

The Bulletin

BULLETIN OF TUFTS UNIVERSITY 2019-2020

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President, 2011–present

Acting President, 1905–1906

President, 1906–1912

Lawrence S. Bacow

President, 2001–2011

Emeritus, 2011–present

Reverend Elmer Hewitt

Capen

President, 1875–1905

John DiBiaggio

President, 1992–2001

Emeritus, 2001–present

Reverend Alonzo Ames

Miner

President, 1862–1875

Jean Mayer

President, 1976–1992

Chancellor, 1992–1993

John Potter Marshall

Acting President, 1861–1862

Burton Crosby Hallowell

President, 1967–1976

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President, 1853–1861

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Acting President, 1966–1967

Through this bulletin, announcement is made of the general rules, regulations, fees, and schedules in effect as of the date of publication. This bulletin is for informational purposes only and does not constitute a contract between the university and any applicant, student, or other party. The university reserves its right to make changes, without notice, in any course offerings, requirements, policies, regulations, dates, and financial or other information contained in this bulletin. Published by the Trustees of Tufts University, Medford, Massachusetts 02155. Printed in the USA.

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Hamilton

School of Arts and Sciences

COLLEGE OF LIBERAL ARTS

GRADUATE SCHOOL OF ARTS AND SCIENCES

School of Engineering

University College

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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 10,800 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 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, Truman, Goldwater, and Beinecke scholarships and fellowships.

Accreditation of Tufts University

Tufts University is a privately endowed institution founded in 1852 and has been accredited by the New England Association of Schools and Colleges (NEASC) and Commission on Institutions of Higher Education (CIHE) since 1929, and its accreditation by NEASC encompasses the entire institution. Tufts underwent a comprehensive evaluation in March 2013 and was accredited by the Commission in September 2013. The NEASC accepted The University's Fifth Year interim report in May 2018. NEASC establishes and maintains high standards of educational excellence through self-evaluation and peer review. Institutions demonstrating that they meet these standards are accredited and thus members of NEASC. The CIHE, recognized by the U.S. Department of Education, is one of seven accrediting commissions that provide accreditation regionally.

Some programs and degrees at Tufts have been accredited by additional specialist agencies:

- B.A./M.A. in Art History, accredited by the National Association of Schools of Art and Design's Commission on Accreditation.
- B.S. in Biomedical Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Chemistry, accredited by the American Chemical Society.
- B.S. in Chemical Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Civil Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Computer Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Electrical Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Environmental Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Mechanical Engineering, accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.
- B.S. in Computer Science, accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org>.
- M.A. and Ed.S. in School Psychology, accredited by the National Association of School Psychologists and the Massachusetts Department of Elementary and Secondary Education.
- B.S. in Early Childhood Licensure, accredited by the MA Department of Elementary and Secondary Education.
- Studio Art Certificate (post-baccalaureate), accredited by the National Association of Schools of Art and Design's Commission on Accreditation.
- Studio Art Diploma, accredited by the National Association of Schools of Art and Design's Commission on Accreditation.
- M.A.T. in Art Education (grades PreK–8 and 5–12), accredited by the Massachusetts Department of Elementary and Secondary Education.

- M.A.T. in Art Education, accredited by the National Association of Schools of Art and Design's Commission on Accreditation.
- M.A. in Art History and Museum Studies, accredited by the National association of Schools of Art and Design's Commission on Accreditation.
- M.A. in German with Teacher Licensure, accredited by the Massachusetts Department of Elementary and Secondary Education.
- M.A.T. in Early Childhood Education, accredited by the Massachusetts Department of Elementary and Secondary Education.
- M.A.T. in Elementary STEM, accredited by the Massachusetts Department of Elementary and Secondary Education.
- M.A.T. in Middle and High School, accredited by the Massachusetts Department of Elementary and Secondary Education.
- B.F.A., M.F.A. (offered with the School of the Museum of Fine Arts, Boston), accredited by the National Association of Schools of Art and Design's Commission on Accreditation.
- Professional Entry Level Master's Degree in Occupational Therapy, accredited by the Accreditation Council for Occupational Therapy of the American Occupational Therapy Association.
- M.A. in Urban and Environmental Policy and Planning, accredited by the Planning Accreditation Board.
- Dental Education, accredited by the Commission on Dental Accreditation of the American Dental Association.
- Medical Education, accredited by the Liaison Committee on Medical Education of the American Medical Association and the Association of American Medical Colleges.
- Master of Public Health, accredited by the Council on Education for Public Health.
- Physician Assistant Program (Master of Medical Science), accredited by the Accreditation Review Commission on Education for the Physician Assistant.
- Doctor of Veterinary Medicine, accredited by American Veterinary Medical Association.

The Tufts University Police Department has been accredited by the Massachusetts Police Accreditation Commission.

Financial Information

Expenses and Policies

All undergraduate students (with the exception of those in the R.E.A.L. program) are expected to carry a full course load unless they are granted a reduction as a result of serious, documented medical problems. The minimum full-time load is 12 semester hours; students will need to take an average of 15 semester hours each term to graduate on time. A typical first-year student in residence at Tufts during the 2019–2020 academic year may expect the following expenses:

Tuition	\$57,324
Residence hall	\$8,220
Meal plan	\$6,866
Health service and student activity fees	\$1,254
Books, supplies, and miscellaneous expenses (estimated)	\$2,536
Total for year (estimated w/o books)	\$73,664*

Medical Insurance costs \$3,260* for the year if the student is not covered by a comparable plan of their own. International students are required to be covered by the insurance plan through Tufts.

*The charges listed above are subject to change.

Tuition

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

Campus Housing

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.

Meal Plans

Students select a meal plan or JumboCash in accordance with university requirements. JumboCash allows students to make purchases at all on-campus dining locations (Carmichael and Dewick-MacPhie Dining Centers, Hodgdon Food-on-the-Run, Hotung Café, Commons Marketplace, Brown and Brew Coffee House, Tower Café at Tisch Library, Pax et Lox Glatt Kosher Deli, Mugar Café, and The Rez), as well as the bookstore, Campus Center Info Booth, vending machines, and on-campus washers and dryers; to pay fines at the Tisch and Ginn Libraries; and to purchase parking permits or lost IDs at Public Safety Administrative Services. JumboCash can also be used to pay for printing and copying in campus libraries and computer centers. JumboCash may be used at 15 off-campus restaurants for dining in, take-out, or delivery (where

available), as well as at a drug store and two convenience stores (alcohol, tobacco products, lottery tickets, and gift cards excluded). Dining Services is located at 89 Curtis Street, Somerville. For more information, contact 617-627-3566, e-mail: tuftsdining@tufts.edu, website: <http://dining.tufts.edu>.

Health Service

The Health Service fee is mandatory and non-waivable and covers the cost of running a comprehensive outpatient health service and counseling center. The fee covers unlimited primary care and walk-in visits to the Health Service, access to the Counseling and Mental Health Service, and an annual flu shot if 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 <https://students.tufts.edu/health-and-wellness/health-insurance>.

Fees

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 the room charge. The housing commitment fee is nonrefundable at the time a student selects a room, has a proxy select a campus room on their 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, or
- b) the student, subsequent to selecting a room, is admitted to a study abroad program. In such cases the student must file an electronic study abroad leave of absence form online via SIS. Students in both Tufts and non-Tufts study abroad programs must notify the Residential Life Office in Harleston Hall, within ten (10) days of acceptance—no later than April 15 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 \$750 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 their 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, website: <http://ase.tufts.edu/reslife>.

Payment of Bills

All currently enrolled students are billed electronically through the Tufts eBill system. Information on Tufts eBill can be found at <http://go.tufts.edu/mybill>. Students are required to pay tuition, fees, room, and board prior to the start of each semester. Bills for the fall semester must be paid by the first week in August; spring semester bills are due and payable in early December. The amount billed 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, e-payment, wire transfer or enrolling in the monthly payment plan. Detailed information about the payment plan is sent to returning students in April and incoming students in May/June.

Fall semester 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 to Tufts 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.

In compliance with S2248 PL 115-407 Section 103, veterans and eligible dependents who have notified Tufts that they are using VA educational benefits such as the Post 9/11 GI Bill will not be imposed a late fee, be denied access to facilities, or receive another penalty due to a late payment of tuition and/or fees from the VA directly to Tufts. This applies if payments have not been received within 90 days of the beginning of the term and applies only to the amount of the expected VA payment.

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 student 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 if assigned to a collection agency. Diplomas and official transcripts of records for those in arrears are regularly withheld until all payments have been made.

Administrative/Financial Withdrawal

If a student's account remains unsettled beyond the billing due date, subsequent bills will be issued reflecting monthly late payment charges. If the student's account remains unsettled after the first day of classes, the student may 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 2019 Semester

Date of Withdrawal	% Tuition Charge Cancelled
September 2, 2019	100%
September 3 to 16, 2019	90%
September 17 to 23, 2019	80%
September 24 to September 30, 2019	60%
October 1 to 7, 2019	40%
October 8 to 14, 2018	20%

Spring 2020 Semester

Date of Withdrawal	% Tuition Charge Cancelled
January 14, 2020	100%
January 15 to 28, 2020	90%
January 29 to February 4, 2020	80%
February 5 to 11, 2020	60%
February 12 to 18, 2020	40%
February 19 to 25, 2020	20%

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.

Campus Housing Charges

Campus housing charges will be refunded based on the above prorated tuition 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 residential facilities. The housing commitment fee is nonrefundable.

Meal Plan Charge

Students wishing to cancel their meal plan after the cutoff date, the third Friday after classes begin, 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 medical 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

Information regarding all student loans can be found on the Tufts University Financial Aid website: go.tufts.edu/finaid. This information includes student loan terms and conditions set forth by the University, the Federal Government, and additional details regarding the financial aid application process, types of aid, and scholarships. For specifics on a University loan, please review the terms and conditions set forth in the loan document.

Students intending to use VA benefits such as the Post 9/11 GI Bill must notify Student Services of their intention to use their benefit before the beginning of the term by providing a Certificate of Eligibility and a request for certification.

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's tradition of innovation dates to the school's founding in 1852. Today, a multidisciplinary 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 twenty-first 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 and Sciences, the largest of Tufts's nine 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 a 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

The College of Liberal Arts offers two degrees, the Bachelor of Arts (or Bachelor of Science option) and the Bachelor of Fine Arts. Students admitted to the College of Liberal Arts are admitted specifically into the Bachelor of Arts degree program or the Bachelor of Fine Arts degree program. This section will describe the degree requirements and academic policies for the Bachelor of Arts (or Bachelor of Science) degree, while the degree requirements and academic policies for the Bachelor of Fine Arts will be described in a separate section.

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 120 semester hours. A cumulative average of C- (1.67) or higher is required for graduation. No more than two courses, of no more than 8 semester hours, may consist of fieldwork or internships. No more than 15 semester hours may consist of online courses. 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. The exception to this is students who transfer to Tufts as juniors. (See Residence Requirement in the General Information section for details.)

Three-fourths of all semester hours (equivalent to 90 semester hours) 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 advisors to select those courses best suited to their particular needs and interests.

Each student selects courses to fulfill the foundation and distribution requirements. All courses used to fulfill these requirements must be taken for a letter grade, not pass/fail. A grade of D- or above is passing. Also, a grade of D- or above will fulfill foundation and distribution requirements.

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. In some cases, a single course may be used toward fulfillment of both a foundation and a distribution requirement, or two different foundation requirements (e.g., culture and world civilization), but not all three.

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 Philosophy 2. Students for whom English is a second language may take English 3 with consent of the instructor. A Philosophy 2 class transferred from another college will not count for English 2 or 4. Students may not count Philosophy 2 as English 2 if taken before or at the same time as English 1.

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; a score of seven on the Higher-Level International Baccalaureate; or an A on the British A-Level or AS-Level exams in Language, Language and Literature, or General Paper.
- 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 six on the Higher-Level International Baccalaureate, seven at the Subsidiary Level, or a B on the British A-Level or AS-Level exams in Language, Language and Literature, or General Paper. Students so exempted from the first half of the requirement must complete English 2 or Philosophy 2.
- Satisfactory completion of English 1 or 3 and of English 2, English 4, or Philosophy 2.
- 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 language other than English through the third-semester college level. 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.

PART I. Basic Language Requirement

Every student must demonstrate competence in a second language through the third-semester college level. Language competence may be determined on the basis of a placement examination taken at Tufts, or test scores specified on the equivalency chart on page 42. Entering students who do not demonstrate the required level of competence must take college language courses until that level is reached. All courses used to fulfill these requirements must be taken for a letter grade, not pass/fail. A grade of D- or above is passing. American Sign Language may be used to fulfill this option.

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 Part I through the sixth semester level (e.g. French 22).
- 2) To complete courses through the third college semester level (e.g., Spanish 1, 2, and 3) in a language different from the one used to satisfy Part I.
- 3) To complete three courses, at least 9 semester hours, dealing with a single culture or designated cultural area, either the same as or different from the language used to fulfill Part I. All three courses must deal with the same culture area. 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. At least one of the three culture courses, adding up to at least 3 semester hours, 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.
- 4) To continue studying the language used to fulfill Part I for one or two semesters, then culture courses in that same culture area. For example, a student who has completed four semesters of foreign language study may choose to complete Part II by taking two culture courses (at least 6 semester hours) 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.

Students wishing to submit courses that are not pre-approved must petition the Academic Review Board; forms are available under Student Forms on the student services home page at <http://go.tufts.edu/registrar>.

Option for students fluent in a language not taught at Tufts:

Students who attended a school through grade ten where all instruction was in a language other than English may be exempted from both parts of the foreign language requirement. Students who attended a school through grade twelve where all instruction was in a language other than English may be exempted through the eighth semester level required for the International Relations major. These students should contact their Advising Dean or Student Success Advisor.

Students who can speak, read, and write proficiently in a language other than English that is not taught at Tufts, but who attended high school with English as the language of instruction, will receive information prior to the start of each semester about the opportunity to be evaluated through the University of Pennsylvania Language Center. No credit is awarded for this option. TOEFL and IELTS exam scores cannot be used in fulfillment of the foreign language requirement.

3. World Civilizations

The world civilizations requirement is at least 3 semester hours, normally a single course, focusing 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 Middle East, the Caribbean, Latin America, and selected indigenous cultures of Oceania and North America. The course or courses 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 courses that are not pre-approved, a petition form is available under Student Forms at <http://go.tufts.edu/registrar>.

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 at least six semester hours in each area.
- No more than 3 courses, of any number of semester hours, may be from the same department or program.
- At least 3 semester hours in each area must come from credits earned after matriculation.
- No single course may be used in more than one distribution area. For example, a history course may be counted as either a 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).

Several Tufts departments offer courses in statistics. Students may take more than one statistics course for academic credit. Students majoring in fields that require statistics should check with their department to find out which are acceptable for the major.

Special restrictions apply to ExCollege courses. Approval of the Academic Review Board must be obtained in all cases. Only one ExCollege course, no matter how many semester hours, may be used to fulfill a distribution requirement. Those courses graded pass/fail may not be used to satisfy any distribution requirement.

Summary Sheet of Requirements

A grade of D- or above will fulfill foundation and distribution 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: Competence equivalent to three semesters of college language courses, 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 secondlanguage
- 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 courses 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.

3. WORLD CIVILIZATIONS

1)

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

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 (Major) 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 the Interdisciplinary Studies major, 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.

Students are expected to choose their major and to have a faculty advisor in the major field during the second semester of the sophomore year. With the assistance of the faculty advisor, 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 constitute the concentration program.

A major is a coherent group of at least 10 courses, amounting to at least 30 semester hours, defined by a department or program. For students with more than one major, no more than 5 courses, and no more than 15 semester hours, used to fulfill the requirements for one major may be used to satisfy the requirements for any other major. For courses taught in a foreign language beyond the third-year level of instruction, however, up to 80 percent of the semester hours used to fulfill the requirements for one major may also be used to satisfy the requirements for another major. Departments and programs may further restrict the amount of overlap between majors. Students who wish to complete two sets of major requirements are urged to continue to design such programs with minimal course overlap.

Interdisciplinary Studies Major

(See also Center for Interdisciplinary Studies)

The Interdisciplinary Studies major offers students the opportunity to create a self-designed, individual concentration that draws on courses from at least two of the following six areas of study: humanities, arts, social sciences, natural sciences, mathematics (quantitative), and engineering.

Students proposing an Interdisciplinary Studies major must have a high degree of initiative and self-discipline. The Interdisciplinary Studies major consists of an integrated program of at least ten courses, adding up to at least 30 semester hours. The program requires a two-semester thesis or honors thesis (for eligible students) or a substantial project comparable in scope to a thesis, including a written component. A student who wishes to pursue an Interdisciplinary Studies major must submit a detailed application by the spring of their sophomore year describing the planned program of study. The student 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 tenured or tenure-track member of the Arts and Sciences faculty. In consultation with this advisory committee, the student develops a rationale for the major, selects courses, and outlines the thesis plan. The proposal is reviewed for approval by the Center for Interdisciplinary Studies (CIS) Board or its designated subcommittee.

Note: Two courses used to fulfill another major may be used toward the Interdisciplinary Studies major; students may not triple major if one major is in Interdisciplinary Studies.

For specific information and application guidelines visit the CIS website: <http://cis.tufts.edu/>.

