academic standing, with financial need, pursuing a major in environmental studies.

The Willner Family Scholarship, established in 1998 to provide aid to academically promising students from New York City with family incomes that are particularly modest. Additional preference will be given to students showing promise in the visual or performing arts at Tufts.

The Winnick Family Foundation Scholarship, established in 2000 to provide aid to undergraduate students at Tufts.

The Dara Wolbom Memorial Endowment, established in 1997 in memory of Dara Wolbom J'99 to provide financial aid to Tufts undergraduates with first preference to female students in their junior year who have distinguished themselves in English or journalism.

The Norman P. Wood Scholarship, established under the will of Nellie M. Wood, late of Northfield, Massachusetts, as "a scholarship in the Department of Classics to be known as the Norman P. Wood Scholarship."

The Frank G. Wren Memorial Scholarship, established in 1951 by friends, family, and former students of Frank G. Wren of the Class of 1894, member of the faculty (1895–1940), and dean (1907–1939).

The Paul I. and Alice T. Wren Memorial Scholarship, established in 2001 to aid deserving liberal arts and engineering students.

The Joseph N. Wright Memorial Scholarship, for undergraduate students studying in Tufts Programs Abroad, with preference for those studying in Germany.

The Francis Yirrel Scholarship. A scholarship founded in memory of Francis Yirrel of the Class of 1949, established by his friends and classmates to assist deserving students.

The Doris W. York Endowed Scholarship Fund, established in 2005 by a bequest from Doris York of Somerville, Massachusetts to provide financial aid to female students who attended Somerville High School.

The Howard S. Young Scholarship Fund, established in 1982 to provide scholarships for civil engineering students.

The Young Men's Philanthropic League Scholarship, established in 1960 by the Young Men's Philanthropic League of New York, the income from this fund to be used for scholarships for undergraduate and graduate students in Tufts University.

The Stanton "Bud" Yusem Endowed Scholarship, established in 2000 to provide financial aid to Tufts undergraduate students with financial need.

Prize Scholarships and Academic Awards

In addition to the above university scholarship funds, the following endowed funds have been established, and prizes from the income are awarded annually in recognition of exceptional academic achievement and extracurricular activities. These prizes are not awarded unless, in the opinion of the Committee on Academic Awards, Faculty of Arts, Sciences, and Engineering, qualified candidates appear.

At an awards ceremony held each spring, public announcement is made of the recipients of these prize scholarships. Since election is made by the Committee on Academic Awards, no application is necessary. Nominations are made by faculty and staff members. Student nominations are not allowed, but students can discuss deserving peers with faculty members. Inquiries concerning these prize scholarships should be addressed to the Committee on Academic Awards.

The Vida H. Allen Prize is presented annually to the student who has written the best senior honors thesis in the Department of History.

The Alpha Omicron Pi Prize Scholarship, founded by the Boston Alumnae of the Delta Chapter of Alpha Omicron Pi, is awarded to that student who best represents the combination of very high scholarship and significant participation in social service work.

The Alpha Xi Delta Prize Scholarship, founded by the Boston Alumnae Chapter of Alpha Xi Delta, is awarded to that junior who, throughout the freshman and sophomore years, has attained a high scholastic record and who, by loyal cooperation in college activities of merit, has given evidence of the greatest promise of future achievement.

The Nancy W. Anderson Award for Environmental Sustainability, awarded to a junior or senior normally majoring in environmental studies whose work in the natural and social sciences, engineering, or humanities promotes integration of those subjects in informing public policy decisions that may protect endangered natural resources while promoting sound social and economic development.

The Department of Anthropology Prize is awarded annually to a student who has shown excellence in anthropological studies.

The Architectural Studies Prize is awarded annually to a senior majoring in architectural studies who has

demonstrated academic excellence and a commitment to the field of architectural studies. The prize is supported by the memorial fund for Margaret Henderson Floyd, professor of art and architectural history.

Art & Art History Prize, each year the Department of Art & Art History awards a prize to a graduating senior who has demonstrated a combination of superior academic achievement in course work (and independent study) and commitment to the field through participation in relevant activities beyond the classroom, such as work, internships or exhibitions, study abroad, and involvement with professional groups. Attention is given to the number, range and level of classes taken in Art & Art History, performance in FAH 100 (our capstone course), and to the quality of written work produced throughout. Selection is by faculty vote, and advisors are responsible for recommending candidates.

The Robert Asch Prize, established in 2002 by friends and family of Bob Asch to honor the former director of the Tufts-in-Tübingen program. A beloved friend to all who knew him, Bob served as director from 1972 to 2001. He was known both for his zest for life and a humanistic approach to his quest for international understanding. Awarded to juniors or seniors who will use the fund for research, projects, or internships in a German-speaking country.

The Asian Studies Prize is awarded to a graduating senior who has demonstrated excellence and interest for future development in Asian studies.