Departmental, Interdepartmental, and Program Concentrations:

Africana Studies	Environmental Studies
American Studies	Film and Media Studies
Anthropology	French
Applied Mathematics	German Language and Literature
Applied Physics	German Studies
Arabic	Greek
Archaeology	Greek and Latin Studies
Architectural Studies	History
Astrophysics	History of Art
Biochemistry	Interdisciplinary Studies
Biology	International Literary and Visual Studies
Biomedical Sciences	International Relations

Biopsychology	Italian Studies
Biotechnology	Japanese
Chemical Physics	Judaic Studies
Chemistry	Latin
Child Study & Human Development	Latin American Studies
Chinese	Mathematics
Civics	Middle Eastern Studies
Classics	Music
Cognitive and Brain Sciences	Philosophy
Community Health	Physics
Computer Science	Political Science
Drama	Psychology
Earth and Ocean Sciences	Religion
Economics	Russian
Economics/Quantitative	Russian and East European Studies Science
Education	Technology, and Society Sociology
Engineering Psychology	Spanish
English	Women's, Gender, and Sexuality Studies (WGSS)

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 mathematics, applied physics, astrophysics, biochemistry, biology, biopsychology, chemical physics, chemistry, cognitive and brain sciences, computer science, engineering psychology, environmental studies, geological sciences, geology, mathematics, and physics are eligible to receive a Bachelor of Science or Bachelor of Arts degree. Those majoring in psychology, psychology/clinical, and quantitative economics may choose to receive the degree of Bachelor of Science or Bachelor of Arts at the time they complete their graduation packet. 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 graduation packet.

Additional Graduation Requirements

Other courses to complete the 120 semester hours required for graduation may be selected without restriction. 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 advisors are ready at all times to aid and counsel in making decisions.

Seniors must file a graduation packet the semester prior to their expected date of graduation.

Undergraduate Minor Programs

A minor is a coherent group of four or more courses, carrying 15 or more semester hours. 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 or interdisciplinary area, including an introduction to appropriate methodologies and ways of thinking about the subject. There is a wide variety of minors offered within Arts and Sciences. Not all departments and programs have minors, so students should consult department and program websites for additional information.

A student may have any number of majors and minors. All courses used in fulfillment of a minor must be taken for a

grade (not pass/fail). No more than two courses used for any minor, regardless of the number of semester hours they carry, may be used toward a foundation or distribution requirement, or toward a major or another minor. Students may not complete a major and a minor, or two majors, or two minors from the same department or program unless the department or program explicitly permits it.

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; it is not designed as a safety valve to permit students to carry unrealistic academic loads. The instructor is not aware if the student has elected to take the course with pass/fail grading. A student will be graded as usual throughout the course, with final grades transcribed by the registrar into pass (if D- or better) or fail. A pass does not affect the grade point average; a failing grade is averaged into the grade point average. A course that has been taken using the pass/fail grading option and for which the student earned a pass may not be repeated for credit. If a class that has been taken pass/fail is later needed for a requirement that was not anticipated, the student may submit a petition request to his or her Advising Dean to have the originally assigned grade restored.

In a program of 120 semester hours, students are normally required to take at least 90 semester hours under standard grading; the pass/fail option may be applied to any courses in excess of 90 semester hours, 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 the semester hours they take 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 ten weeks of any term. After ten 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, concentration, and minor requirements may not be taken pass/fail.

Dean's List

Each semester, students who have been enrolled in a minimum of 12 semester hours, received letter grades in at least 12 semester hours, with no work incomplete (with the exception of Y), and earned a minimum grade point average of 3.40 in the College of Liberal Arts 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 the New England Conservatory of Music whose total course load equals 12 semester hours 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. Students in the BFA/BA combined-degrees program with Tufts/School of the Museum of Fine Arts whose total course load equals 12 semester or more will be awarded Dean's List honors if they meet Dean's List GPA requirements at Tufts.

Degrees with Honors

For determination of eligibility for Latin Honors, a student's cumulative grade point average (GPA) will mean the cumulative average of all grades earned at Tufts. Grades in courses taken at institutions other than Tufts shall not be used to calculate GPA, nor shall they be used to satisfy Latin Honors requirements for the number of A's earned in a major. Exceptions to this rule are: courses taken through cross-registration, Tufts domestic exchange programs, and

Tufts programs abroad. (See also: Thesis Honors Program.) Advanced placement scores are not interpreted as grades. Distinction (*cum laude*) is conferred at commencement on liberal arts students who achieve a record of at least 5 grades of A or A-, in courses adding up to at least 15 semester hours, in satisfying their concentration requirements for one of their majors, including related fields, and whose cumulative GPA is 3.50 or higher.

High distinction (*magna cum laude*) may be conferred at commencement on liberal arts students who achieve a record of at least 6 grades of A or A-, in courses adding up to at least 18 semester hours, in satisfying their concentration requirements, including related fields, and whose cumulative GPA is 3.65 or higher. The department must vote to confirm high distinction.

Highest distinction (*summa cum laude*) may be conferred at commencement on liberal arts students who achieve a record of at least six grades of A or A-, in courses adding up to at least 18 semester hours, in satisfying their concentration requirements, including related fields, and whose cumulative GPA is 3.80 or better. Students must further satisfy any requirements stated by their major department or program for highest distinction, which will be confirmed by a vote of that faculty. 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 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.

Phi Beta Kappa

Founded at the College of William and Mary in Virginia on December 5, 1776, Phi Beta Kappa is the highest national academic honor for students in the liberal arts. There are chapters of Phi Beta Kappa at 283 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 programs 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.

Thesis Honors Program

The Thesis Honors Program allows students to pursue a program of independent study leading to a senior thesis, counting as two courses normally within the major. A student may only write one thesis; a student in a dual-degree program may write one thesis for each bachelor's degree, normally not in the same year. 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. Departments and programs are responsible for establishing specific guidelines for senior theses. 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 a major in Interdisciplinary Studies or a CIS thesis are eligible for thesis honors.

Since this is an honors program, the opportunity to write a thesis 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 major department or program. 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. The advisory committee is normally

chaired by a member of the student's major department or by the primary faculty advisor in the case of a major in Interdisciplinary Studies. 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 two one-semester courses for the thesis. 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.

A student who plans to write a thesis must submit a Senior Honors Thesis Candidate form and return it to Student Services in Dowling Hall by the end of September of the senior year. The form is located under Student Forms on the student services home page.

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, written, or both.

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.

For answers to frequently asked questions and a style sheet, visit the website

<https://students.tufts.edu/academic-advice-and-support/academic-advising/what-we-offer/senior-honors-thesis>.

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 some departments and programs. Students granted internships for academic credit must register for a relevant course and have a faculty advisor on campus as well as professional 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 internship courses, adding up to no more than 8 semester hours, are normally accepted toward a degree. No credit is granted retroactively for these activities, and the two internships may not be done in the same semester. Students may develop their own field placement programs, but, 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 advisor 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 the Career Center 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.

Auditing

Tufts undergraduates may audit a class only with permission of the instructor. The student will not be registered for the class, no credit will be received, and there will be no record of the audit on the student's transcript. Only students currently enrolled at Tufts in the semester may audit. The student is expected to attend class regularly, but the exact character of each audit must be determined by the instructor at the beginning of the semester. The student may not submit papers, take exams, or participate in any form of evaluation of performance. Auditing for credit is possible through the ExCollege. (See the ExCollege website for Auditing for Breadth.)

Cross-Registration

Tufts undergraduate students may enroll in each of the following institutions during the fall and spring semesters: Boston College, Brandeis University, and Boston University. Online classes may not be cross-registered. Qualifying students must be enrolled full time and be in good academic standing in their home institution. The course must be taken for credit and may not be taken pass/fail. There is no exchange of fees, and both semester hours and grades are recorded at the home institution. Only one cross-registered course at the above institutions may be taken per semester. Cross-registration is not allowed during Summer Session. Normally, 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 of the Museum of Fine Arts.

Tufts students may also cross-register for courses at certain schools within the university, with permission of the course instructor and the registrar of the relevant school.

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

Domestic Exchange and Off-Campus Programs

Tufts offers one-semester student exchanges with Swarthmore College. Juniors in good standing may participate. For the Swarthmore exchange program, students pay all charges to their home institution; there is no exchange of fees. The semester hours and grades earned in the exchange program by Tufts students are recorded on the Tufts transcript.

Bachelor of Fine Arts

The College of Liberal Arts offers two degrees: The Bachelor of Fine Arts (BFA) and the Bachelor of Arts/Science (BA/BS). Students matriculate specifically into the BFA degree program, the BA/BS degree program, or the 5-year Combined BFA + BA/BS program. This section describes the degree requirements and academic policies for the BFA degree.

Degree Requirements

Students at the School of the Museum of Fine Arts at Tufts earn their BFA degree after completing 8 full-time semesters in residence, 120 Semester Hour Units (SHUs) of coursework including 76 SHUs of Studio Art (~19 full-day studio courses), and 44 SHUs of non-studio distribution requirements (~15 courses).

Non-Studio Distribution Requirements	42 credits/SHUs total
Art History	15 credits/SHUs (5 courses)
English I & II	6 credits/SHUs (2 courses)
Humanities	3 credits/SHUs (1 course)
Social Science	3 credits/SHUs (1 course)
Language/Culture	3 credits/SHUs (1 course)
Science/Technology	3 credits/SHUs (1 course)
Electives	9 credits/SHUs (3 courses)

Studio Requirements

Studio Art	76 credits/SHUs (~ 19 full-day studio courses)
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Open Electives

Studio or non-studio	2 credits/SHUs
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The SMFA features a self-directed curriculum that allows individual artists to develop their own path. We encourage students to pursue a course of study appropriate to their experience and interests. Students work with their advisors to select those courses best suited to their needs and goals during the registration period each fall and spring.

Writing Requirement

All BFA students must complete two semesters of college writing to graduate and students should complete this requirement in their first year. Most students complete English 1 or English 3 in the first semester and English 2 or Introduction to Philosophy in the second semester.

Art History

BFA students must complete 15 SHUs of art history coursework (5 courses). In their first semester, BFA students complete one (1) Art History course, most often Introduction to Visual and Critical Studies. Students may satisfy the Art History requirement with any courses with the BFA Art History course attribute in the online Student Information System (SIS).

Language/Culture

Students may complete the Language/Culture requirement using one course of foreign language study or one course about a specific culture. Tufts language placement exams cannot waive this requirement. All courses that satisfy the Language/Culture requirement have the BFA Language/Culture attribute online in the Student Information System (SIS).

Social Science

Social science courses focus on the study of human behavior and societal institutions. They typically take an empirical approach. All courses that satisfy the Social Science requirement have the “BFA Social Science” attribute online in the Student Information System (SIS).

Humanities

Humanities courses focus on cultural, literary, historical, and philosophical questions. They rely on close reading, interpreting, and critical analyses of various expressions of human experience and thought. All courses that satisfy the Humanities requirement have the “BFA Humanities” attribute online in the Student Information System (SIS).

Science/Technology

Science / Technology courses investigate the basic mechanisms and rules that deal with matter and energy. They may also use quantitative and symbolic reasoning to examine ideas derived from our perceptions of the natural world. All courses that satisfy the Science/Technology requirement have the “BFA Science/Technology” attribute online in the Student Information System (SIS).

Electives

Any 3-credit non-studio, non-physical education course may count as an elective. Students may complete elective courses “Pass/Fail.” BFA students may include up to one (1) additional Art History course toward this requirement.

Cross-Registration

Cross-registration allows SMFA students to take courses at other institutions during the academic year. Students do not pay additional tuition or fees for cross-registered courses. Tufts records both SHUs and grades. Students may not cross-register during Summer Session.

ProArts Consortium

The ProArts Consortium is a group of seven visual and performing arts schools in the Boston area: Berklee College of Music, Boston Architectural College, The Boston Conservatory at Berklee, Emerson College, Massachusetts College of Art and Design, New England Conservatory, and The SMFA at Tufts.

After the first semester of their program, full-time undergraduate SMFA students may cross-register for studio art courses through the ProArts Consortium. Students may cross-register for a maximum of two studio courses worth up to 4 SHU's total in a given semester. ProArts studio art courses count toward a student's review board eligibility. Students may take only studio art courses through ProArts. Find more information about the ProArts Consortium at:

www.proarts.org.

Boston University, Brandeis University, and Boston College

Up to twenty undergraduate Tufts students may cross-register for in-person courses at Boston College, Brandeis University, and Boston University. Students must be in good academic standing and enrolled full time. Students must take the course for credit and cannot take it pass-fail. Students may take up to one cross-registered course at the above institutions per semester. Tufts students may take up to two courses in departments for which Tufts has not equivalent (e.g., business). Tufts students are subject to the requirements of the course taken at the host institution, including attendance. If students cross-register for a studio art course, the credits will count toward the student's review board eligibility.

Studio Internships

Full-time and part-time students may earn studio credit for hands-on, professional visual arts work experience outside

the SMFA at Tufts. This encourages advanced students to become familiar with the professional arts community in a variety of traditional, new visual media, and community-engaged practices.

Students may receive credit for internships after they have been a student at SMFA at Tufts for at least two semesters. To receive studio credit for an internship, students must register for their internship as a course through the Career Center. Students may register for 2 or 4 SHU's during the fall and spring semesters and 2, 4 or 6 SHU's during the summer semester, depending on the number of hours committed to the internship. Internship credits count toward a student's review board eligibility in the fall and spring semesters.

SMFA students who want to pursue an internship should consult with the Career Advisor for the Arts through the Career Center. The Career Center organizes informational meetings at the start of each semester to educate students about procedures and details of the program. The Career Center generates local and national internship opportunities. The Career Advisor for the Arts works with individual students to guide them toward appropriate internship(s), help them complete the application process, and offer supervision and evaluation.

Grading

Studio Courses

Studio courses at SMFA at Tufts use a Credit/No Credit grading system. Students will earn a grade of "CR" for credit if they complete the course requirements and or a grade of "NC" for No Credit if they do not complete the course requirements. CR and NC grades do not affect a students' GPA but NC grades may impact a students' academic standing.

Non-Studio Courses

Students must complete courses that satisfy non-studio distribution requirements under the traditional letter grading system. Students will pass the course and meet distribution requirements with a grade of D- or above.

Pass/Fail Option

Students may elect to record their grades in certain courses as pass or fail. Students are graded as usual throughout the course. The registrar will transcribe final grades into pass (if D- or better) or fail. A pass has no impact on the grade point average, but a fail will be calculated into students' grade point average. Students must make all decisions with respect to the pass-fail option within the first six weeks of any term for sophomores, juniors, and seniors, and within the first ten weeks of any term for first-year students. After six weeks (ten weeks for first-year students), the student must complete a course under the chosen grading system or withdraw from the course.

BFA students must take non-studio distribution requirements for a grade apart from electives and English 3. If a student passes a course graded on a pass/fail basis, they may not repeat the course for credit. If a student takes a course pass/fail and then learns they need the course for a distribution requirement, they may submit a petition to their academic dean to restore the originally assigned grade.

Repeating Studio Courses

Students may take introductory studio courses once for credit and may take intermediate and advanced studio courses twice for credit.

Dean's List

BFA students are not eligible for Dean's List because studio classes are completed on a credit/no credit basis.

Review Boards

The SMFA's pedagogy is based on the idea that the development of an artistic practice is an organic and fluid process, one that requires self-direction and intense mentorship. The Review Board is at the center of this unique pedagogical philosophy.

During Review Boards, students talk about their work from the semester with faculty and peers, which highlights the explicit and implicit relationships between the individual works presented. The Review Board helps students explore and articulate their artistic direction, evaluates their needs and achievements, and helps students plan their development as an artist. We urge you to use the critical feedback you will receive on your work. If you have questions about the review board experience and preparation, please do not hesitate to speak with your faculty, peers or members of the SMFA Advising team.

Review Board Participation

Students must have a Review Board at the end of each semester in which they attempted 7 or more SHU's of studio coursework. Each student signs up for a time slot where two instructors and two peer reviewers evaluate the student's work. The student participates fully in the review board and is encouraged to bring an artist's statement. After the Review Board, each reviewer provides a written evaluation, which is kept in a student's review board file.

Review Boards take place during the exam period at the end of the semester and run through the entire exam schedule, so students should not plan travel until after the review board schedule is finalized and they have received their review board assignments.

Peer Reviewing

In addition to attending their own Review Board, all students scheduled for a Review Board must review two other students' Review Boards. By reviewing their peers, students hone their conceptual and evaluative skills as an artist.

Peer reviewers must:

- Participate in two (2) Peer Review sessions
- Arrive at least 15 minutes before their assigned student reviewing time to receive specific board assignments
- Remain at their assigned board for the entirety of the session;
- Submit constructive, considerate, and thoughtful peer reviews to <https://tuftsstudentservices.tfaforms.net/45> within 24 hours of your peer review time;
- Obtain faculty signatures and turn in their completed student reviewing verification form when finished to the Student Services Office.

Students are only assured a peer review assignment at their assigned time. If students arrive more than 15 minutes late for their assigned peer reviewing time, they are marked as absent and may not review the board. If students miss their assigned peer review time, they may "stand by" for another assignment at another time. Students must be present 15 minutes before a scheduled review board to remain eligible for a stand-by assignment. We will assign student reviewers to a board up to 15 minutes past the board start time and each board may have up to three (3) peer reviewers.

Missed Review Boards

If students fail to complete any of the above requirements, they may be penalized with:

- Academic Warning
- Academic Probation, which may result in the loss of financial aid (applies if student is already on academic warning)
- Requirement to withdraw from the university for one semester (applies if student is already on academic

- probation)
- Permanent academic withdrawal from the program (i.e. removed from the school; applies if student was required to withdraw from the university in the previous semester)

If a student who misses a review board (as a reviewer or reviewee) has a medical excuse or a documented emergency, by the Assistant Dean of Student Affairs at the SMFA or the Associate Dean for Undergraduate Advising at the SMFA may excuse them from their review board obligations. The student must make up the board no later than early in the next term the student is enrolled in the case of their own review board, and peer reviewing by the end of the next term.

Invited Guests

Guests may be welcome at the discretion of the faculty reviewers of a given Review Board. To preserve the integrity of the critique, faculty have the right to ask any guests to leave the Review Board and invited guests are observers only. Guests must be cleared with faculty reviewers 2 business days before a scheduled board.

Academic Standing

Satisfactory Academic Progress Requirements

- BFA students must receive a minimum of 75% of SHUs attempted each semester and maintain a cumulative grade point average of C- (1.67) or better.
- Grades of Incomplete (INC) will be considered "SHU's not earned." Two or more grades of INC within a given semester constitutes unsatisfactory progress.
- Grades of W will also be considered "credit not earned" for the purposes of satisfactory academic progress. Grades of W do not factor into a student's GPA.

Failure to Make Satisfactory Academic Progress

Academic Warning: Students in good standing who do not make satisfactory academic progress as defined above during any semester will receive an Academic Warning. Students who make satisfactory academic progress for the semester in which they are on Academic Warning will return to good standing.

Academic Probation: Students who fail to make satisfactory academic progress as defined above for a semester in which they are on an Academic Warning will be placed on Probation. Students on Probation may still enroll at SMFA at Tufts but they cannot receive federal financial aid. Students on Probation may appeal to retain financial aid one time during their academic career. Students must submit appeals and supporting documentation to the Financial Aid Office for review and approval. Students who make satisfactory academic progress for the semester in which they are on Academic Probation will return to good standing.

Students on Probation must meet with the Associate Dean of Undergraduate Advising for the SMFA at Tufts before registering for classes to develop an academic plan that will allow students to return to good academic standing and complete the program.

Required to Withdraw (1 semester): Students who fail to make satisfactory academic progress for a semester in which they are on Probation will be required to withdraw for 1 semester. A student who returns after a required withdraw will return on a probationary status. Students who petition for reentry should consider their readiness to resume academic studies.

Permanent Academic Withdrawal: If a student returns to Tufts after a required withdrawal, they must remain in good standing from that point forward. If the student meets the criteria for academic probation in any ensuing semester, they may be permanently withdrawn from the university as determined by the SMFA Committee on Academic Standing.

Pre-Matriculation Credits

Studio Art Credits/SHUs

BFA students may earn studio art pre-matriculation credits. Students with scores of 4 or 5 on the Studio Art Advanced Placement exam or scores of 6 or 7 on the Studio Art International Baccalaureate will receive 4 SHUs toward their studio art requirement. Students may transfer up to 38 SHUs of studio art credit, which includes credits from high school examinations and transfer coursework.

Non-Studio Credits/SHUs

Students may receive up to 6 SHUs of pre-matriculation credit toward non-studio distribution requirements. Students earn these credits from certain scores on Advanced Placement, SAT II examinations, and IB/A-level examinations. If a student has additional scores beyond the two allowed courses, the scores may count toward requirement exemptions. Students may receive up to 21 SHUs of non-studio pre-matriculation credits and transfer credits.

Transfer Credit

BFA students may transfer up to 38 SHUs of studio art credits and 21 SHU's of non-studio coursework from other approved institutions. Students may transfer Community College credits earned before they matriculate at Tufts University. After they matriculate at Tufts, students may transfer credit only from accredited 4-year institutions. Students may earn transfer credit for courses in which they earn a C or better.

Studio Transfer

Students may transfer undergraduate visual art coursework for studio art credit. Students who have completed college-level coursework in music and or theater/performance may earn up to 24 SHUs of studio art transfer credit on a case-by-case basis. These courses appear on the student's transcript as transfer credit.

Non-Studio Transfer

Transfer courses must fulfill the distribution requirements of the BFA program and must include a total of 42 contact hours of instruction or more. Transfer courses are not graded and have no impact on GPA. Students should provide final transcripts and course descriptions from previous institutions. In some cases, students may need to provide additional back-up material such as course syllabi or accreditation. Online coursework cannot be transferred into the BFA or the Combined Degree programs.

Summer Transfer Credit

BFA students can take courses at other accredited 4-year colleges or universities during summer sessions. Students may transfer a maximum of 15 SHU's of non-studio coursework and 12 SHU's studio coursework from summer coursework.

Students may take a maximum of 9 SHUs of non-studio coursework and academic credits 6 SHUs of studio coursework per summer session. Students who wish to take courses elsewhere during the summer and have them transfer in toward their degree requirements must complete the Transfer of Credit process in SIS to seek course content approval from the appropriate department.

Online Credit

Students can only take online courses at Tufts. No more than 2 of the 14 non-studio courses may consist of Tufts online courses.

Study Abroad

Students may spend up to two semesters of full-time study at other approved four-year institutions or on approved foreign study programs.

Additional Graduation Requirements

Graduation Petition

To complete their program and earn their degree, students file the “BFA Degree Sheet” with the Student Services Office by the published deadlines in fall. Students may graduate in May, August (for requirements completed over the summer), and February (for requirements completed during the fall semester). The Commencement Ceremony is held once in May; students who graduated in the preceding February are invited to participate in that years’ Commencement ceremony.

Participation Status

Students who have not completed all degree requirements may participate in commencement ceremonies as a participant only if they 10 SHU's or fewer left to complete. Students who walk-only in the spring ceremonies will earn their degrees in August after they complete their degree requirements.

Graduate School of Arts and Sciences

The Graduate School of Arts and Sciences is the academic unit responsible for all post-baccalaureate degree programs and certificate 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, educational specialist, doctor of occupational therapy, and doctor of philosophy. The Graduate School of Arts and Sciences also partners with other Tufts schools and several Boston area colleges and universities to offer joint and dual degrees, including juris doctorate, master of public health, and master of business administration.

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 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 wide variety of master's level programs, the school provides students with a focused education and specific skills to further their professional careers.

Please refer to the individual department sections of this bulletin to obtain further details on specific programs offered at the Graduate School. The Graduate School of Arts and Sciences website, <http://asegrad.tufts.edu/>, and a specific departmental website will provide more information on program offerings. [The Graduate Student Handbook](#) should be referenced for information on the policies specific to graduate students.

Admission

Graduate program and application information is available online at <http://asegrad.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. The admission deadlines and requirements vary by program, as do the scholarship packages.

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. *In order for a course to be held for graduate study it must be a graduate-level course and the grade earned must be a B- or better.* 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.

Undergraduate students must complete the appropriate paperwork, located at <http://students.tufts.edu/registrar/student-forms>, in order to reserve courses for graduate education.

Combined Bachelor's/Master's Degrees Program

The College of Liberal Arts and the Graduate School of Arts and Sciences (GSAS) offer combined degrees programs through select departments. The combined degrees program is one way of recognizing the increasing number of undergraduates entering college with exceptional preparation in certain areas. In this program students can enroll in bachelor's and master's degree programs with the goal of completing both in five years. Students seeking admission to the program should consult their undergraduate major advisor, their Associate Dean in Dowling Hall, and their prospective graduate advisors before applying to the graduate school.

Combined degree students are required to complete the undergraduate degree requirements and graduate before moving into the master's portion of their program. Students who do not receive their bachelor's degree by August of their senior year must continue to enroll as an undergraduate and pay undergraduate tuition.

Four years of undergraduate tuition and the entire tuition for the master's degree are required.

Admission to the combined degrees program is typically during the junior year. Therefore, students interested in the program should discuss with their advisors 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. For a list of participating programs, please go to <https://asegrad.tufts.edu/academics/combined-degree-programs>. Interested students should contact participating departments and programs for the most up-to-date curriculum information.

Certificate Programs

A number of advanced certificate programs are offered through the Graduate School of Arts and Sciences. 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://asegrad.tufts.edu/>.

School of Engineering

Mission Statement

A Unique Learning Environment

The Tufts University School of Engineering offers a rigorous engineering education in a unique environment that blends the intellectual and technological resources of a world-class research university with the strengths of a top-ranked liberal arts college. Our size and educational philosophy support a distinctive sense of community, a diversity of perspectives, and a student-centric learning environment. Engineering curricula across a wide spectrum of majors emphasize project-based learning, the nurturing of leadership skills, and cultivation of creativity through innovative design. Close partnerships with Tufts' cadre of excellent undergraduate, graduate, and professional schools, coupled with a long tradition of collaboration, provide a strong platform for interdisciplinary education and scholarship. Proximity to a thriving Boston metropolitan area facilitates close relationships with local industry and research labs, student internship and employment opportunities, and the committed engagement of seasoned practitioners in the school professoriate.

Mission

- To educate engineers committed to the innovative and ethical application of science and technology in addressing the most pressing societal needs
- To develop and nurture twenty-first-century leadership qualities, perspectives, and skills in our students, faculty, and alumni
- To develop and disseminate transformational new knowledge and technologies that further the well-being and sustainability of society
- To provide national leadership in enhancing the role and visibility of the engineering profession in the education of our youth and the development and implementation of public policy

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. 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 fourteen bachelor of science degrees: bachelor of science in biomedical engineering, chemical engineering, civil engineering, computer engineering, computer science, data science, electrical engineering, environmental engineering, human factors engineering, mechanical engineering, engineering science, engineering, and engineering physics, and bachelor of science (no major).

The programs of study leading to these degrees differ in structure and in 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 ABET, <http://www.abet.org>, 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, there are several more flexible degree options for students. Through consultation with the Senior Associate Dean of Undergraduate Advising, students may pursue an individualized program of study leading to the bachelor of science degree with no major. The bachelor of science in engineering (BSE, BSE Architectural Studies, BSE Environmental Health) programs are administered by the Department of Civil and Environmental Engineering and allow for some departure from the curriculum for the professional degree. The bachelor of science in Engineering Science provides an opportunity to focus on a particular area of natural science within the general engineering curriculum. The Department of Mechanical Engineering administers a bachelor of science degree program for students who are interested in the field of human factors and ergonomics. The Department of Electrical and Computer 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. The Department of Computer Science and Electrical and Computer Science jointly offer a Bachelor of Science in Data Science. This program combines mastery of statistics and machine learning with real-world data-centered problem solving.

Professional Degree Requirements

- Bachelor of Science in Biomedical Engineering (B.S.B.M.E.)**
- Bachelor of Science in Chemical Engineering (B.S.CHE.)**
- Bachelor of Science in Civil Engineering (B.S.C.E.)**
- Bachelor of Science in Computer Engineering (B.S.CP.E.)**
- Bachelor of Science in Electrical Engineering (B.S.E.E.)**
- Bachelor of Science in Environmental Engineering (B.S.EV.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 ABET, <http://www.abet.org>. A baseline requirement for all professional degrees in engineering is a minimum of 120 semester hours. The specific requirements for most degree programs, as detailed below, will require completing more than 120 semester hours. Of the semester hours required for the professional degrees accredited by the Engineering Accreditation Commission of ABET, a minimum of 30 semester hours must be college-level math and science appropriate to the discipline, and a minimum of 45 semester hours must be engineering consistent with ABET general and program criteria.

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 ABET, <http://www.abet.org>. This program combines mastery of computer science with the breadth and practicality of an engineering education. It is for students who desire knowledge of computer science, computer systems, and computer applications without the hardware courses required for the computer engineering degree.

INTRODUCTORY COURSE REQUIREMENT

There are ten introductory courses:

- a. Mathematics 32, 34, 42, 51 (or 61 for computer science majors)
- b. Physics 11
- c. Chemistry 1
- d. Applications in Engineering, EN 1
- e. Introductory Computing (at least one of ES 2 or COMP 11)
- f. Two program-approved courses in mathematics or natural sciences.

Please see

<http://students.tufts.edu/academic-advice-and-support/academic-advising/what-we-offer/guidance-academic-policies/requirements-graduation-engineering/engineering-degrees> for more information.

FOUNDATION REQUIREMENT

There are eight courses required by the student's department of concentration and selected from among the following: computer science, mathematics, natural science, engineering science, engineering topics, and general education topics.

CONCENTRATION REQUIREMENT

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

HUMANITIES, SOCIAL SCIENCES, AND ARTS REQUIREMENT

There are 18 semester hours required in the humanities, social sciences, and arts. Accepted courses consist of those listed in SIS with the attribute SoE-HASS-Humanities, SoE-HASS-Arts, or SoE-HASS-Social Sciences. English 1 or 3 is a required course. Courses selected must include a minimum of one course each in the areas of humanities and social sciences. In addition, at least two courses must be taken in the same department. ExCollege courses are excluded, although those approved for distribution credit by the College of Liberal Arts may be considered by petition on a case by case basis.

FREE ELECTIVE REQUIREMENT

There are one or two free elective courses required to complete the degree, depending on the major. The courses selected to fulfill the free elective credits may be chosen without any restriction.

PRE-MATRICULATION CREDITS

Students are limited to 27 semester hours of prematriculation credit toward their degree.

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 semester hours 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. Students following the bachelor of science with no major may not 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 the College of Liberal Arts or the School of Engineering. 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 following the bachelor of science with no major may not earn a minor.

Minor programs offered in the School of Engineering are:

Architectural Engineering

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

Biotechnology Engineering

Department of Chemical and Biological Engineering

Computer Science

Department of Computer Science

Engineering Education

Administered by the Center for Engineering Education and Outreach

Engineering Management

Administered by the Gordon Institute

Entrepreneurial Leadership

Administered by the Gordon Institute

Environmental Science and Policy

(For engineering students only) Department of Civil and Environmental Engineering

Geoengineering

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

Human Factors Engineering

Department of Mechanical Engineering

Multimedia Arts

(For liberal arts and engineering students) Department of Electrical and Computer Engineering. Administered by the Film and Media Studies Program

Music Engineering

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

Musical Instrument Engineering

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

For more information, see departmental listings in this bulletin.

Dean's List

Each semester, students who have been enrolled with a minimum of 12 semester hours, received letter grades in a minimum of 9 semester hours, completed every course in which they were enrolled with no work incomplete, and earned the minimum grade point average of 3.2 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.

Pass-Fail Option

The spirit of the pass-fail option is to encourage academic exploration. A maximum of eight pass-fail courses may be counted toward the total credits required for graduation. No introductory, 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. Refer to the academic calendar for deadlines. After the deadline, the only choices are to complete a course under the existing grading system or to withdraw for the remainder of the term. Forms are available at <http://students.tufts.edu/registrar/student-forms>.

Grade Requirements

For graduation, grades of C- or better are required in 67 percent of the semester hours submitted for the degree. It is expected that grades of C- or better will be earned in at least 75 percent of the semester hours taken in the concentration.

Degrees with Honors

Distinction (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 have an academic average of 3.50 or higher.

Highest distinction (summa cum laude) is conferred at commencement to deserving students who have a cumulative grade point average of 3.80 or higher.

These nominations are approved by a special vote of the faculty.

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.

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 Center for Interdisciplinary Studies (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 advisor 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 advisor, 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 six semester hours (with at least 3 semester hours 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, 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 the Digital Collections and Archives (DCA). 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 important information about guidelines and deadlines, as well as advice and support for writing a thesis, visit

<https://students.tufts.edu/academic-advice-and-support/academic-advising/what-we-offer/senior-honors-thesis>.

Undergraduate Internship Programs

Internships provide undergraduate students with the opportunity to apply their education and skills directly toward a field-based situation, 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. These internships may be awarded transcript notations without any academic credit.

In rare instances, students may receive credit toward degree requirements for which the following conditions must be met: the internship proposal is approved in advance by the department, a faculty mentor has supervisory and technical control of any work that receives credit, a minimum of 150 hours of work for the semester is required, and a written report is submitted that will be evaluated by the faculty mentor and the outside institution supervisor.

Engineering students are encouraged to pursue curricular and extra-curricular work experiences, but, each engineering student is limited to enroll in 3 credits of internship, at most, totaled over the undergraduate program. For an international engineering student to engage in Curricular Practical Training (CPT), the student must be registered for a co-op or be enrolled in a one-or-more credit internship concurrent with the CPT experience.

Undergraduate international students who wish to participate in the Curricular Practical Training (CPT) program should contact the International Center.

The Office of Engineering Internship helps qualified engineering students identify potential internship opportunities.

Combined Bachelor's/Master's Degrees Program

The School of Engineering offers exceptional engineering students the option of pursuing a combined bachelor of science and master of science degree (B.S.-M.S.) as a thesis or non-thesis program.