The Association of Tufts Alumnae Seventy-fifth Anniversary Award is established to honor a woman student who has provided meritorious service to the Tufts University community, adding to the university by her presence. The student should be a junior or senior with good academic standing. This award was established by the Association of Tufts Alumnae on the occasion of its seventy-fifth anniversary.

The Michael E. Avtges Memorial Prize, established in 1989 by Mr. and Mrs. Nicholas E. Avtges and the Boston Chapter, Society of American Military Engineers in memory of Michael E. Avtges, a student in the College of Engineering. Prizes are awarded to deserving students in the Department of Civil and Environmental Engineering with preference to those who are interested in computer science and engineering.

The Peter Belfer Award in Political Science is given annually for the outstanding piece of written work done in a political science course or independently by a political science major. This award was established in 1973 by Mrs. Ann Belfer Goldstein in memory of her late husband, Peter Belfer, A'67.

The Bennett Memorial Scholarship, founded in 1924 by the Class of 1914 in memory of William Joseph Bennett, scholar, soldier, athlete, and a member of this class, who met his death during World War I. The scholarship is awarded to that student who best exemplifies the qualities of true sportsmanship as exhibited by the man whose name it bears.

The Berger, Lehman Scholars Fund, honoring the life-long contributions of Dr. Berger, E'36, as a valuable alumnus and trustee of Tufts University, and Dr. Berger's partner, Lawrence H. Lehman, and his family, including his son Scott, A'82. The fund is to provide students within the Department of Geology with assistance for their studies and to encourage the students to pursue a career in geology.

The Charles G. Bluhdorn Prize in Economics, awarded annually to an undergraduate majoring in economics who has demonstrated outstanding scholastic ability. This prize was founded in 1983 by Donald Gaston in memory of Charles G. Bluhdorn.

The Anne E. Borghesani Memorial Prize is an annual incentive award that will enable the recipient(s) to undertake a project, activity, or plan of study in any field involving international issues. The prize is designed to encourage personal growth and independence, while increasing one's understanding of all peoples and encouraging a commitment to the world community. The award honors the memory of Anne E. Borghesani, J'89, an international relations major. Anne's years at Tufts were a time of intellectual and personal challenge, adventure, and increasing commitment to her friends, the Tufts community, and the world. Anne's love of people and her fascination with travel and other cultures made her major a natural choice.

The Boston Greek Prize, founded in 1962 with income from a fund raised by the Committee for the Promotion of Greek Studies at Tufts University, is awarded for meritorious achievement in the Greek language only when students of conspicuous merit are nominated by the Department of Classics faculty.

The Benjamin G. Brown Scholarships, established in 1947 by the bequest of Robert C. Brown of the Class of 1888 in honor of his father, Benjamin G. Brown, onetime Walker Professor of Mathematics at Tufts. These scholarships are awarded to seniors who have shown promise in scientific research in fields other than chemistry.

The Moses True Brown Prize, established in 1903 by Moses True Brown, who was Tufts College's first professor of Oratory (from 1866–1890). The prize is awarded, whenever a suitable candidate appears, to a senior majoring in drama who combines high achievement in dramatic

scholarship with a strong potential for successful teaching in the field of dramatic literature, criticism, and theatre history.

The Harry Poole Burden Prize in Electrical Engineering, established in 1973 by friends of Harry P. Burden, H'53, dean of the College of Engineering from 1936 to 1957, is for one or more prizes for the best design or research project done by an undergraduate electrical engineering student or students during the academic year of the project.

The Professor Kalman A. Burnim Prize for Scholarly Excellence, awarded annually to a Ph.D. student in drama who has completed all steps toward the degree except the dissertation and who has demonstrated distinction by excelling academically and in research and by contributing to the life of the program in an outstanding manner. The prize was established by alumni, colleagues, and friends in honor of Kalman A. Burnim, Emeritus Fletcher Professor of Drama and Oratory, and Tufts alumnus (A'50), who created the Ph.D. program in drama. During his 28 years at Tufts, Professor Burnim chaired the department for nine years and earned his reputation as a world-renowned scholar in theatre history.

The Thomas Harrison Carmichael and Emily Leonard Carmichael Prize Scholarship, established in 1950 by Leonard Carmichael of the Class of 1921, seventh president of Tufts College, in memory of his parents, is awarded to assist an academically able junior or senior who has shown ability in physiological psychology or general physiology.

The Helen Morris Cartwright Memorial Prize is awarded to that senior who, in the judgment of the Department of Philosophy, has shown outstanding philosophical ability, both orally and in writing.

The Theresa McDermott Carzo Award in honor of Theresa McDermott Carzo, a 1984 graduate of Tufts through the Resumed Education for Adult Learners Program, is given to a student in the Resumed Education for Adult Learners Program who demonstrates a love of learning and the determination necessary to return to college to complete a degree despite obstacles.

Madeline Harrison Caviness Prize, the Department of Art and Art History has established the Madeline Harrison Caviness Prize in honor of our esteemed senior colleague. This prize will be awarded annually to the undergraduate major whose senior honor's thesis merits recognition for its intellectual rigor, creativity, and scholarly promise.