Students seeking admission to the program must submit an application by March 1st of their junior year. Admission to the program requires (1) a minimum cumulative GPA (through the fall semester of the junior year) of 3.60 for the B.S.-M.S. program, and (2) acceptance by the department in which the student intends to complete the master's portion of the program. Applicants not meeting the GPA requirement will still be considered and reviewed by the department. Two graduate-level courses are allowed to count toward the master's degree requirements as long as they carry the designation of the department in which the master's portion of the combined degree program is to be completed. Combined-degree students must pay four years of undergraduate tuition and two semesters of graduate tuition (plus continuation fees as applicable).

Combined-degrees students are required to fulfill all the requirements of the bachelor's degree program and graduate before moving into the master's portion of their program. Students who do not receive their bachelor's degree by August of their senior year must continue to enroll as an undergraduate and pay undergraduate tuition.

University College

Mission Statement

University College was established to facilitate the development of university-wide degree and non-degree programs for matriculated students and to offer educational programs that reach new non-matriculated student populations, including pre-K through high school students, working professionals, and lifelong learners. Established in November 2018 by a vote of the Board of Trustees as the successor to the College of Special Studies, University College is committed to Tufts' mission as a student-centered research university by seeking to extend access to Tufts' high-quality education to those for whom a full-time, residential degree in a traditional discipline is not the right option. Dedicated to serving students at all points in their educational journey, University College collaborates with all of the schools and faculties of Tufts University to offer learning experiences that complement and expand the reach of their degrees, certificates, and research. Today, University College is responsible for Summer Session, Short-term Abroad, Courses at Tufts, Winter Term, Tufts Pre-College Programs, and the Osher Lifelong Learning Institute at Tufts.

Courses at Tufts / Graduate Career Advancement Program

Courses at Tufts, which subsumes the Graduate Career Advancement Program, allows high school students, visiting undergraduate and graduate students, working professionals, and others to enroll in select courses across the many schools of Tufts. These courses will allow students to accelerate their career, to consider a new degree or certificate program, or simply to expand their knowledge of particular disciplines.

Summer Session

Summer Session fills the months of May, June, July, and August with a wide range of educational opportunities. Summer Session allows students to take courses that fulfill core requirements, that may be full or difficult to make work with demanding semester schedules, or that offer interesting and fun new areas to explore. In addition to regular courses, Summer Session offers workshops and special course formats across the schools of Tufts University.

Short-Term Abroad

Short-term Abroad programs allow students to travel and learn in short, intensive programs – usually for credit – without interrupting their regular academic year plan. Students may choose programs in the Summer or Winter terms with destinations currently throughout Europe and Northern Africa.

Winter Term

University College will pilot a Winter Term in December 2019 / January 2020, which will include the Tufts Campaign School with Tisch College, Winter Abroad programs, and SMFA short courses and workshops.

Tufts Pre-College Programs

Tufts Pre-College Programs offer high-achieving high school students the opportunity to experience a Tufts-quality education and get a head start on their college career. Students may take select courses year-round through Courses at Tufts for High Schoolers and in the Summer Session or participate in one of our many cohort programs ranging from the semester-long Tufts Research Experience program, the 6-week Tufts College Experience summer program, and our 2- to 3- week summer Intensives.

Osher Lifelong Learning Institute at Tufts

University College oversees the Osher Lifelong Learning Institute, which seeks to engage the minds and foster the well-being of intellectually curious 50+ adults through a wide range of educational and social programs, including lectures, interactive study groups, special-interest clubs, and more, all offered in an inclusive and welcoming, pressure-free environment.

General Undergraduate Information

Undergraduate Policies

Academic Residence Requirement

The university requires eight semesters of full-time study for the baccalaureate degree for all undergraduates. After matriculating at Tufts, a student may spend no more than two semesters of full-time study at other approved institutions or on approved non-Tufts study abroad programs. Ordinarily, four semesters of the undergraduate's course of study must be taken at Tufts University's home campus. Up to two semesters may be spent in a Tufts-related program, either foreign or domestic. Normally, students will be in full-time residence at Tufts for the final two semesters. Transfer students must spend at least four full-time semesters at Tufts or on Tufts study abroad programs. Candidates for certain combined bachelor's degrees (liberal arts/engineering combined degrees and the program with New England Conservatory) must complete their programs in no fewer than ten full-time semesters. Candidates for the BA/BFA program at the SMFA at Tufts must complete their program in no fewer than eight full time semesters.

All students must earn at least 60 semester hours at Tufts or on Tufts study abroad programs. Pre-matriculation credits received from certain standardized examinations (such as Advanced Placement) are not considered Tufts credits for this purpose.

Matriculated students may transfer courses only from accredited four-year colleges and universities. No online courses or internships will be accepted for transfer.

Students earning the equivalent of 5 (credit-bearing) courses, adding up to at least 17 semester hours, from pre-matriculation credits and/or Tufts summer session courses (including Tufts summer abroad programs) may elect to use these semester hours in fulfillment of one semester of residence. Students earning the equivalent of 9 such courses, adding up to at least 32 semester hours, may elect to use them in fulfillment of two semesters of residence. Pre-matriculation credits are defined as credits earned from certain scores on Advanced Placement and SAT examinations, IB and British A-level examinations, as well as credits earned from approved college courses taken prior to matriculation at Tufts or at any four-year college or university. Courses taken during summer school at other institutions do not count toward the residence requirement.

Completion of a specified number of credits 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.

Graduation Dates

Tufts awards undergraduate degrees three times during the year: May, August, and February. The only commencement ceremony is held in May.

Transfer Students

Transfer students are entitled to the same advanced placement 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 and Advanced Placement Tests, IB and British A-levels should have official records of their scores sent to Student Services before orientation. Such credits will be approved only on the basis of official test records and not a transcript from the student's previous institution.

Students transferring from other institutions must spend a minimum of four full-time semesters at Tufts or on a Tufts program abroad and must complete at least half the semester hours (60 semester hours for BA/BS degrees, 60 or more semester hours for engineering, depending on degree program, 38 semester hours of studio coursework and 21 semester

hours of non-studio coursework for BFA toward their degree at Tufts or on a Tufts study abroad program. Pre-matriculation credits received from certain standardized examinations (such as Advanced Placement and international diplomas) are not considered Tufts credits for this purpose.

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 sixty semester hours for both the College of Liberal Arts and the School of Engineering. Tufts does not accept transfer credits for internships nor for online courses.

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 through SIS. Courses taken at a community college after a student has matriculated at Tufts are not accepted for transfer. 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 who transferred to Tufts must spend a minimum of four full-time semesters at Tufts or on a Tufts study abroad program. Students attending summer schools (other than Tufts Summer Session) are normally allowed to transfer no more than twelve semester hours in one summer, nor more than a cumulative total of twenty semester hours toward a Tufts degree.

Students who plan to complete a full-time semester elsewhere must complete the equivalent of twelve or more semester hours to have it qualify as a full-time semester. All students planning to transfer credits earned while on leave from Tufts at other institutions should begin the process by first discussing their plans with their Advising Dean. Applied courses in music and dance, such as performance ensembles and lessons, are not normally accepted for transfer.

A course taken at a school using the quarter system will transfer according to the rule that one quarter hour is $\frac{2}{3}$ of a semester hour; the resulting semester-hour value will be rounded to the nearest integer. For example, a 3-quarter-hour course counts as 2 semester hours (as $3 \times \frac{2}{3} = 2$); a 4-quarter-hour course counts as 3 semester hours (as $4 \times \frac{2}{3} = 2\frac{2}{3}$, rounded to 3). If planning to use a quarter-system course toward a major, students should check with the department first.

Resumed Education for Adult Learners (R.E.A.L.)

The Resumed Education for Adult Learners (R.E.A.L.) program is open to students 24 years of age. This unique undergraduate program meets the need for greater academic flexibility in the education of older students, including veterans, and students who are married or are parents. 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, with the exception of the residence requirement. 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 co-directors, Carmen Lowe or Kendra Barber, at 617-627-2000.

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. Failure to register or file the appropriate leave of absence could result in administrative withdrawal from the University. Students taking a leave of absence, including a leave to study abroad on a non-Tufts program, must do so through SIS.

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 drops a course, then the first waitlisted student will be rolled 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

course must get the instructor's approval and the instructor will need to submit an enrollment correction form to Student Services.

First-year students (not transfer students) are able to drop courses online through the end of the tenth week of classes only in their first semester of study. Second semester first-year students, sophomores, juniors, and seniors are able to drop courses online through the end of the fifth week of classes; these students may withdraw from a course online through the end of the tenth week of classes. The grade of W (withdrawn) will appear on the transcript, but does not affect a student's cumulative grade point average. After these deadlines, students must complete the course work and receive the appropriate grade. Exact dates vary from year to year and students should check the relevant Academic Calendar. Summer session has different deadlines, found on the summer session web site.

Pre-matriculation Credits

Pre-matriculation credits are defined as credits earned from certain scores on Advanced Placement and SAT Subject examinations, scores on examinations , from the IB and British A-levels as well as credits earned from college courses taken prior to matriculation at Tufts or any four-year accredited college or university. These scores and their equivalencies have been determined by the individual departments and are listed below. Liberal Arts students may apply toward their degree pre-matriculation credit amounting to at most five courses, regardless of the number of semester hours. Engineering students may apply toward their degree pre-matriculation credit amounting to at most twenty-seven semester hours. Credits earned prior to matriculation via Tufts Summer Session are not included in this limit. For Liberal Arts students, at least 3 semester hours in each distribution area must come from credits earned after matriculation. If the student chooses to take a course that is equivalent to a pre-matriculation credit received, and passes, then the pre- matriculation credit will be removed from the student's record. Students do not need to take the next level course in order to keep the pre-matriculation credit (except where stated). If they wish to make any changes, they may do so by completing the appropriate form under Student Forms at <http://students.tufts.edu/registrar>.

Students who took college classes while still in high school may request transfer of credit for those courses online through SIS on the Student Services web page. Credit is awarded only for courses taken at a college with regularly enrolled college students. Some colleges offer their courses at nearby secondary schools for classes composed entirely of secondary school students; credit is not awarded for these courses. Also, students requesting such credit must provide a letter from their principal or guidance counselor stating that the course was not used to complete requirements for the high school diploma.

Tufts does not grant credit for the IB or British A-levels as a whole; rather, credit is awarded for each approved subject examination passed at an appropriate level.

Tufts Exam Equivalency Chart
Liberal Arts & Engineering 2019-2020 Academic Year

SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Anthropology	A-level	A, B	3.0	ANTH 10	
	IB/HL	6, 7	3.0	ANTH 10	
Art History	AP	5	0.0	FAH 1 / 2	
Biology	AP	5	5.0	BIO AP	Equivalent to BIO 13 or BIO 14
	A-level	A, B	5.0	BIO AC	Equivalent to BIO 13 or BIO 14
	IB/HL	6, 7	5.0	BIO AC	Equivalent to BIO 13 or BIO 14
Chemistry	AP	5	10.0	CHEM 1 & 2	Lose credit if CHEM 11 & 12 are taken
		(5)	5.0	CHEM 1	If CHEM 2 or 12 is taken at Tufts
	A-level	A	10.0	CHEM 1 &2	Lose credit if CHEM 11 & 12 are taken
		(A)	5.0	CHEM 1	If CHEM 2 or 12 is taken at Tufts
		B	5.0	CHEM 1	Lose credit if CHEM 11 is taken
	IB/HL	7	10.0	CHEM 1 & 2	Lose credit if CHEM 11 & 12 are taken
		(7)	5.0	CHEM 1	If CHEM 2 or 12 is taken at Tufts
		6	5.0	CHEM 1	Lose credit if CHEM 11 is taken

SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Chinese	AP	5	0.0	CHNS 4	
		4	0.0	CHNS 3	
	SAT	760–800	4.0	CHNS 22	
		710–750	0.0	CHNS 21	
		660–700	0.0	CHNS 4	
		600–650	0.0	CHNS 3	
		490–590	0.0	CHNS 2	
		410–480	0.0	CHNS 1	
Classics	A-level	A, B	3.0	CLS AC	
	IB/HL	6, 7	3.0	CLS AC	
Computer Science	AP	4, 5	3.0	COMP 5	Either COMP A or CSP exam
					Counts as free elective for EN students
					Only one course credit if both exams are taken
	A-level	A, B	3.0	COMP 5	Counts as free elective for EN students
	IB/HL	6, 7	3.0	COMP 5	Counts as free elective for EN students
Drama/Theater	A-level	A, B	3.0	DR AC	
	IB/HL	6, 7	3.0	DR AC	

SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Economics	AP	5	3.0	EC AP	Students should enroll in EC 5
		5/5	7.0	EC 5 & AP	If both Macro and Micro AP
	A-level	A, B	7.0	EC 5 & AC	
	IB/HL	6, 7	7	EC 5 & AC	
English	AP	5	3.0	ENG 1/2	
		4	3.0	ENG 1	
	A-level	A	3.0	ENG 1/2	
		B	3.0	ENG 1	
	IB/HL	7	3.0	ENG 1/2	
		6	3.0	ENG 1	
	IB/SL	7	3.0	ENG 1	
General Paper Exam		A	3.0	ENG 1/2	
		B	3.0	ENG 1	
Environmental Science	AP	4, 5	3.0	BIO 7	Counts as free elective for EN students
	A-level	A, B	3.0	BIO 7	Counts as free elective for EN students
	IB	6, 7	3.0	BIO 7	Both HL & SL
					Counts as free elective for EN students

Film	IB-HL	6, 7	3.0	FMS 30	
SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
French	AP	5	4.0	FR 21	
		4	0.0	FR 4	
		3	0.0	FR 3	
	SAT	770–800	4.0	FR 22	
		720–760	0.0	FR 21	
		660–710	0.0	FR 4	
		590–650	0.0	FR 3	
		500–580	0.0	FR 2	
		420–490	0.0	FR 1	
	A-level	A	4.0	FR 21	
		B	0.0	FR 4	
	IB/HL	7	4.0	FR 21	
		6	0.0	FR 4	
		5	0.0	FR 3	
	IB/SL		0.0		Take placement exam
	FB	12-20	4.0	FR 122	

SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
German	AP	5	4.0	GER 21	
		4	0.0	GER 4	
		3	0.0	GER 3	
	SAT	770–800	4.0	GER 22	
		720–760	0.0	GER 21	
		660–710	0.0	GER 4	
		600–650	0.0	GER 3	
		490–590	0.0	GER 2	
		410–480	0.0	GER 1	
	IB	7	4.0	GER 21	Both HL & SL
		6	0.0	GER 3	Both HL & SL
Hebrew	SAT	770–800	4.0	HEB 22	
		720–760	0.0	HEB 21	
		660–710	0.0	HEB 4	
		600–650	0.0	HEB 3	
		490–590	0.0	HEB 2	

		410–480	0.0	HEB 1	
SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
History	AP	4, 5	3.0	HIST AP	A max of 6.0 credits are awarded
	A-level	A, B	3.0	HIST AC	
	IB/HL	6, 7	3.0	HIST AC	
Human Geography	AP	5, 4	3.0	ANTH AP	
Italian	AP	5	0.0	ITAL 4	
		4	0.0	ITAL 3	
		3	0.0	ITAL 2	
	SAT	770–800	4.0	ITAL 22	
		720–760	0.0	ITAL 21	
		660–710	0.0	ITAL 4	
		590–650	0.0	ITAL 3	
		500–580	0.0	ITAL 2	
		420–490	0.0	ITAL 1	
	IB/HL	7	4.0	ITAL 21	
		6	0.0	ITAL 3	
	IB/SL				Take placement exam

SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Latin	AP	4, 5	3.0	LAT 3	
		3	0.0	LAT 3	
	SAT	720–800	3.0	LAT 21	
		620–710	0.0	LAT 3	
		480–610	0.0	LAT 2	
	IB/HL	6, 7	3.0	LAT 3	
Mathematics AB	AP	5	3.0	MATH 32	
		4	3.0	MATH 32	No credit for engineering students
Mathematics BC	AP	5	6.0	MATH 32, 34	
		4	3.0	MATH 32	For engineering students
		4, 3	3.0	MATH 32	For Liberal Arts students, with AB subscore of 4 or 5
Mathematics	A-level	A	3.0	MATH 34	Math 32 only for engineering students
		B	3.0	MATH 32	
	IB/HL	6, 7	3.0	MATH 32	
Further Math	IB/SL	7	3.0	MATH 14	No credit for engineering students

SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Music	AP	5	0.0	n/a	See department for placement
	A-level	A, B	3.0	MUS AC	See department for placement
	IB/HL	6, 7	3.0	MUS AC	See department for placement
Philosophy	A-level	A	3.0	PHIL AC	Knowledge and Inquiry Exam
		A, B	3.0	PHIL 2	
	IB/HL	6, 7	3.0	PHIL AC	
Physics 1	AP	4,5	5.0	PHY 1	No credit for engineering students
Physics 2	AP	5	5.0	PHY 2	No credit for engineering students
Physics B	AP	4,5	5.0	PHY 1	No credit for engineering students
Physics C (M)	AP	4,5	5.0	PHY 11	Lose credit if PHY 1 is taken
Physics C (E)	AP	5	5.0	PHY 12	
Physics A-Level	A-level	A	5.0	PHY 2	No credit for engineering students
		B	5.0	PHY 1	No credit for engineering students
Physics IB/HL	IB/HL	7	5.0	PHY 2	No credit for engineering students
		6	5.0	PHY 1	No credit for engineering students
Political Science	AP	4, 5	3.0	PS AP	Only one credit is awarded even if both exams are taken
	A-level	A, B	3.0	PS AC	Cannot be used toward the major

	IB/HL	6, 7	3.0	PS AC	Cannot be used toward the major
SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Psychology	AP	4, 5	3.0	PSY 1	
	A-level	A, B	3.0	PSY 1	
	IB/HL	6, 7	3.0	PSY 1	
Sociology	A-level	A, B	3.0	SOC 1	
	IB/HL	6, 7	3.0	SOC 1	
Spanish	AP	5	0.0	SPN 4	
		4	0.0	SPN 3	
		3	0.0	SPN 2	
		2	0.0	SPN 1	
	SAT	770–800	4.0	SPN 22	
		720–760	0.0	SPN 21	
		660–710	0.0	SPN 4	
		590–650	0.0	SPN 3	
		500–580	0.0	SPN 2	
		420–490	0.0	SPN 1	
	IB/HL	7	4.0	SPN 21	
		6	0.0	SPN 3	

		5	0.0	SPN 2	
	IB/SL	6, 7	0.0	SPN 2	
		5	0.0	SPN 1	
SUBJECT	EXAM	SCORE	CREDIT	EQUIVALENT	NOTES
Statistics	AP	4, 5	3.0	MATH 21	Counts as free elective for EN students
	A-level	A, B	3.0	MATH 21	Counts as free elective for EN students
	IB/HL	6, 7	3.0	MATH 21	Counts as free elective for EN students
Studio Art	AP	4,5	4.0	FAM AP	
	A-level	6, 7	4.0	FAM AC	
	IB/HL	6, 7	4.0	FAM AC	
Visual Arts	IB/HL	6, 7	4.0	FAM AC	

Key:

AP = Advanced Placement

AC = Accelerated Credit

A-Level=British Certificate of Education

FB = French Baccalaureate (French language only)

IB/HL = International Baccalaureate

Higher Level

IB/SL = International Baccalaureate

Subsidiary Level

Please note: If a student elects to take the equivalent course at Tufts, the exam credit will be removed upon completion of the course. A student will be awarded credit for the highest level achieved in a single language, even if multiple tests were taken. This applies only to scores for which departments award credit.