The Mary Grant Charles Prize Scholarship Fund, established in 1975 by Ralph S. Charles, A'23, and his two sons, Grant H. Charles, A'51, and Ronald A. Charles, E'57,

in loving memory of wife and mother, Mary Grant Charles, is awarded to an outstanding undergraduate possessing the same creative qualities in the writing of prose and poetry as Mrs. Charles, and preferentially to a student whose writing reflects an interest in ancestry and genealogy.

The Shirley and Stanley Charm Scholarship in Food and Biotechnology, established in 1984 by Dr. Stanley Charm, who was chair of the Chemical Engineering Department from 1981 to 1985, is used in the Department of Chemical and Biological Engineering as a stipend for a senior, graduate, or postdoctoral student who is committed to study and research in food science or biotechnology.

The Department of Chemical and Biological Engineering Prize is awarded to a senior who has shown excellence in chemical engineering studies.

The Chemical Engineering Special Recognition Award is awarded to a senior who has shown character and perseverance in achieving high academic standards in chemical engineering studies while overcoming difficult circumstances.

The Chinese Language and Literature Prize is awarded annually to a graduating senior who has demonstrated excellence in the studies of Chinese language, literature, and culture.

The Anna Quincy Churchill Prizes in General Biology, established in 1954 by Dr. Churchill, M'17, a member of the anatomy department in the Tufts School of Medicine and Dental Medicine from 1918 until her retirement as assistant professor *emerita* in 1954, are awarded annually for excellence in the study of botany and zoology in the general biology course.

The Gemma Cifarelli Memorial Scholarship, established in 1956 by classmates and fellow students in memory of Gemma Cifarelli of the Class of 1957, is awarded to a junior who has combined good academic standing with participation in activities of importance to the university.

The Prize Scholarship of the Class of 1882, founded by Dr. Arthur Winslow Pierce, A'82, Litt. D.'99, in the name of his college class, is reserved for an undergraduate student with great potential for intellectual leadership and creativity.

The Class of 1898 Prizes, from a fund established by the Class of 1898, are awarded as follows: one prize each to that student in the College of Liberal Arts, in Jackson College, and in the College of Engineering who, having completed two years at Tufts University, has best demonstrated high scholarly ability together with a wide range of intellectual interests and competence.

The Class of 1911 Prize Scholarships, from the Class of

1911 Fund, are awarded to seniors of engaging personality who, from matriculation as freshmen to the senior year, have, in the judgment of the Committee on Academic Awards, made most progress as measured both by academic record and by successful participation in extracurricular activities of enduring worth.

The Class of 1921—Leonard Carmichael Prize Scholarship Fund, established through the gifts of members and friends of the Class of 1921 in honor and memory of their classmate Leonard Carmichael, seventh president of Tufts, secretary of the Smithsonian Institution, and vice president of the National Geographic Society with special responsibilities for research and exploration, awarded by the Department of Psychology to a third-year student or students whose academic achievements have been judged as outstanding.

The Class of 1942 Prize Scholarship was founded in 1985 by Elaine and Grant Curtis in honor of the women and men of the class who served their country, and in particular the five who served their Alma Mater for more than an aggregate 125 years (Professor Freeland Abbott, Dean Grant Curtis, Dr. Nelson Fontneau, Professor Burleigh Wellington, and William Wells, Esq.). The prize is awarded annually to seniors considered by other undergraduates, faculty, or staff as “the most likely to become outstanding university teachers, counselors, or administrators.” Written nominations, stressing how the nominee has already served or contributed to the university, should be sent to the Faculty Committee on Academic Awards.

The R. M. Karapetoff Cobb Chemistry Fund is awarded to the two Jackson College chemistry majors with the highest academic standing at the end of their junior year.

The Morton N. Cohen Creative Writing Award is given to undergraduates who demonstrate in a substantial piece of creative writing, the greatest distinction in creative writing. The recipient is selected by a special committee from the Department of English.

The Community Service Award is presented annually to undergraduate and graduate students who have provided exceptional community service that is much needed by the beneficiaries, even though it often goes unnoticed by the general public. The award recognizes those who, as individuals or as part of a Tufts volunteer organization, have given special service at Tufts or to the larger community. Service should generally represent activities which occur outside the student’s required program of study and outside of elective office or employment.

The Department of Religion Prize is awarded each year to a Religion major who has shown excellence in religious studies.

The James Schmolze Prize for Excellence in Computer Science is awarded annually to a junior or senior who has demonstrated excellence in computer science studies.

The Donald A. Cowdery Memorial Scholarship, founded in 1946 by Jeanetta Wilson Cowdery Black, F’46, in memory of her husband, Donald A. Cowdery, Class of 1939, who was killed in action in World War II, is awarded annually to that senior or junior whose academic achievements and personal qualities of leadership and high principle have been outstanding.

The Dance Studies Award is given, when appropriate, to a student who has demonstrated excellence in dance courses, who has choreographic potential, and who has shown an ideal attitude about learning in the liberal arts environment.

The Mabel Daniels Prize in Music and Literature, established in 1960 by Mabel Wheeler Daniels, Hon. M.A. ’33, the distinguished composer, is awarded to a junior or senior who shows marked creative talent and accomplishment in music or literature.

Daughters of the Revolution Prize Scholarship, is awarded on recommendation of the Department of History to a student demonstrating marked interest in American colonial history as well as excellence in scholarship.

The de Florez Prize in Human Engineering, established in 1964 by the bequest of Admiral Luis de Florez, USN (retired), H’46, is awarded to an undergraduate student, ordinarily majoring in psychology, engineering, or science, who has acquired a high degree of theoretical sophistication and demonstrates an interest in the practical application of knowledge to problems of human engineering.

The Distinguished Achievement Award in International Relations is given annually to an outstanding international relations major of high academic standing who has participated widely in the program and who, having proven a spacious understanding of and sensitivity to the richness of the international community, intends to pursue a professional career in the field of international relations.

The Amos Emerson Dolbear Scholarships, established in 1947 by the bequest of Katherine E. Dolbear of the Class of 1897 in memory of her father, the eminent scientist and inventor, who was professor of physics at Tufts from 1874 to 1910, are awarded to two seniors who have shown promise in the field of either electrical engineering or physics.

The Priscilla N. Dunne Prize Fund, founded in 1980 by Mrs. Doris Scheff in honor of her daughter, Priscilla N. Dunne, J’75, is given annually to an undergraduate psy-

chology major with an excellent record and great promise of future achievement in the field.

The Durkee Scholarship, established by the bequest of Robert C. Brown of the Class of 1888 in honor of his sister, Henrietta N. Durkee, WA'93, G'95, G'18, and her husband, the late professor Frank W. Durkee, A'88, G'89, H'21, and their children, is awarded to senior students in the Department of Chemistry who have undertaken a research problem in the field of chemistry.

The Margaret Durkee Angell and Henrietta Brown Durkee Scholarship Fund, in memory of Professor Frank W. Durkee, is awarded to that Jackson College senior who has demonstrated high promise and achievement in the field of chemistry. The prize commemorates Professor Frank W. Durkee, A'88, G'89, H'21, who was long chairman of the department, a renowned chemist, a man of great energy and diligence in all that he undertook, and a most loyal alumnus of Tufts.

The Alex Elias Memorial Prize Scholarship, established in 1966 by the Brotherhood of Alpha Epsilon Pi and friends of Alex Elias within and outside the university, is awarded to that junior or senior who best displays those high standards in community activities and in athletic and scholastic pursuits for which Alex Elias was well known.

The Eliot-Pearson Department of Child Development Prize is awarded to that senior majoring in child development who best exemplifies a combination of high academic achievement and the promise of outstanding teaching ability.

The James Vance Elliott Political Science Prize is awarded in the senior year to the student majoring in political science whose achievements best combine academic excellence with active participation and effective leadership in campus and civic affairs.

The Frederick Melvin Ellis Prize, established in 1968 by fellow alumni, students, and friends of the late Professor Frederick "Fish" Ellis of the Class of 1929, the outstanding four-sport athlete of his day and possibly the greatest Tufts College has ever known, is awarded to a student who has demonstrated marked athletic versatility, a modest manner, successful academic achievement, and the potential for effective leadership of youth.

The Department of English Prize was created by the Class of 1898 Fund and is awarded to that student who has shown excellence in English studies.

The Ivan Galantic Special Achievement in Humanities Prize, named after Ivan Galantic, Professor of Art History 1971-1989, is awarded to a student who has demonstrated the inclination and capacity to cultivate an integrative approach to learning; one who reaches for

wisdom, not simply knowledge.

The Constantine Ghikas Prize in Romance Languages was established in 1957 by George C. Ghikas in memory of his son, Constantine Ghikas of the Class of 1941, for excellence in a program of major study in romance languages.

The John S. Gibson Award, named after the first director of the International Relations Program at Tufts University, is given to the author of the most outstanding paper written by an undergraduate in one of the participating departments in the International Relations Program.

The Goddard Rhetorical Prizes, from a fund created in 1862 by Thomas A. Goddard, then treasurer of Tufts College, are provided annually in the field of dramatic interpretation and acting. These undergraduate prizes may, at the discretion of the Department of Drama, be awarded for marked excellence in acting as demonstrated during the student's career in stage productions of the university theatre.

The Graduate School of Arts and Sciences Outstanding Academic Performance Award recognizes the overall academic achievement of graduate students as evidenced by course grades, quality of papers, theses, and projects in the arts, humanities, natural sciences, and social sciences.

The Graduate School of Arts and Sciences Outstanding Contributions to Undergraduate Education Award recognizes excellence as a teaching assistant or other roles such as mentoring undergraduates in the arts, humanities, natural sciences, and social sciences.