Standardized Exam Equivalencies

If a student completes a course at Tufts for which a pre-matriculation credit was awarded, the pre-matriculation credit will be removed from the student's record.

A student will be awarded pre-matriculation credit for one course equivalent to the highest level achieved in a single language, even if multiple tests were taken in that language. This applies only to scores for which departments award credit.

Health professions graduate programs, such as medical and dental schools, will generally expect actual college science courses with laboratory on the transcript.

Academic Standing/Satisfactory Progress Toward the Degree

Determination of a student's academic status is made by the faculty Committee on Academic Standing. The committee reserves the right to make decisions on an individual student's academic progress.

Academic Alert: A student will be sent an academic alert at the end of any semester in which the student earned fewer than 12 semester hours but more than 4, and/or failed one course of any semester hour value. Incompletes are not earned credits. The student's advisor and parents or guardians will be notified. No transcript notation will be made.

Academic Probation: A student will normally be placed on academic probation by the Committee on Academic Standing at the end of any semester in which the student earned 4 semester hours or fewer and/or a semester GPA lower than 2.0 and/or failed to make satisfactory progress as defined by number of credits earned at the end of any semester beyond their first semester. Satisfactory academic progress for each semester is defined by the number of semester hours listed below (see table). Incompletes are not earned credits. If put on academic probation, the student will no longer be in good academic standing, and notification of this status will be sent to the student's advisor and parents or guardians. The probation status will also be recorded on the student's unofficial transcript. To return to good academic standing, in the following semester a student must complete a minimum of 12 semester hours and earn a minimum term GPA of 2.0. An additional grace period may be allowed for the student to make satisfactory progress toward their degree as defined by the number of semester hours earned (see table). Students on academic probation who do not meet these criteria will either remain on academic probation or will be required to withdraw for one semester.

Required Academic Withdrawal: If a student's academic performance in any subsequent semester meets the criteria for academic probation, then the student will normally be required to withdraw for one semester.

Summary:

- Academic Alert: 5-11 semester hours and/or failed one course of any semester hour value. In good academic standing; student, advisor, and parents/guardians notified; no transcript notation.
- Academic Probation: 0-4 semester hours and/or term GPA 0–1.99 and/or failed to make satisfactory progress as defined by the number of semester hours earned at the end of any semester beyond their first semester. No longer in good academic standing; student, advisor, and parents/guardians notified; notation on unofficial transcript.
- Required Academic Withdrawal for one semester: Credits and GPA meet the criteria of academic probation for any subsequent semester. No longer in good standing; student, advisor, and parents/guardians notified; notation on unofficial transcript.

Permanent Academic Withdrawal: A student who returns from having been required to withdraw for a semester and meets the criteria for academic probation in any semester after the return will be subject to a permanent academic withdrawal, determined by the Committee on Academic Standing.

Satisfactory Progress Toward the Degree: Undergraduates will be alerted by their Advising Dean if they are not earning adequate semester hours to make satisfactory progress toward the degree. Satisfactory progress is defined by the number of semester hours completed by the end of each semester, as follows:

	Fall	Spring
First-year	12	24
Sophomore	39	54
Junior	70	86
Senior	102	120

Approved Part-time Enrollment Permission to enroll as a part-time student may be granted to students in the Resumed Education for Adult Learners Program and those who have completed eight semesters of full-time study. Students seeking to go part time after completing the residence requirement should see their Advising Dean during their final full-time semester.

Reduced Course Load (Disability Related)

In some instances, health needs and other disabilities may also merit a reduced course load; determination for this is made by the Student Accessibility Services Office. Students must file a petition in advance of the semester for which it is requested and work with the director of the Student Accessibility Office and their Advising Dean to effect a change to their program. Please see the Student Accessibility Services website for complete details and procedures:

<http://students.tufts.edu/student-accessibility-services>. Students are considered to be making satisfactory progress if they complete each course with a C- or better. A Reduced course load is 3-11 semester hour units.

Grades

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

- A Superior work
- B Meritorious work
- C Satisfactory work
- 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 for 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. Instructors are encouraged to consult with a student's Advising Dean prior to awarding an incomplete. 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 student's Advising Dean at the time final grades are reported. It is the responsibility of the student to request an incomplete before the required work is due. If an incomplete is granted, all work in the course must be completed six weeks into the following semester (fall or spring only), but students are encouraged to complete the work before the start of the next semester. The instructor may set an earlier or later deadline than

the standard six weeks and the student must abide by that deadline. The work will be evaluated without prejudice, and a grade should be submitted two weeks after the work is received by the instructor. A course not completed by the designated time will either remain a permanent incomplete or be assigned an appropriate grade (such as an F) by the instructor.

- W** Withdrawn: An indication that a student has been permitted to withdraw from a course after the fifth week of a semester (tenth week for first semester first-year students), but no later than the tenth week of the semester day
- CR** Credit: Credit is received, but is not included in the grade point average.
- NG** No Grade: The instructor has no current knowledge of the student listed on the grade sheet.

To compute 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; F, 0. B+, C+, and D+ count 0.333 more; A-, B-, C-, and D- count 0.333 less. The grade score for each course is multiplied by the number of semester hours of the course, and the sum of these weighted scores is divided by the total number of semester hours. The result is computed to three decimal places; semester and cumulative averages are rounded to two decimal places.

Although a grade of F is averaged into the GPA, those semester hours do not count towards graduation. For example, if a student has earned A- in a 3-semester hour course, B+ in a 4-semester hour course, B+ in a 3-semester hour course, and B in a 5-semester hour course, that student's average grade for the term is: $\frac{(3.667 \times 3) + (3.33 \times 4) + (3.33 \times 3) + (3.0 \times 5)}{3+4+3+5} = 3.289$, which is then rounded to 3.29.

If a student has earned A in each of three 3-semester hour courses and F in another 3-semester hour course, that student has completed 9 semester hours toward graduation and the average grade for the term is: $\frac{(4 \times 3) \times 3 + (0 \times 3)}{3+3+3+3} = 3.0$.

Changes in Course Grades: Statute of Limitations

Effective education requires timely and objective evaluation of students' academic work, using clear, standard, fair, and public criteria. Such standards should be listed in the course syllabus. While criteria differ across disciplines and faculty, and while the ultimate responsibility for setting standards and evaluating performance rests with departments and faculty, submitted grades are final and not subject to negotiation. Exceptions should be limited to correcting clerical and calculation errors, and correcting deviations from stated criteria. Of course, students do have the right to know the basis for a grade, and faculty should be open to that post-semester conversation. Following such a conversation, undergraduates who believe that an error or deviation remains may appeal to the department chair or program director and, if necessary, subsequently to a dean of the faculty in Ballou Hall.

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.

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 the 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 original and the repeated courses and grades will appear on the transcript. The credit value of the original course will be removed, but the full impact of the grades of both the original and repeated courses will be calculated into the cumulative grade point average. The repeated course, if passed, will receive the full credit value.

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 on the transcript, but the grade will not be calculated into the grade point average.

Some studio art classes and performance classes in dance and music may be repeated for credit. See department for

details. Similarly, physical education skills courses may be repeated for credit. A total of 4 such courses, up to 8 semester hours, may be taken for credit; additional such courses will appear on the transcript with no 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. Journalism and Nonfiction Writing at the intermediate level may be taken only once each.

Extra Courses

Liberal arts students may register for a maximum of 18 semester hours each semester; liberal arts students in the combined BA or BS/BFA program may register for a maximum of 21 semester hours each semester; engineering students may register for a maximum of 21 semester hours each semester. To add an additional credit, students must petition their Advising Dean for permission beginning on the first day of each semester, but not before. Such permission is rarely granted to engineering students or to first-year liberal arts students.

Missed Classes

Students should make themselves aware of each professor's attendance policy. Students who must miss a class because of an illness should submit the online short-term illness form, available through SIS. Students are encouraged to speak with the professor directly about missed work since illness does not automatically excuse this. Students should consult their Advising Dean in Dowling if they are missing more than a few classes due to illness. As the academic calendar is constructed, religious holy days are not the sole factor in determining days on which classes are held or suspended. It is the policy of the faculty, however, that students be encouraged to observe their appropriate religious holy days; that instructors strive to facilitate this by allowing absence from classes for such purposes and by trying to ensure that no examinations, written reports, oral reports, or other mandatory class assignments are scheduled for or due on holy days; and that instructors provide ample opportunities for such students to make up work missed on such occasions without penalty.

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 advisor, and meet the requirements of the program to which they are applying. (For further information on requirements, see <http://students.tufts.edu/study-abroad>.) 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 advisor 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 pre-approved non-Tufts programs is available online. 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 complete the equivalent of 12 or more semester hours. 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.

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 advisor and their advising 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 SIS. Tufts does not accept online classes or internships for transfer. 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 complete the equivalent of 12 or more semester hours. To meet the costs of administrative procedures connected with study at other institutions, students studying elsewhere will be charged a fee.

Leaves of Absence and Transfers

Students considering a leave of absence or transferring to another school must consult their Advising Dean and complete the online leave of absence form, available through SIS. 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. Students taking a personal leave of absence with a plan to return to Tufts should consult their Advising Dean if they intend to take classes elsewhere while on leave.

Medical Leaves:

Students taking a Medical Leave of Absence leave campus in order to fully attend to health-related issues. This type of leave is recommended if a student finds it difficult to productively or safely manage the demands of their academics and campus life due to a health concern. Tufts University is committed to supporting students on medical leave and as they prepare for their transition back to Tufts. Making a decision to take a leave from the University may be a difficult one. The University strongly encourages students considering their options to consult and seek support from the staff in the Dean of Student Affairs Office and their Advising Dean at any time during the semester.

Understanding the financial and academic implications of any leave is important. The full policy is available on our website. Please know that your Advising Dean, or graduate faculty advisor and appropriate Dean of Students staff member will help you navigate this process.

Notification of intention to request re-entry must be submitted in writing or via email to the Office of the Dean of Student Affairs by the deadlines noted online: <https://students.tufts.edu/student-affairs/what-we-help/your-health-wellness-and-safety/leaves-absence/return-medical-leave>.

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 purchase 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 their 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 their 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 of student academic misconduct are reported to the Office of the Dean of Student Affairs. Students have the right to review the complaint of academic misconduct made against them and to reply in writing. Students also have the right to appeal disciplinary decisions to the Committee on Student Life (CSL) according to the policies set forth in *Tufts University Student Judicial Process*.

Consequences for academic dishonesty include disciplinary probation, suspension, or expulsion. Instructors are required to follow the grading guidelines outlined in the Academic Integrity Handbook. For more information, please refer to the Academic Integrity Handbook, available online.

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 on the Student Affairs web site: <http://students.tufts.edu/student-affairs/student-life-policies/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 email 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 Student Services. 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 in their education and employment. It is the policy of the university not to discriminate on the basis of race; color; national or ethnic origin; age; religion; disability; sex; gender; sexual orientation; gender identity or expression, including a transgender identity; genetics; status as a veteran; retaliation (for filing a complaint or raising a concern about any of the above categories); and any other characteristic protected under federal or state law, including Title IX. This equal opportunity protection applies in the administration of Tufts University's educational policies, admissions policies, employment policies, scholarship and loan programs, and athletic or other university-sponsored programs. The University expects all Tufts employees, students and community members to join with and uphold this commitment. 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 <http://oeo.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 10 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. Five-year students are required to confer with their faculty advisors 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.

Dual-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 in a musical instrument, voice, composition, music history, and theory without giving up the academic disciplines of a liberal arts degree. Admission to this dual-degree program is generally gained by simultaneous application to both institutions. Students in the program will complete a minimum of 72 semester hour units at Tufts; will be in full-time residence for ten semesters; and will meet the foundation, distribution, and concentration requirements stipulated by the School of Arts and Science. Students are also expected to complete 84 credit hours at NEC. Prospective students are requested to address their questions to the Dean of Enrollment Services, Office of Admission, New England Conservatory of Music, 290 Huntington Avenue, Boston, Massachusetts 02115, or Undergraduate Education at Tufts University.

Combined Degree BFA & BA/BS Program with SMFA at Tufts

Students in the combined degree BFA & BA/BS program will be in full-time residence for a minimum of 8 semesters; will complete a minimum of 96 semester hour units of non-studio coursework and 76 semester hour units of studio art coursework. The non-studio distribution requirements for the BFA are satisfied by students completing 15 SHUs in art history, as well as the distribution, foundation and concentration requirements for their BA or BS degree, with the exception of their Arts Distribution requirement, which is satisfied by studio coursework taken towards their BFA degree. There are instances where students may use courses to satisfy multiple requirements in close consultation with their advisor. Normally, the majority of the non-studio work is taken on the Tufts Medford/Somerville campus, and most of the studio art courses are taken at the SMFA.

Combined Bachelor's/Master's Degrees Program with the School of Engineering

(SEE SCHOOL OF ENGINEERING FOR DESCRIPTION.)

Combined Bachelor's/Master's Degrees Program with the College of Liberal Arts

The College of Liberal Arts and the Graduate School of Arts and Sciences (GSAS) offer combined degrees programs through select departments. The combined degrees program is one way of recognizing the increasing number of undergraduates entering college with exceptional preparation in certain areas. In this program students can enroll in bachelor's and master's degree programs with the goal of completing both in five years. Students seeking admission to the program should consult their undergraduate major advisor, their Associate Dean in Dowling Hall, and their prospective graduate advisors before applying to the graduate school.

Combined degree students are required to complete the undergraduate degree requirements and graduate before moving into the master's portion of their program. Students who do not receive their bachelor's degree by August of their senior year must continue to enroll as an undergraduate and pay undergraduate tuition.

Four years of undergraduate tuition and the entire tuition for the master's degree are required.

Admission to the combined degrees program is typically during the junior year. Therefore, students interested in the program should discuss with their advisors 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. For a list of participating programs, please go to <https://asegrad.tufts.edu/academics/combined-degree-programs>. Interested students should contact participating departments and programs for the most up-to-date curriculum information.

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

(<http://admissions.tufts.edu/academics/special-degree-paths/early-admission-to-tufts-profe/>)

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

The combined-degree program is offered jointly by the undergraduate schools (Arts and Sciences or Engineering) and The Fletcher School. It offers an opportunity for a limited number of highly qualified Tufts undergraduates to earn both the bachelor's degree in their selected major and the Master of Arts in Law and Diplomacy (MALD) degree. A total of 16 Fletcher courses (48 SHUs) are required for the MALD degree. As many as four of these courses (12 SHUs) may be used in fulfilling requirements for the BA/BS degree. Degrees are conferred upon completion of requirements for each portion of the program; that is, a bachelor's degree will be conferred once the BA/BS requirements are completed and a master's degree will be conferred once the MALD requirements are completed. Students may not begin their three full-time Fletcher semesters until they have earned their bachelor's degree. A student who has any remaining credits for the bachelor's degree will remain enrolled in A&S, and pay tuition to A&S until their degree is completed.

Typically, the program lasts six years (12 semesters) and will not reduce the time usually required to pursue the two degrees separately. An undergraduate who is able to complete the AS&E eight-semester residency requirement by December of senior year may be able to complete the combined-degree program in five and a half years. Interested students should consult their undergraduate Advising Dean about this program.