The Graduate School Council Awards are given annually to outstanding graduate student organizations and faculty mentors.

The Graduate Student Research Awards are given semi-annually to graduate students enrolled in either the School of Arts and Sciences or the School of Engineering. Awards are competitive and decisions are made by student peers and based on the proposal, significance of the scholarly activity and need.

The Marjorie B. Greene Award is made to a graduate occupational therapy student who has demonstrated outstanding achievement in the areas of leadership and involvement in student and professional activities.

The Greenwood Prize Scholarship, created in 1877 by Mrs. Eliza M. Greenwood of Malden, Massachusetts, is awarded for excellence in state production and technical arts, as demonstrated during the student's career in the university theatre.

The Audrey Butvay Gruss Science Award is awarded annually, with preference for a female student, to a student who has demonstrated outstanding academic work

in any of the sciences and who is a scholarship recipient. This award was established in 1992 by Audrey Butvay Gruss, an alumna of Jackson College.

The Robert P. Guertin Student Leadership Award recognizes outstanding graduate student leadership in the arts, humanities, natural sciences, and social sciences. The award is given to individuals or groups of students enrolled in either the School of Arts and Sciences or the School of Engineering for accomplishments in such areas as academic or social programming, curricular initiatives, supporting the work and lives of fellow students, community service, and developing improved policies.

The Martin Guterman Award in memory of Martin Guterman, beloved faculty member in the Department of Mathematics, for the first-year student with the highest academic achievement in mathematics, to encourage further study in that field.

The Audrey L. Hale Prize, established in 1995 in honor of Audrey L. Hale for forty-seven years of extraordinary service to Tufts University, including fourteen years as assistant provost, is to be awarded to an undergraduate student in the junior or senior year who has demonstrated academic excellence and a commitment to international understanding through acts of compassion and humanity. The recipient, who is able to achieve his/her educational goals through personal and financial sacrifice, will be determined and recommended by the dean of students.

The Ethel M. Hayes Scholarship, founded by the Tufts Alumnae Association in 1946, in memory of Ethel M. Hayes, Class of 1896, college librarian (1896–1943), is awarded to an undergraduate dependent to some extent on his or her own efforts to meet the cost of education and whose work throughout the preceding year has been of such excellence that he or she is deemed worthy of high academic distinction.

The Jane Anne Herman Prize is given in honor of Jane Anne Herman, J'87, who will always be remembered for her devotion to friends and family, her generosity during Thanksgiving, and her appreciation of the arts. This award is given by the Department of Drama and Dance for excellence in directing and/or stage management, as demonstrated during the student's career in the university theatre.

The Morris and Sid Heyman Prize Scholarships, established in 1980 by the bequest of Mrs. Sid L. Heyman in memory of her husband, Morris Heyman, who graduated from Tufts University in 1919 with a bachelor of science degree in electrical engineering, are awarded to one or more undergraduate students in the Department of Electrical Engineering and Computer Science, based on

academic achievement and future promise.

The Marshall Hochhauser Prize is presented annually to seniors who exemplify the altruistic spirit of the man whose name it bears, while working within the system to broaden and enrich the intellectual climate at Tufts without regard for personal gain. The prize honors the memory of Marshall Hochhauser J'82P, E'79P, who, as National Chairman of the Parents' Fund at the onset of the Campaign for Tufts, labored on behalf of undergraduate education at Tufts far beyond the call of duty. The prize may be awarded to one or two seniors. The Board of the Experimental College selects the recipients of this award.

The Rob Hollister Award for Community Service and Citizenship recognizes graduate students who have contributed their time and effort to the community outside of Tufts. This contribution could be in the form of volunteer work, activism in community issues, or participation in public service activities. The award is given to individuals or groups of students in either the School of Arts and Sciences or the School of Engineering.

The Marion Ricker Houston Prize Scholarship in Economics, established in memory of a faculty wife whose friendship and gracious hospitality enriched the lives of many generations of Tufts and Jackson students, is awarded to junior or senior economics majors who have been responsible citizens of the Tufts community and who, in the opinion of members of the economics department, have made substantial progress in mastery of their chosen field.

The James D. Hume Field Geology Scholarship Prize was established in 1996 by alumni, colleagues, friends, and family in memory of Jim Hume, exemplary teacher and geology department chairman, who shared his enthusiasm, knowledge, and cheerful nature with everyone he knew. This award is presented annually to one or more outstanding geology students to further their field experience in geology.

The Albert H. Imlah European History Prize, named after Albert Imlah, Professor of History 1927–1956, Walter S. Dickson Professor of English and American History 1958–1970, is awarded to a student or students for distinguished work in European history, or to promote summer reading in the honors program, or in comparable programs in history.

The Albert H. Imlah Excellence in History Prize, named after Albert Imlah, Professor of History 1927–1956, Walter S. Dickson Professor of English and American History 1958–1970, is awarded to a senior for excellence in history. Through this award Professor Imlah sought to encourage high academic performance.