Fletcher courses may be taken over a period of up to three years. The student must be a full-time Fletcher student during at least three semesters. While matriculated at Fletcher, students will pay Fletcher tuition and may receive Fletcher financial aid.

After being admitted to Fletcher, combined-degree students may take up to four Fletcher courses (12 SHUs) while still registered in AS&E and have these courses count toward the 16 courses (48 credits) required for the Fletcher degree. Fletcher courses taken through cross-registration before starting the combined-degree program are not eligible for Fletcher credit. Cross-registration for courses at Harvard or at other institutions in the greater Boston area will not be approved until the student has completed at least eight Fletcher courses (24 credits), including those taken while still an undergraduate.

No more than four Fletcher courses (12 SHUs) can be taken each semester, but students still completing undergraduate requirements may take a combination of Fletcher and undergraduate classes totaling 16 SHUs or fewer. The student's program must be coordinated in such a fashion as to satisfy both the Fletcher and undergraduate requirements.

Admissions

Students may apply for the combined-degree program once they have completed and received grades for 80 SHUs. All BA/BS-MALD applicants are required to participate in an on-campus evaluative Fletcher admissions interview. Once admitted, students may begin taking Fletcher courses at the start of the following semester, whether it begins in January or September. The application deadline for January enrollment is October 15. The application deadline for September enrollment is January 10.

Additional information about the Fletcher admissions process and financial aid can be found on the Fletcher website at www.fletcher.tufts.edu.

Africana Studies

(FOR DEGREE REQUIREMENTS, SEE Department of Studies in Race,
Colonialism, and Diaspora)

American Studies

(FOR DEGREE REQUIREMENTS, SEE Department of Studies in Race, Colonialism, and Diaspora.)

Anthropology

Professor Sarah Pinto, Chair, *Medical anthropology, gender, mental health, reproduction, cultures of biomedicine, kinship, body, global feminism; India*

Associate Professor Amahl Bishara, *Media, human rights, the state, journalism, democracy, the politics of place, knowledge production; the Middle East*

Associate Professor Rosalind H. Shaw, *Memory, violence, temporality, post-conflict, transitional justice, children & youth; West Africa*

Assistant Professor Alex Blanchette, *Ecology, labor, green capitalism, biotechnology, animals, modernity, alienation, food politics, industrial agriculture; USA*

Assistant Professor Tatiana Chudakova, *Medical anthropology, science & technology, environment, ethnicity, indigeneity, nationalism, post-socialism; Russia; North Asia*

Assistant Professor Sarah Luna, *Sociocultural anthropology, sex work, migration, gender and sexuality, race and ethnicity, borders; Mexico; United States*

Assistant Professor Zarin Machanda, *Biological Anthropology, primatology, chimpanzee behavioral ecology, primate life history and development, the evolution of social relationships, the ecology of male-female relationships*

Assistant Professor Nick Seaver, *Computing, algorithms, sound, music, knowledge, attention, taste, classification, media technologies, science & technology studies*

Senior Lecturer Cathy Stanton, *Tourism, museums, myth & ritual, cultural performance, culture-led redevelopment, mobilities, farm history/heritage*

Lecturer Lauren Sullivan, *Mesoamerican Archaeology; Maya Archaeology; the rise & fall of complex societies; prehistory of the American Southwest; Paleoindians of North America; human evolution; Cultural Anthropology; ceramic analysis*

Professor Emeritus David M. Guss, *Urban and aesthetic anthropology, placemaking, cultural performance, myth and ritual, popular culture; Latin America*

Professor Emeritus Deborah Pacini Hernandez, *Comparative Latino Studies, racial and ethnic identity, popular music, globalization; Latino community studies*

Associate Professor Emeritus Stephen M. Bailey, *Biological and nutritional anthropology; growth and body composition, methodology; the Americas, China*

Anthropologists study global human experience, combining social, cultural, biological, archaeological, and linguistic approaches within a single discipline. Our questions and topics are diverse, including (for example) the relationship between power and culture, how human bodies relate to their environments, and the study of social distinctions through archaeological methods. While in the past anthropology was typically the study of non-Western societies, today anthropologists also work “at home”—wherever in the world that “home” is. Ethnography, cultural anthropology’s signature set of research methods, helps researchers view social interactions and cultural practices with new eyes, and is in demand in the workplace. This combination of disciplinary breadth, global and local understanding, and hands-on research makes Anthropology a strong major and an excellent preparation for a wide range of careers.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Anthropology (for students matriculating in Fall 2018)

Eleven courses, including: one gateway (introductory level) sociocultural anthropology course (Anthropology 10-39); one gateway biological anthropology or archaeology course (Anthropology 40-59); Anthropology 130: Anthropological Thought; Anthropology 161: Fieldwork Lab; and seven additional anthropology courses, at least one of which must be a critical geographies course (course adopting a regional focus), and two of which must be upper-level seminars (Anthropology 162-189).

Students who matriculated before Fall 2018 may opt to complete the old major requirements:

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: Anthropological Thought; and 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 recommend taking the theory course (Anthropology 130) in the junior year. The department encourages

majors to explore the possibility of undertaking an internship (Anthropology 99) or independent study (Anthropology 191-199). A minimum of 50% of courses counted toward the Anthropology major must be completed at the Tufts University home campus or in Tufts University-sponsored programs abroad. A maximum of two courses cross-listed in other Tufts departments may be counted toward the Anthropology major. Students must achieve a grade of C- or better for a course to count for credit toward the major.

UNDERGRADUATE MINOR REQUIREMENTS

We offer four distinct minors that allow you to gain a foundation in a thematically focused area of anthropology and training in specific methods, including ethnographic and publicly-engaged research.

Minor in Biological Anthropology

Five courses and at least 15 SHUs, including: Anthropology 40 (Biological Anthropology); three additional courses related to biological anthropology, one of which may be taken in another department but must be approved by the Anthropology Department; and a capstone project in biological anthropology.

Minor in Cultural Anthropology

Five courses and at least 15 SHUs, including: one gateway course in cultural anthropology (Anthropology 10-39); Anthropology 130 (Anthropological Thought); Anthropology 161 (Fieldwork Lab) or other methods course as designated by the department; and two additional courses in cultural anthropology as designated by the department.

Minor in Medical Anthropology

Five courses and at least 15 SHUs, including: one gateway course in cultural anthropology (Anthropology 10-39); Anthropology 130 (Anthropological Thought); Anthropology 148 (Medical Anthropology); and two additional courses in medical anthropology as designated by the department

Minor in Social Justice Anthropology

Five courses and at least 15 SHUs, including: one gateway cultural anthropology course related to social justice as designated by the department (in the range of Anthropology 10-39); Anthropology 161 (Fieldwork Lab) or other methods course as designated by the department; two additional anthropology courses related to social justice and activism as designated by the department, which may include Anthropology 130 (Anthropological Thought); and a capstone project in social justice anthropology.

For more detailed information, please visit the website <http://ase.tufts.edu/anthropology>.

Applied Mathematics

(FOR DEGREE REQUIREMENTS, SEE MATHEMATICS.)

Applied Physics

(FOR DEGREE REQUIREMENTS, SEE Physics and Astronomy.)

Arabic

(FOR DEGREE REQUIREMENTS, SEE International Literary and Visual Studies.)

Archaeology

DIRECTOR:

Professor R. Bruce Hitchner, *Classics*

PROGRAM COMMITTEE:

Professor David M. Guss, *Anthropology*

Professor Jack Ridge, *Earth and Ocean Sciences*

Associate Professor Stephen M. Bailey, *Anthropology*

Associate Professor David M. Gute, *Civil and Environmental Engineering*

Associate Professor Steven W. Hirsch, *Classics*

Senior Lecturer Matthew Harrington, *Classics*

Senior Lecturer David J. Proctor, *History*

Lecturer Lauren A. Sullivan, *Anthropology*

Archaeology is the discipline of material things. It examines the record of human activity to recover and interpret information about past societies and cultures. There are many sub-disciplines 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. The interdisciplinary undergraduate major in archaeology incorporates this perspective through a range of courses in the Humanities, Social Sciences, Sciences, and Arts designed to both introduce students to the methods, practices, and theories of archaeology and the cultures and societies which depend on archaeological material as a primary source of knowledge. Ideally, a student in archaeology will combine coursework with firsthand experience in recovery, conservation, and interpretation of material remains.

The archaeology program is affiliated with the Center for Materials Research in Archaeology and Ethnology (CMRAE) 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, Harvard University, and others).

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The undergraduate major consists of eleven courses and at least 33 semester hour units (SHUs) including a core of five required courses plus a selection of six elective courses divided between Archaeology (2 courses and at least 6 SHUs), History and Arts (2 courses and at least 6 SHUs), and Social Science/Natural Science/Mathematics (2 courses and at least 6 SHUs). Students are encouraged 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 a 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. Five courses in core curriculum:

1. **Archaeology 26** (cross-listed as **CLS 26** and **HIST 76**)
2. **Archaeology 27** (cross-listed as **CLS 27** and **FAH 19**)

3. Archaeology 30 (cross-listed as ANTH 50)

4. GIS 101

5. Earth and Ocean Sciences 2

II. Six courses and at least 18 SHUs as indicated below from Archaeology, History, and Natural/Social Sciences. (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 advisor in the archaeology program. Transfer courses from other institutions limited to two unless approved by advisor.)

- a. Two Archaeology courses taken from ARCH 49, 51, 52, 128, 163, 164, 167, 168, 187, 188, 190, 191, 192; Classics 87, 160, 163, 164, 167, 168, 187, 188; FAH 23, 28 103, 104, 105, 106, 123, 128
- b. Two History courses taken from CLS 37, 38, 47, 85, 87, 142, 143, 144, 146, 147, 148 185; HIST 17, 40, 50, 51, 55, 58, 101, 105, 148, 149, 151
- c. Two Natural/Social Science courses taken from ANTH 20, 24, 32, 40, 126, 130, 131, 132, 150; Biology 7 or 10 (student may not count both BIO 7 and BIO 10), 143; CHEM 2, 8; EOS 32; MATH 21; ENV 7

III. Honors Thesis or Interdisciplinary Capstone (optional)—Archaeology 193 or 194 or other approved courses

Architectural Studies

DIRECTOR:

Assistant Professor Diana Martinez

2019-20 Interim Director – Full Time Lecturer Aaron White

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 32-34) and physics (Physics 11-12,) and are encouraged to take Drama 10 for public speaking.

For more information: contact Lecturer Aaron White aaron.white@tufts.edu (History of Art and Architecture) or Professor Masoud Sanaye masoud.sanaye@tufts.edu (Civil and Environmental Engineering).

COLLEGE OF LIBERAL ARTS

Major in Architectural Studies

The Department of the History of Art and Architecture offers an interdisciplinary major in Architectural Studies for students in the College of Liberal Arts that teaches students understanding of the built environment from multiple perspectives through the development of basic skills in analyzing, interpreting, engineering, designing, and engaging imaginatively and actively with the current and historical built environment.

The built environment is defined broadly, from stage scenery and interior design to civil engineering and urban planning, in order to reflect historical and contemporary experience and to encompass the richness of Tufts' curricular assets, which besides the offerings of the Art and Art History Department and the School of the Museum of Fine Arts @Tufts, include the university's School of Engineering, and its graduate department in Urban and Environmental Policy and Planning. The Architectural Studies major totals twelve courses: seven core classes and five multidisciplinary electives. 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. (Students may take no more than three courses with 2 SHUs designation towards the major's requirements.) As a capstone, senior majors in their final semester complete a senior integrative project, either as an independent research project or an internship in a professional office. Several opportunities exist for study abroad. Completion of an intensive summer architectural design course from an accredited architecture school (e.g., Career Discovery at Harvard's Design School) exempts majors and minors from the FAH 96 requirement. For more information see <http://ase.tufts.edu/art/architecture/>.

Required Core Curriculum

1. **Art History 8** Introduction to Architecture, 1400 to the Present
2. One Introductory Course in Art History (Architectural content strongly preferred)
3. **Art History 96** Design: Architectural
4. Engineering/Technology core course: **Engineering 1-08, 5, 23, 39, or 80; or Engineering Psychology 61; or Engineering Science 5, 18, 25; or GIS 101**
5. Humanities/Social Sciences core course (Asterisked [*] course from Area C below)
6. Upper-level architectural history courses **MUST be taken at Tufts (FAH 115, 120, 123, 125, 127, 128, 134, 192, 193, 195, 196, or 198 [seminar in architecture]; or 193; or CE 120)**
7. **Art History 98** Architectural Studies Senior Project Seminar

As courses in various departments often change, if courses falling within the categories of required areas of multidisciplinary electives do not appear on the list below, the student may still petition for approval, during the advising period, **BEFORE** enrolling in the course. Visit the department website at ase.tufts.edu/art for an updated course list.

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. Engineering and Technology

A. ARCHITECTURAL AND ART HISTORY

- Archaeology 26** Ancient Egypt
- Art History 2** Introduction to World Art II
- Art History 15/115** Japanese Architecture
- Art History 19** Classical Archaeology
- Art History 21/121** Early Islamic Art
- Art History 25/125** Medieval Architecture
- Art History 28/128** Medieval Art in the Mediterranean
- Art History 34/134** Renaissance Venice
- Art History 92/192** Special Topics [architecture]
- Art History 95/195** Boston: Architecture and Urbanism
- Art History 96** Design: Architectural
- Art History 97** Design: Advanced Architectural
- 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 123** Byzantine Art and Architecture
- Art History 127** Cathedrals and the Arts
- Art History 193** Histories of Modern Architecture
- Art History 196** Museum Architecture
- Art History 198** Seminar in Architecture
- Art History 199** Senior Honors Thesis
- Civil Engineering 120** The Art of Building
- Drama 119** History of Style and Décor

B. STUDIO ART

- DRWM 26** Drawing: Foundation
- DWRM 63** Perspective Drawing
- DWRM 77** Sculpture: Foundation
- GRAC 39** Graphic Design
- GRAM 20** Design: Foundation
- GRAM 21** Design: Intermediate to Advanced
- PAIM 54** Painting: Foundation
- PAIM 93** Watercolor
- Drama 20** Stage Engineering
- Drama 21** Computer-Assisted Design
- Drama 29** Scene Painting
- Drama 93** Special Topics Architectural Styles and Designs
- Drama 94** Special Topics Advanced 3-D Design
- Drama 125** Scene Design

C. HUMANITIES AND SOCIAL SCIENCES

(Courses with asterisk count toward core requirement.)

- ***Anthropology 20** Global Cities

Anthropology 42 Extreme Environments
Anthropology 128 Mesoamerican Archaeology
Anthropology 183 Urban Borderlands
***Anthropology 186** Place and Placemaking
Economics 30 Environmental Economics
Economics 127 Urban Economics
***English 116** The Country and the City
***History 123** Industrial America and Urban Society
***History 143** South Asian Urban History
***History 161** Vienna
Philosophy 52 Aesthetics
Philosophy 186 Phenomenology and Existentialism
Political Science 15 Politics and the City
***Political Science 195** Politics of Sustainable Communities
Psychology 27 Perception
Psychology 53 Engineering Psychology
Psychology 130 Advanced Engineering Psychology
***Sociology 113** Urban Sociology
***Sociology 180** Cities of the Global South
***UEP 101** Land Use Planning
***UEP 105** Urban Planning and Design
***UEP 113** Housing Policy
UEP 173 Transportation Planning
***UEP 178** Urban Policy and Planning
***UEP 181** Homelessness in America

D. ENGINEERING AND TECHNOLOGY

(Courses with asterisk count toward core requirement.)

Civil and Environmental Engineering 1 Introduction to Civil and Environmental Engineering
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 185 Legal Issues of Engineering
Civil and Environmental Engineering 188 Engineering Design with CAD
***Engineering 01-08** Design of the Built Environment
***Engineering 5** Skyscrapers: Architecture and Engineering
***Engineering 23** Building Big: Infrastructure Engineering
***Engineering 39** Bridge Design
***Engineering 80** Structural Art
***Engineering Psychology 61** Human Factors and Ergonomics
Engineering Psychology 161 Human Factor Product Design
Engineering Science 2 Introduction to Computing in Engineering
***Engineering Science 5** Introduction to Mechanics (Statistics and Dynamics)
Engineering Science 9 Applied Mechanics (Strength of Materials)
***Engineering Science 18** Computer Aided Design w/Lab
***Engineering Science 25** Environment and Technology
Engineering Science 51 Engineering Management
***Engineering Science 93** Special Topics Bridge Engineering
Environmental Studies 193 Introduction to Geographic Information Systems
***GIS 101** Introduction to Geographic Information Systems
GIS 102 Advanced Geographic Information Systems

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 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, providing a coherent basis for graduate work in architecture or design. The faculty advisor for this program is Professor Masoud Sanaye.

Degree Requirements

A minimum of 38 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: **Introductory Course, 8, 98, 198 [seminar in architecture]**; two studio courses, including architectural design (**FAH 96**) and either **GRAM 20, DWRM 26, or 63**; one elective (selected from disciplinary areas A, B, C above);
5. Humanities and social science: 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:

1. **One Introductory Course in Art History** (architectural content strongly preferred)
2. **Art History 8** Introduction to Architecture, 1400 to the Present
3. Studio Art (**FAH 96**; or **GRAM 20, DWRM 26**; or **DR 21**)
4. Engineering/Technology course: **Engineering 1-08, 5, 23, 39, or 80**; or **Engineering Psychology 61**; or **Engineering Science 5, 18, 25, or 27**; or **GIS 101**
5. Upper-level architectural history class **MUST be taken at Tufts (FAH 115, 120, 123, 125, 126, 127, 190, 191, 193, 195, 196, 198 [seminar in architecture], or 192 [architecture]; or CE 120)**

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 advisor for this minor is Professor Masoud Sanaye.

History of Art and Architecture

Professor Christina Maranci, *Department Chair, Arthur H. Dadian and Ara Oztemel Professor of Armenian Art and Architecture; Armenian and Byzantine art and architecture*

Professor Andrew McClellan, *Director of Museum Studies, Early Modern European art and theory; history of museums, exhibitions, and collecting; history of art history*

Professor Peter Probst, *Director of Undergraduate Studies, Art and Anthropology, African art and visual culture, Museum and Heritage Studies, Historiography*

Professor Malcolm Turvey, *Sol Gittleman Professor, Director of Film and Media Studies; film history and theory*

Associate Professor Cristelle Baskins, *Italian Renaissance art, Mediterranean studies, early modern books, and portraiture (on leave Spring 2020)*

Associate Professor Ikumi Kaminishi, *Director of Graduate Studies; Asian art and architecture, Buddhist painting, narrative studies*

Associate Professor Karen Overbey, *Medieval art and architecture; early Ireland, Britain, and Scandinavia; portable arts; medieval materiality (on leave fall 2019)*

Associate Professor Eric Rosenberg, *American art, modern and contemporary art*

Associate Professor Adriana Zavala, *Modern and Contemporary U.S. Latinx and Mexican art; Latin American art; Race, Colonialism, and Diaspora*

Assistant Professor Eva Hoffman, *Islamic art and architecture, portable arts (on leave Spring 2020)*

Assistant Professor Diana Martinez, *Director Architectural Studies, American architecture history, global architecture history, post-colonial studies, materiality (on leave 2019-20)*

Assistant Professor Jeremy Melius, *Modern art and art writing, critical theory and aesthetics, historiography, histories of sexuality*

Assistant Professor Jacob Stewart-Halevy, *Contemporary art, global conceptualism, video art, media theory and anthropology (on leave 2019-20)*

SECONDARY APPOINTMENTS:

Patrick Carter, *Tufts Studio Arts Coordinator and Transfer of Credit Representative for Studio Art Courses on Medford Campus*

Our department offers courses on cultures from across the globe, including Impressionism, Latin American and US Latinx, Islamic, African, Buddhist, American, Medieval, Renaissance, Armenian, Contemporary, and Byzantine art, as well as courses on the history of architecture, film, and photography. Our approach is fundamentally interdisciplinary, and many of our courses are cross-listed with other departments and programs including International Relations, Classics, Film and Media Studies, American Studies, Latino Studies, Anthropology, Africana Studies, and Middle Eastern Studies. Students taking art history classes can expect to learn how to analyze, interpret, and write on visual works of art.

As a humanistic discipline, the history of art emphasizes scholarly investigation and critical analysis over technical training. However, majors may take studio courses as part of their program and take advantage of the SMFA@Tufts courses offered on the Boston and Medford Campuses.

UNDERGRADUATE PROGRAM

The department offers the bachelors of art degrees in art history and in architectural studies.

Art History Concentration

For the bachelor of arts degree in art history, ten courses (minimum of 30 semester hours units) are required for the major:

–two introductory courses in Art History

–FAH 100 Theory and Methods in Art History

–Seven additional art history courses, one of which may be an approved course in a related field (e.g. history, literature, studio art). At least one of the courses in the major must be taken as an upper-level seminar (FAH 0198-xx).

The major in Art History equips students with a critical and globally informed understanding of the history of art and visual culture. Understanding the sources, aesthetics, and significance of images that people use to communicate — whether in the confined world of art or beyond — is crucial for anyone wanting to play an active part in society. In the major, students learn how to look at and write about works of art while exploring the historical and transcultural contexts in which visual works emerge and operate, and immersing themselves in questions of politics, identity, religion, economics, mobility, communication, and many other issues. All majors are required to take two courses that introduce broad fields and provide foundational training in the discipline. We strongly recommend that students take these classes early in their course of study, as they allow students to acquaint themselves with different fields and periods and with different faculty. The two introductory courses are designed as a springboard to the more specialized upper level (list available on department website ase.tufts.edu/art). As with all humanistic disciplines, art history is underpinned by certain theories and methods; these are at work in each and every course, but they are the focus of FAH 100, Theories and Methods of Art History, also a required class for majors, normally taken in the senior year.

Art History Minor

For the minor in art history, 5 courses (minimum of 15 semester hours) are required with at least one course taken at the 100 level. Three of the 5 courses should be taken on the Tufts campus, including the 100 level.

- one introductory course in art history
- two other courses in art history
- two electives

Museums, Memory, and Heritage Minor

This minor is designed for students who wish to study museums, the institutionalization of memory, monuments, and cultural heritage both from an academic point of view and as a potential career path. The minor is housed in the Department of the History of Art and Architecture and builds on the strengths and shared interests of faculty in the department and related programs. Supervision of the Minor will rotate among faculty.

Six courses distributed as follows:

- A. Three courses from the following core courses:
FAH 009: The Art World
FAH 160: Museum History & Theory
FAH 163: Art and Anthropology
FAH 164: Who Owns the Past?

- B. Three courses from the following list of electives:
FAH 0002: Introduction to Western Art from 1500
FAH 0008: Introduction to Architecture
FAH 0009: The Art World
FAH 0092: Ancient Near East
FAH 0099: Supervised internship
FAH 0120: Armenian Art
FAH 0122: Iconoclasm & Iconophobia
FAH 0160: Museum History & Theory
FAH 0163: Art and Anthropology
FAH 0164: Who Owns the Past?
FAH 0186: Latina/o Presence in Art and Visual Culture
FAH 0198: Seminar: The Museums of Boston
FAH 0198: Seminar: Monuments and Memory
GER 0077/GER 0177: German Colonial Fantasies: "A Place in the Sun"
HIST 0010: Colonialism in the Global World (CST 11)
HIST 0170: Colonialism and Decolonization (CST 194)
HIST 0173: Black and Native New England
ILVS 0192: Dangerous Passions: Collecting, Hoarding, and Possessing

REL: 0110: Sacred Spaces, Contested Places
VISC 0020: Interpreting Art: Tools for Critiquing, Creating, and Curating
VISC 0122: Reassessing Museums: Collecting and Art
VISC 0155: Reimagining America: Colonial Views and Returning Gazes
VISC 0180: Critical Perspectives of the Americas.

Visit the department website at ase.tufts.edu/art for an updated course list.

For inquiries about the art history major, minor, or the museums, heritage, and memory minor please contact the department at 617-627-3567 or visit the website <http://ase.tufts.edu/art/undergraduate/>.

Architectural Studies (see also listing above)

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 in 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.

For more information please see the entry for "Architectural Studies" located at the beginning of the Bulletin or contact Lecturer Aaron White aaron.white@tufts.edu. More detailed information can be found on the website <http://ase.tufts.edu/art/architecture>.

Senior Honors Thesis

Seniors in Art History and Architectural Studies who qualify for the Thesis Honors program (restricted to those whose names have appeared on the Dean's List at least two times before their senior year) may spend their final year writing an honors thesis. They require a good deal of discipline and focus on the student's part, but in return they can take you well beyond the classroom and can develop useful research, writing and organizational skills.

In spring semester of junior year, prospective thesis writers, including those studying abroad, should begin consulting with their advisors about possible thesis topics and research plans. **By the first Friday in April of their junior year**, all prospective thesis writers, including those studying abroad, must submit to the director of undergraduate studies a single-page prospectus listing the proposed thesis title, department advisor and relevant coursework, plus a short description of the thesis' content and research plan.

If approved by the department at this preliminary, prospectus stage, the student may then proceed to the proposal stage in close consultation with the advisor. **By the first Friday of classes of the senior year**, a three-to-five-page proposal must be submitted to the director of undergraduate studies listing: the thesis title, the department advisor, and at least one additional committee member, and also include a lengthier description of the proposed project accompanied by a full research bibliography. The department in early-September grants or denies approval for the proposed thesis to move forward.

For a thesis to be considered for the department's **Madeline Harrison Caviness Thesis Prize**, the completed senior theses are submitted electronically to the director of undergraduate studies on the **last Friday of April**. Theses are publicly presented in ten-minute talks at a luncheon held the day after the conclusion of spring classes. The Prize winner will be announced at the Commencement Ceremony.

Defenses are conducted in late April or early May. After the defense, a final copy of the thesis, in electronic form, must be submitted to the Tisch Library archive and a hard copy to the department. Students may copy their senior thesis in the department at no charge. Seniors theses are taken into consideration when awarding academic honors or department prizes.

GRADUATE PROGRAM

The Department of Art and Art History offers the Master of Arts degree in Art History, which has two tracks. The M.A. program normally takes two years to complete.

Entering graduate students choose one of the following tracks:

- M.A. in Art History
- M.A. in Art History and Museum Studies

Master of Arts: Art History

The master's program in art history is designed to provide a broad historical understanding of the visual arts, in addition to developing critical thinking and methodological skills. Students engage these ideas through course work, seminars, independent research, and teaching experience. Students complete their degrees either by writing a thesis or submitting two qualifying papers; either option involves an independent research topic designed by the student in consultation with a faculty advisor.

Requirements for the M.A. degree in Art History:

- Reading knowledge of one foreign language upon entry
- Eight semester courses in art history at the advanced (100 and above) level
- Historiography and Methodology (FAH 101)
- At least three (3) seminars
- A graduate level language course in a second foreign language maybe taken in lieu of a lecture course with the permission of the graduate director
- Comprehensive exam
- M.A. thesis or two qualifying papers (QPs).

Masters students have the opportunity to TA or RA in at least one semester (subject to enrollments and funding.)

For inquiries about the program, please contact the director of the graduate program, Associate Professor Ikumi Kaminiishi, at ikumi.kaminiishi@tufts.edu.

Master of Arts: Art History and Museum Studies

The master's program in Art History and Museum Studies is designed to give students advanced qualification in art history and a broad introduction to museum work. The program is offered for those hoping to work in art collection-related fields. It provides students with skills to integrate theoretical study of art history with practical concerns of displaying, managing, and interpreting art objects in a variety of museum studies simultaneously. Graduates of this program typically pursue careers in museums, art galleries, art publishing, museum education, teaching, art libraries, visual resource collections, or auction houses.

Requirements for the M.A. degree in Art History and Museum Studies:

- Reading knowledge of one foreign language upon entry
- Six semester courses in art history at the advanced (100 and above) level
- Historiography and Methodology (FAH 101)
- At least two (2) seminars
- Five courses in Museum Studies, including a museum internship
- Comprehensive exam
- M.A. thesis, or two QPs, or one QP and an additional Art History seminar

Art History and Museum Studies Masters students have the opportunity to TA or RA in at least one semester (subject to enrollments and funding.)

For inquiries about the program, please contact the advisor to the M.A. in Art History and Museum Studies, Professor Andrew McClellan, andrew.mcclellan@tufts.edu.

Policy on Summer Courses (for both tracks)

Courses taken through Tufts Summer Session with the intention of fulfilling a degree requirement must be approved by the student's department. Provided that the course is required for the degree, the graduate school will pay the summer tuition for full-time students (courses taken in excess of the degree requirements, directed and independent studies, special topics courses, audited courses, and language courses taken to prepare for the language exam are excluded). Students who withdraw from a course or receive a grade below B- will be responsible for paying for the course. All graduate students must pay the \$50 registration fee.

STUDIO ART

Studio Art Courses

Students may elect courses in studio art for credit at Tufts. Classes are taught both on the Tufts Medford campus, in studios located in Lane Hall and Jackson Gym, and at the Museum School in Boston. Studio art courses taught at Tufts University's Medford campus include drawing, painting, design, calligraphy, photography, sculpture, architecture, and watercolor. These courses and descriptions can be found in SIS under the search for classes tool in course attribute choosing "Studio Art". The Museum School offers expanded course offerings in the above areas, as well as ceramics, sculpture, animation, video, metals, and printmaking. Courses are taught on weekdays, evenings, and Saturdays at the Museum School campus in Boston. These courses can also be found in SIS under the search for classes tool by course attribute "Studio Art".

Students must register for studio courses through the Tufts student registration system SIS.

Students who have questions about studio courses or transfer of credit or need help in planning a comprehensive program of study, should contact Patrick Carter (patrick.carter@tufts.edu), Studio Coordinator at Tufts, Department of Art and Art History, 11 Talbot Avenue, Medford Campus.

Astronomy

Associate Professor Danilo Marchesini, Astronomy/Astrophysics

Associate Professor Anna Sajina, Astronomy/Astrophysics

Senior Lecturer Robert F. Willson, Tufts University School of Medicine; 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, which also offers concentrations in astrophysics at both the undergraduate and graduate levels.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Minimum Grade Policy

The undergraduate concentration requires a minimum GPA of 2.0 in the courses applied to a major, and no more than one course with a grade less than C-. This policy applies to all majors offered by the department for students entering September 2013 or later. A course used to fulfill the concentration requirement must be at least 3 credits (semester-hour units).

Major in Astrophysics

The major in Astrophysics requires four courses in astronomy more advanced than Astronomy 10; two courses in mathematics more advanced than Mathematics 42 or 44; and four courses in physics more advanced than Physics 12, including Physics 13 and either Physics 31 or 64. 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.

UNDERGRADUATE MINOR PROGRAM

Minimum Grade Policy

The program requires the completion of five courses, with a minimum grade of C-. Prematriculation credits may not be applied towards the requirements for the minor. The minimum grade policy applies to students entering September 2013 or later. A course used to fulfill the concentration requirement must be at least 3 credits (semester-hour units).

Minor in Astrophysics

The minor in Astrophysics requires five courses, at least three of which must be courses in astronomy numbered 15 or higher. The remaining courses may be selected from among Physics 11, 12 (or 1, 2), 13, and courses in physics or astronomy numbered 15 or higher.

GRADUATE PROGRAM

Advanced degrees (master's and doctoral) are offered through the Department of Physics and Astronomy in observational astrophysics. Details are given under Physics and Astronomy. Additional advanced courses may be taken through a cooperative program with Boston University.

For more detailed information, please visit the website <http://as.tufts.edu/physics>.

Astrophysics

(FOR DEGREE REQUIREMENTS, SEE ASTRONOMY OR PHYSICS AND ASTRONOMY.)

Biochemistry

(FOR DEGREE REQUIREMENTS, SEE BIOLOGY OR CHEMISTRY.)

Bioengineering

Professor Kyongbum Lee, Program Director; *Chemical and Biological Engineering; Metabolic engineering, tissue engineering, systems biology, metabolomics*

Professor Mark Cronin-Golomb, *Biomedical Engineering; Optical instrumentation, laser tweezers, atomic force microscopy, nonlinear optics*

Professor Soha Hassoun, *Computer Science; Computational systems biology, computer-aided design for integrated circuits*
Hoda Koushyar, *Mechanical Engineering; Biomechanics*

Professor Eric L. Miller, *Electrical and Computer Engineering; Signal processing, image processing*

Associate Professor C. Andrew Ramsburg, *Civil and Environmental Engineering; Environmental remediation, emerging contaminants, water reuse*

The Bioengineering Master's degree program offers course-only and thesis options. The program provides a broad engineering and biotechnology curriculum, while offering a focus on a specific engineering track that best fits students' interests and career choices. This combination gives our bioengineering graduates professional flexibility, a distinct competitive advantage in the ever-changing field of bioengineering.

The Bioengineering Master's program offers both part-time and full-time schedule options. The program has six tracks:

- [Bioinformatics](#)
- [Biomaterials](#)
- [Biomechanical Systems and Devices](#)
- [Cell and Bioprocess Engineering](#)
- [Environmental Biotechnology](#)
- [Signals and Systems](#)

For more detailed information, including descriptions of the core curriculum and the individual tracks, please visit the website <http://engineering.tufts.edu/bioengineering>.