The International Letters and Visual Studies Prize is awarded annually to a graduating senior who has demonstrated excellence in the studies of literature, film, and visual media in an international context.

International Relations Research Scholars Program, established in 2001, supports original, high-quality undergraduate international research. Awarded jointly to selected IR juniors who plan to undertake a senior honors thesis or other capstone research experience and their faculty mentors, the scholarship financially supports a minimum of eight weeks of summer research on an international topic. The program's objectives are to promote intensive faculty-student mentoring and to advance the development of strong international research skills critical to professional and academic goals in an increasingly interdependent world.

The Japanese Language and Literature Prize is awarded annually to a graduating senior who has demonstrated excellence in the studies of Japanese language, literature, and culture.

The Ralph S. Kaye Memorial Prize was founded in 1947 by members of Omicron Chapter of Phi Epsilon Pi as a memorial to Ralph Sumner Kaye, of the Class of 1937, who died while serving as a lieutenant aboard a destroyer sunk in the naval battle for Okinawa (Gunto) in 1945. It is awarded to a junior or senior who, at the conclusion of two years or more of mathematics courses and irrespective of his/her major field of concentration, demonstrates a favorable combination of proficiency in mathematics and participation in extracurricular activities.

The William J. King Applied Music Award, for piano performance was established by Mrs. Margaret King in memory of her husband, who was a professor of Music at Tufts for 41 years. Each spring, the award is presented to one or more students who demonstrated outstanding ability in piano performance in either classical or jazz music. Students are nominated for the award by their faculty instructors based on their fall semester performance.

The N. Hobbs Knight Prize Scholarship in Physics, established in 1957 by Mrs. Esther F. Martin in honor of her father, the late Nathaniel Hobbs Knight, a member of the faculty in the Department of Physics from 1911 to 1953. The scholarship provides two annual awards to be presented to two juniors or seniors who are majoring in physics and who have demonstrated outstanding ability in theoretical and experimental physics, selected in such manner as the Committee on Academic Awards shall determine.

The Laminan Prize in Romance Languages, established in 1963 by Toivo, A'31, and Margaret C. Laminan is awarded each year to a student for distinguished work in the Department of Romance Languages.

The Earle F. Littleton Scholarship is awarded to worthy juniors, seniors, or graduate students in the civil engineering program who are active in professional or community affairs and show promise of becoming active and loyal alumni.

The Lewis F. Manly Memorial Prize was established by friends, family, and former students in memory of Lewis F. Manly, for forty years a member of the Tufts faculty, twenty-six of them as chairman of the Department of Economics. He also served for six years as head coach of basketball and for fifteen years as head coach of football, uniquely combining a dedicated career as teacher and as an athletic coach. His loyalty, devotion, and service to Tufts were of a high order. The prize is to be awarded to an undergraduate at Tufts University who combines a record of academic excellence with superior athletic performance. Preference shall be given to an economics major where there is a choice among otherwise highly qualified candidates.

The Lt. Commander Robert James Manning Memorial Prize is awarded annually to an engineering undergraduate who is industrious, competent, enthusiastic, and who shows the same commitment to excellence that Lt. Commander Manning demonstrated throughout his life. The prize was established in 1990 by Lt. Commander Manning's wife Nancy E. Manning, and by his parents Mr. and Mrs. Edward V. Manning, with the support of his friends and family. Lt. Commander Manning was a 1970 Tufts graduate.

The Mechanical Engineering Prize is awarded to a senior who, in the judgment of the mechanical engineering faculty, has excelled in the study of Mechanical Engineering.

The Alex Mendell Memorial Scholarship is awarded annually to a sophomore or junior who, through his or her leadership in a variety of campus activities, brings together students representing a broad spectrum of the community. Like the student in whose memory the award is made, the recipient should demonstrate a generosity of spirit and character that both contributes to the self-esteem of others and to their love of Tufts.

The Melissa Beth Meyers Award is presented annually to a graduating BFA or BFA in art education student in recognition of academic excellence, personal growth and his/her ability to achieve this success while overcoming substantial educational and/or personal obstacles.

The Russell E. Miller History Prize is awarded to an undergraduate of exceptional ability whose participation in advanced history courses has demonstrated an eagerness to explore problems of historical analysis and interpretation.

The Paul Montle Prize Scholarship is awarded to upper-classmen or women who demonstrate entrepreneurial skills and who accept along with the scholarship a moral obligation to return to Tufts later in life, much more than they received, in terms of financial aid and educational benefits.

Mary Ann Mulcahy Service in Education Award, The Department of Education and the University College of Citizenship and Public Service created this award to honor a graduate student completing the MAT middle and high school teacher licensure program who has demonstrated a strong commitment to both public service and effective classroom practice in the field experience portion of their program.

The Outstanding Contribution to Music at Tufts Award is given annually to a senior student whose service to the department, creativity, musical achievements, and contribution to the musical atmosphere at Tufts exemplify the highest distinction.

The Multicultural Service Award is for an undergraduate who has made significant efforts to define Tufts as a multicultural environment in which race, ethnicity, religion, class, gender, and sexual preference are not barriers to the full enjoyment of community membership.

The Ellen C. Myers Memorial Prize was established in 1982 in honor of Ellen Myers, J'82, an example of great courage and mental fortitude as she pursued her degree while battling an incurable illness. The prize is to be awarded to a junior or senior who has shown character, diligence, and perseverance in achieving high scholarship standards in the face of adverse circumstances while working toward a bachelor's degree at Tufts University.

The Navy V-12/NROTC Memorial Prize was established in 1998 by Tufts V-12/NROTC alumni who were enrolled in the program at Tufts during World War II. The prize is to be awarded to junior or senior students from the Tufts undergraduate colleges who are direct descendants of participants in the Tufts or other college V-12/NROTC programs during World War II, July 1943-June 1946, or are enrolled in an NROTC program. The award is based on scholastic achievement, demonstrated leadership, and significant contributions made by the candidates to the university and greater community.

The Robert L. Nichols Scholarship Prize, established in

1979 by friends and students of Robert L. Nichols and the Department of Geology, is awarded to one or more students of demonstrated ability in geology, for the purpose of expanding their knowledge of geology by field experience.

O'Leary Design Award, The James P. O'Leary Award is named in honor of James P. O'Leary, Associate Professor of Mechanical Engineering, and is presented annually to a Mechanical Engineering senior who has made outstanding contributions in the area of design.

The Daniel Ounjian Prize in Economics was established by alumni, friends, colleagues, and family in memory of Daniel Ounjian, an esteemed professor of economics at Tufts for thirty-one years. The award is given annually to a junior economics major who, in the judgment of the Department of Economics, should be encouraged to pursue graduate studies in economics and whose contributions to the Tufts community reflect the loyalty and commitment that his students and peers appreciated in Daniel Ounjian.

The Wendell Phillips Memorial Scholarship is one of two scholarships (the other being assigned to Harvard College) that was established in 1896 by the Wendell Phillips Memorial Fund Association in honor of Boston's greatest preacher and orator. The scholarship is given annually to the junior or senior who has best demonstrated both marked ability as a speaker and a high sense of public responsibility. The recipient of the scholarship traditionally gives an address at commencement. Candidates for this award are recommended by the Committee on Student Life.

The Sarah Plummer Memorial Prize is awarded annually to a graduate student or students who demonstrate a deep commitment to the field of classical archaeology or classical studies; to the Tufts University Department of Classics and to the broader community.

The Paula Frazier Poskitt Scholarship was established in 1995 by Dr. Thomas R. Poskitt, A'66, M'70, in memory of his wife, Paula Frazier Poskitt, J'66, G'72, to provide tuition support for a senior biology major who intends to pursue graduate studies.

The Class of 1947 Victor Prather Prize was established by the Class of 1947 to honor the memory of their classmate, Victor A. Prather, Jr., A'47, M'52, whose research for the early space program contributed to eventual manned space flights. In 1961 he lost his life during a strato-lab balloon high-altitude flight designed for testing the space suit used in the first manned flight. Dr. Prather was a scholar and a leader devoted to the advancement of knowledge. The prize will be awarded to a student (or students) from the School of

Engineering and the College of Liberal Arts and Jackson College. Those receiving the prize will be engineering or science majors who have demonstrated excellence in scientific research, enthusiasm for the pursuit of knowledge, and a dedication to scholarly achievement.

The Pride on the Hill Award is named for the lesbian, gay bisexual, and transgender alumni organization of Tufts. The award will honor undergraduate or graduate students who, through community involvement, artistic expression, written work, or scientific research have contributed the most to an understanding at Tufts of gay, lesbian, bisexual, or transgender identities during the preceding academic year.

The William Howell Reed Prize in German, established through a fund left to Tufts University by Professor Reed, a member of the German department from 1904 until the time of his death in 1949, is awarded to a member of the junior or senior class for excellence and promise in German studies. The recipient should demonstrate those qualities of learning, discrimination, and taste that characterized Professor Reed's distinguished career on the Tufts campus.

The Resumed Education for Adult Learners Prize Scholarship is awarded to the continuing education senior who has demonstrated both the greatest perseverance in pursuing his/her academic goals and the greatest generosity and effectiveness in helping other continuing education students to achieve their academic goals.

The Russian Prize is awarded annually to a junior or senior who has demonstrated excellence in the Russian language and Russian-related studies.

The Howard Sample Prize Scholarship in Physics is named in memory of Howard Sample, who was a professor in the Department of Physics at Tufts University. Professor Sample was known for his love of physics and for his generosity in assisting colleagues, graduate and undergraduate students, and for his kindness to all. The award is given annually to undergraduate students for outstanding performances in Physics 11 and Physics 12.

The Stephen Sapuppo Prize, established in 1993 by Helen and Michele Sapuppo and family in loving memory of their son and brother Stephen, A'81, is awarded to a junior who has demonstrated outstanding academic achievement in drama, with preference for a member of Torn Ticket Two.

The School of Engineering Outstanding Contributor to Engineering Education Award is focused on full-time graduate students who through T.A. work, voluntary service, and other activities have enhanced significantly the education programs of their departments.

The School of Engineering Outstanding Graduate Researcher Award is focused on full-time, thesis program students who have distinguished themselves in research, especially technical publication.

The Charles F. Seymour, Jr., Prize is to be awarded annually with preference for a junior or senior participant in musical theatre who has an interest in business studies or career.

The Frederic J. Shepler Memorial Prize in French was established in 1984 by alumni, friends, colleagues, and family in memory of Frederic J. Shepler, an esteemed professor of French in the Department of Romance Languages. The prize is awarded annually to that senior French major who has demonstrated high achievement in the study of French literature and in the understanding of poetry in particular.

The Dr. Philip E. A. Sheridan Prize was established in 1977 by bequest of Dr. Sheridan, classes of Liberal Arts, 1908, and Medicine, 1912. The prize is awarded annually to the student who has shown the most improvement through the junior year in bachelor of arts course work.

The Sociology Prize is awarded to the member of the junior or senior class who, in the opinion of the Department of Sociology, has shown exceptional promise in either general sociological analysis or empirical social research.

The Charles E. Stearns Scholarship Prize, established in 1997 by students, colleagues, friends, and family, honors the exceptional fifty-year career of Charlie Stearns as a gifted student, a caring and intellectually stimulating professor, and a loyal and insightful dean. This award is presented annually to one or more geology students who have demonstrated attention to detail, thoughtful analysis, and insight to their geological studies.

The Joseph and Sara Stone Prize is given to a student in the field of Judaic studies who demonstrates excellence in the field and whose concern for others reflects the enormous efforts of Joseph and Sara Stone to overcome great financial hardship in attaining for themselves and their children the benefit of an excellent education.

The Joanne Mary Sullivan Prize is awarded to a junior or senior who has shown excellence and promise in the study of psychology. This prize was established in 1990 in memory of Joanne Mary Sullivan, who held a B.A. in psychology, by her parents Eugene and Vilma, her brother Eugene, Jr., G'90, and family and friends.

The Elizabeth Vermeer Tishler Prize in Music

Performance, established in 1984 by Elizabeth Vermeer Tishler, J'31, is awarded on the basis of a competition, open to all undergraduates except those enrolled in the Tufts-NEC dual-degree program. In order to be informed of the rules of the competition, those intending to compete must register not later than December 1 with the chair of the music department. Performance will be limited to classical, jazz, or modern work.

The Max Tishler Prize Scholarship, established in 1951 by Merck and Co., Inc., to honor Dr. Max Tishler of the Class of 1928, H'55, is awarded each year to an outstanding student in the sciences, preferably in chemistry, entering the senior year.

Trefethen Reserach Award The Lloyd MacGregor Trefethen Award is named in honor of Lloyd Trefethen, professor of Mechanical Engineering, and is presented annually to mechanical engineering senior who has conducted outstanding undergraduate research.

The Norbert Wiener Award in Mathematics is given on those rare occasions when a very young student exhibits such prodigious strength in mathematics as to recall the highly unusual talents of the child prodigy Norbert Wiener, LA1909, who went on to become one of the giants of twentieth-century mathematics. Aside from his vast legacy within mathematics, he left his mark on popular culture by founding the discipline and coining the term "cybernetics," which has spawned today's notions of cyberspace.

The Etta and Harry Winokur Prize for Outstanding Achievement in Artistic or Scholarly Work Award in the Department of Music for music majors in junior or senior years is given in recognition of outstanding achievement in artistic work such as composition or performance, and/or scholarly works such as a thesis.

The Etta and Harry Winokur Prize for Outstanding Contribution to Performance Award in the Department of Music for music majors in junior or senior years is given in recognition of continuing outstanding contribution to the performance activities sponsored by the music department, such as leadership in performance studies and department ensembles, chamber groups, and recitals, and/or leadership in audience development, concert management, and arts administration.

The Marianne J. H. Witherby Prize in Archaeology was established by Marianne Witherby, an alumna of Tufts who is a devoted supporter of archaeological studies at the university. The prize is awarded each year to an

archaeology major in recognition of scholastic ability, dedication to the discipline, and resourcefulness.

The William Frank Wyatt Prize, established in 1962 for excellence in the translation of Greek or Latin, is awarded by the Department of Classics to the student who best exemplifies Professor Wyatt's sound scholarship and catholicity of interest. Professor Wyatt was a teacher of Greek at Tufts from 1914 until his death in 1961, and chairman of the classics department from its establishment in 1940 to 1952.

The John W. and Katherine L. Zarker Award for Excellence in Classical Studies is awarded to a student who has demonstrated overall excellence in studies as determined by the members of the Department of Classics. Preference will be given, but not limited, to students who plan to pursue a teaching career.

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