Biomedical Engineering Certificate Program

Faculty advisor:

Professor Mark Cronin-Golomb, Biomedical 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 Biomedical Engineering 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, contact the faculty advisor, Mark Cronin-Golomb, at 617-627-4355 or visit the website
<https://engineering.tufts.edu/bme/graduate/certbioeng.htm>

Biology

Professor Catherine Freudenreich, *Department Chair, Molecular biology and genetics*

Professor Elizabeth Crone, *Population ecology, theoretical ecology, plant-animal interactions*

Professor Michael Levin, *Vannevar Bush Professor and Director of Tufts Center for Regenerative and Developmental Biology; Morphological and behavioral information processing living systems*

Professor Sara M. Lewis, *Evolutionary and behavioral ecology*

Professor Mitch McVey, *Molecular biology, genomic instability*

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 Barry A. Trimmer, *Henry Bromfield Pearson Professor of Natural Sciences; Neurotransmitters and receptors in insects, intracellular signals*

Associate Professor Harry A. Bernheim, *Organismal physiology, immunology*

Associate Professor Erik B. Dopman, *Evolution and genetics of natural populations*

Associate Professor George S. Ellmore, *Vice Chair, Draupner Ring Scholar; Plant development, experimental plant morphology, anatomy*

Associate Professor Juliet Fuhrman, *Immunology and parasitic diseases*

Associate Professor Kelly A. McLaughlin, *Cell biology, cell signaling of organogenesis*

Associate Professor Philip T. B. Starks, *Evolutionary dynamics of parasite and host populations*

Associate Professor Eric D. Tytell, *Biomechanics and neural control of locomotion*

Assistant Professor Stephen M. Fuchs, *Biochemistry and molecular biology, interplay between protein structure and protein function*

Assistant Professor Julia Svoboda Gouvea, *Education; Biology education*

Assistant Professor Mimi Kao, *Neurobiology and animal behavior*

Assistant Professor Zarin Machanda, *Anthropology; Social behavior of wild chimpanzees*

Assistant Professor Benjamin Wolfe, *Microbiology, ecology and evolution of microbial communities*

Lecturer Lauren Crowe, *Cell biology*

Lecturer Ekaterina "Kate" Mirkin, *Genetics*

Lecturer Norah Warchola, *Ecology and Evolution*

Research Assistant Professor Erik Hoel, *Information theory to explore the biological basis of consciousness*

SECONDARY APPOINTMENTS:

Adjunct Professor David L. Kaplan, *Biomedical Engineering; Biotechnology, biomaterials*

Biology is the scientific study of living organisms. Derived from the search for organized understanding 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 foundation for research and teaching in biology. They also provide basic knowledge that drives progress in medicine, biotechnology, and environmental biology.

Biology students should aspire to understand the central principles governing life processes at molecular and higher levels. 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, endocrinology, molecular biology, cell biology, genetics, physiology, plant sciences, behavior, and ecology. Fieldwork experience at marine laboratories or other biological stations is encouraged.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Biology

Students must take eleven courses, including nine courses in biology numbered 13 or higher (with the exception of Biology 91, 93, and 94), at least seven of which must be completed with a grade of C- or better, and either two courses in chemistry (chosen from Chemistry 1, 2, 11, 12, 51, 52) or two courses in physics (chosen from Physics 1, 2, 11, 12). At least five of the nine biology courses must be taken at Tufts. It is recommended that students take at least one seminar course. The nine biology courses must include Bio 13, 14 and 41 and at least one course each in the biology of cells (Group A), biology of organisms (Group B), biology of populations (Group C) and quantitative biology (Group Q). 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 credit hours are applicable toward the total required for a major. All courses taken for the biology major must be worth 3 credit hours (i.e. SHUs) or more.

At least two courses in biology must include a laboratory study, and one of these must be above the level of Biology 14. 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, and 94 which are graded pass-fail and therefore cannot earn biology concentration credit. A maximum of two such courses may be applied to general course requirements for the BS degree.

Biology 193 or 194 may be used as only one of the nine 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 requirements are 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, a semester of organic chemistry, a year of physics, and a year of biology, all with laboratory. A semester of biochemistry is required. Calculus and psychology are 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.

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. Biology 13 and 14 are normally prerequisites for more advanced work in biology. Students interested in biology but not planning to major in the sciences might take Biology 1, 2, 6, 7, 8, or 10. None of these may be counted among the nine courses in biology used to satisfy the concentration requirements.

Major in Biochemistry

The Biochemistry major requires Chemistry 1, 11, or 16 and Chemistry 2 or 12; Chemistry 51/53, 52/54, 31, 43 (or 42), 171, and 172; Biology 13, 41, 105, and one of the following laboratory courses: Biology 50, 54, or Chemical and Biological Engineering 163 (students may instead petition to have a graded research course in biology or chemistry that involves the use of experimental molecular biology techniques satisfy this particular laboratory requirement). Course work in mathematics (Mathematics 34) and physics (Physics 2 or 12) is also required.

Major in Biopsychology

Biopsychology is an interdepartmental major for students particularly interested in neurobiology and behavior. There are ten 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, 117, 134), and an elective in biology; Statistics (Psychology 31 or Biology 132 or Chemical and Environmental Engineering 6), Experimental Psychology (Psychology 32), Brain and Behavior (Psychology 103), plus two electives (see psychology department website for list of current electives). Biopsychology majors may not double major in psychology or biology. Consult the departments of either biology or psychology for details about this program. All courses taken for the biopsychology major must be worth 3 credit hours (i.e. SHUs) or more.

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) global change biology; 3) genetics and molecular biology; 4) developmental biology; 5) physiology, neurobiology and biomechanics.

More information is available at <http://ase.tufts.edu/biology/graduate/>

Master of Science

A candidate for the master's degree in biology must complete at least ten different graduate-level courses, of which at least five must be in the Department of Biology. All courses must be approved by the advisor appointed to guide the student's work. No more than two courses may be transferred from another institution.

Master of Science Degree, Open-Choice track: An open-choice master of science student must take ten courses or 30 credit hours for letter grades (B- or better) including one upper level seminar course (100 level or above). No more than one course may be guided individual study (Biology 293 or 294). Up to two courses of the ten can be for independent research (Biology 193, 194).

Students in the BS/MS (4+1) combined-degree program must take ten courses or 30 credit hours for letter grades (B- or better) including one upper level seminar course. No more than one course may be guided individual study (Biology 293 or 294). Up to two 100-level courses may be cross-counted from courses taken for the Tufts bachelor's degree.

Master of Science Degree, Pathways Program: The part-time Open Choice M.S. in Biology with a focus in Functional Genomics allows professionals to work full-time while attending courses during the evening. The program is designed to be completed in less than 2 years using a trimester format for graduate coursework. Credit requirements are the same as the full-time Open Choice M.S. program. It is an excellent fit for professionals in Boston's robust biotechnology industry. The Functional Genomics track equips graduates with the skills needed to drive enterprising research on genomic, biomedical, or commercial projects.

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 exam. The exam entails the preparation and defense of a written thesis research proposal, which must occur by the end of the second year.

For more detailed information, please visit the website <http://ase.tufts.edu/biology/graduate/>

Biomedical Engineering

Professor David Kaplan, *Chair and Stern Family Professor; Biopolymer engineering, biomaterials, tissue engineering, regenerative medicine*

Professor Mark Cronin-Golomb, *Optical instrumentation, laser tweezers, atomic force microscopy, nonlinear optics*

Professor Sergio Fantini, *Biomedical optics, near-infrared spectroscopy, diffuse optical imaging*

Professor Irene Georgakoudi, *Biomedical spectroscopic imaging and characterization, in vivo flow cytometry, biomedical instrumentation*

Professor Fiorenzo Omenetto, *Frank C. Doble Professor; Ultrafast nonlinear optics, medical optics*

Associate Professor Lauren Black, *Cardiovascular tissue engineering, tissue mechanics and visualization, computational modeling, myocardial infarction, regenerative medicine, cardiogenesis*

Associate Professor Qiaobing Xu, *Biomaterials, drug delivery, micro/nanofabrication, tissue engineering*

Assistant Professor Xiaocheng Jiang, *Nanobiotechnology, microfluidic biotechnology, bioelectronics, biomaterials*

Assistant Professor Srivalleesha Malladi (January 2019) *Molecular and functional ultrasound guided photoacoustic imaging for cancer therapeutics and tissue engineering, image-guided therapy monitoring*

Assistant Professor Madeleine Oudin, *Cancer biology, tumor microenvironment, mechanisms of metastasis and drug resistance*

Assistant Professor Brian Timko, *Drug delivery, tissue engineering, and nanoelectronics*

Research Professor Barbara Brodsky, *Collagen folding and degradation*

Research Professor Zoia Monaco, *Chromosome biology, genome stability, gene expression, human artificial chromosome*

Research Associate Professor Alessandra Balduini, *Regulation, environment and pathology of megakaryocytes to platelets*

Research Associate Professor Thomas Nieland, *3-D tissue engineering, neurodegenerative and psychiatric disease research, systems biology and stem cell biology*

Research Assistant Professor Ying Chen, *Tissue engineering, regenerative tissue applications*

Research Assistant Professor Chunmei Li, *Hard tissue engineering, biomaterials, orthopedic devices*

Research Assistant Professor Giuseppina Matzeu, *Biomaterials, non-invasive monitoring of biological fluids,*

Research Assistant Professor Daniela Moralli, *Chromosome biology, cytogenetics, human artificial chromosome*

Research Assistant Professor Angelo Sassaroli, *Near-infrared spectroscopy, functional brain imaging*

Professor of the Practice Janet Krevolin, *Biomedical engineering, product development, medical devices, design of experiments*

SECONDARY APPOINTMENTS:

Adjunct Professor Peter Bergethon, *Biogen Inc./Boston University School of Medicine; Computational neurology, quantitative medicine, clinical technologies*

Adjunct Professor John Castellot, *Tufts University School of Medicine; Cellular and molecular biology, vascular systems*

Adjunct Professor Luis Dorfmann, *Department of Civil and Environmental Engineering; Mechanical properties and behaviors of materials, couple field phenomena, fracture, cavitation and failure processes, characterization and modeling of soft materials*

Adjunct Professor Jonathan Garlick, *Tufts University School of Dental Medicine; Tissue models to study human disease processes in stratified squamous epithelium*

Adjunct Professor Jim Harden, *University of Ottawa; Biomolecular assemblies, biomaterials, computational biophysics, cell mechanics, complex fluids*

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 Michael Levin, *Department of Biology; Regenerative and developmental biology*

Adjunct Professor Lorenz Meinel, *University of Wuerzburg; Drug delivery interfaces*

Adjunct Professor Eric Miller, *Department of Electrical and Computer Engineering; Signal and image processing algorithms*

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 Sameer Sonkusale, *Department of Electrical and Computer Engineering; Mixed-signal VLSI design, sensor electronics*

Adjunct Professor Igor Sokolov, *Department of Mechanical Engineering; Condensed matter, soft condensed matter and biomedical research, energy-related materials and sustainability, surface science and engineering*

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 Vunjak-Novakovic, *Columbia University; Transport phenomena, tissue engineering and bioreactors*

Adjunct Professor Pam Yelick, *Tufts University School of Dental Medicine; Molecular genetic analyses of craniofacial cartilage,*

bone, and tooth development

Adjunct Associate Professor Blaise Frederick, McLean Hospital; *Magnetic resonance equipment and techniques for the study of psychiatric illness in Alzheimer's disease and substance abuse*

Adjunct Associate Professor Shelley Fried, Harvard Medical School; *Neural prosthetics, spatially-selective neuronal activation*

Adjunct Associate Professor Carl Kirker-Head, Cummings School of Veterinary Medicine at Tufts University; *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 Thomas Schnellendorfer, Tufts University School of Medicine; *Cancer metastases*

Adjunct Assistant Professor Bree Aldridge, Tufts University School of Medicine; *Identifying determinants of mycobacterial tolerance to antibiotic stress in cases of tuberculosis*

Adjunct Assistant Professor Chiara Ghezzi, Biomaterials, tissue models, engineering of soft tissue

Adjunct Assistant Professor Bastien Guerin, Harvard Medical School; *Neuroimaging methods for deep-brain-stimulation*

Adjunct Assistant Professor Niall Lennon, Broad Institute of MIT & Harvard; *Molecular biology, cell biology, nano biotechnology, genomics*

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 advance the field of biomedical engineering through an interdisciplinary approach to education, design, and research.

UNDERGRADUATE PROGRAMS

Bachelor of Science in Biomedical Engineering

The Bachelor of Science in biomedical engineering is a degree program that combines training in design, research, and practical methods, with a solid math, science, and engineering curriculum to provide education with breadth and depth in the field. A key aspect of biomedical engineering is its interdisciplinary nature; introductory courses in mathematics, statistics, biology, chemistry, and physics, together with foundation/concentration engineering courses build the basis for creating the synergy among these disciplines that is required in the practice of biomedical engineering. The mission of the Bachelor of Science degree in biomedical engineering is to provide students with undergraduate educational experiences that provide a sound basis for professional practice in biomedical engineering, life-long learning, and leadership roles in the biomedical engineering field.

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 a bioengineer or designer of biomedical systems. The curriculum includes intensive instruction in math, sciences and engineering disciplines, design and research projects, and biomedical engineering specific courses, culminating in a year-long senior capstone project. The main set of concentration courses in BME is open to all students in the major. As an alternative option to these traditional concentration elective courses, the program also offers a set of research and design concentration elective courses. Enrollment in this set of elective courses (BME 3-6) is limited to a maximum of 21 students. If more than 21 students register for BME 3, the first course in the series, only the 21 students with the highest cumulative GPA in their freshman year at Tufts will be enrolled, while the remaining students would take the main course concentration option.

The student outcomes of the Bachelor of Science in Biomedical Engineering specify that, by the time of graduation, all graduates will be able to:

- Apply fundamental knowledge of mathematics, statistics, physical sciences, biology, physiology, and engineering for the solution of problems at the interface of engineering and biology;

- Make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems;
- Communicate effectively, work as part of a multidisciplinary team, and have an awareness of professional and ethical responsibilities to have a positive impact on society;
- Recognize the importance of life-long learning to expand one's knowledge base;
- Actively participate in creative and integrative design projects and independent research projects.

The **program educational objectives** of the Bachelor of Science in Biomedical Engineering specify that graduates of the program will:

- Be successful in tackling open-ended biomedical engineering problems in a quantitative and systematic fashion;
- Be motivated to continuously expand their knowledge, excel in interdisciplinary activities, be creative and innovative in their contributions to the field of biomedical engineering;
- Perform, manage, or lead original engineering design and research projects in an ethical and professional manner; carry this out at the highest levels in private industry, research laboratories, medical school, graduate and professional schools.

The program leading to this degree is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

A sample course schedule for the B.S.B.M.E. program (which requires at least 120 semester hour units) is listed below. Of the 120 semester hour units required for the professional degrees accredited by the Engineering Accreditation Commission of ABET, a minimum of 30 semester hour units must be completed in college-level math and basic science subjects appropriate to the discipline, and a minimum of 45 semester hour units must be completed in engineering topics, consistent with ABET general and program criteria.

First Year

FALL TERM

Mathematics 32

Physics 11 (+ lab)

English 1

Introductory Engineering 1

SPRING TERM

Mathematics 34

Physics 12 or Chemistry 1 (+ lab)

Engineering Science 2 or Computer Science 11

Humanities or social sciences or arts elective

Sophomore Year

FALL TERM

Mathematics 42

Biology 13

Chemistry 1 or Chemistry 2 or Physics 12 (+ lab)

Engineering Science 5

Biomedical Engineering 50

Biomedical Engineering 3

SPRING TERM

Mathematics 51

Chemistry 2 or Physics 12 (+ lab)

Engineering Science 7

Humanities or social sciences or arts elective

Biomedical Engineering 4 or BME 51 or BME 131 or BME 153

Junior Year

FALL TERM

Probabilities and Statistics elective

Foundation elective

Foundation elective

Biomedical Engineering 62

Biomedical Engineering 121

Biomedical Engineering 5

SPRING TERM

Foundation elective

Concentration elective

Biomedical Engineering 100

Humanities or social sciences or arts elective

Biomedical Engineering 6 or Biomedical Engineering 66

Senior Year

FALL TERM

Foundation elective

Concentration elective

Concentration elective

Humanities or social sciences or arts elective

Biomedical Engineering 7

SPRING TERM

Concentration elective

Concentration elective

Humanities or social sciences or arts elective

Free 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 a minimum of ten courses and a minimum of 30 semester hour units. No more than five of these courses may be used to fulfill the concentration requirement of the first major. All courses must be taken for a letter grade. The courses required for the second major in biomedical engineering are as follows:

1. **Biology 13 or Engineering Science 11**
2. **Physics 12 or Chemistry 2**
3. Probability and Statistics elective
4. **Engineering Science 3 or Engineering Science 5**
5. Engineering elective
6. **Biomedical Engineering 50**
7. **Biomedical Engineering 62 or Biomedical Engineering 100**
8. **Biomedical Engineering 153 or Biomedical Engineering 131**
9. Biomedical Engineering elective
10. Biomedical Engineering elective

Second Major in Biomedical Sciences

The second major in biomedical sciences is offered to liberal arts students. Students must enroll in conjunction with another undergraduate departmental major. For the second major in biomedical sciences, students are required to complete a minimum of ten courses and a minimum of 30 semester hour units. No more than five of these courses may be used to fulfill the concentration requirement of the first major. All courses must be taken for a letter grade. The courses required for the second major in biomedical sciences are as follows:

1. **Biomedical Engineering 50**
2. **Biomedical Engineering 62**
3. Three Biomedical Engineering elective courses
4. Five elective courses related to biomedical sciences, including independent studies, research, and design projects, that are approved by the BME Second Major Advisor.

GRADUATE PROGRAMS

The Department of Biomedical Engineering offers programs leading to the degrees of 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 the M.S. program, or directly into the Ph.D. program. A masters degree is not required for students to apply to the Ph.D. program. Students who receive the M.S. degree at Tufts and wish to continue their studies toward the Ph.D. need to be formally accepted into the Ph.D. program.

M.S. students are initially admitted to a course-based M.S. program. After admission they may apply to convert their program into one including a significant research component (M.S. with thesis) by preparing and defending an original research proposal. The M.S.-thesis 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. As 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. M.S.-thesis and Ph.D. students first identify a field of interest and a research advisor, and then select elective courses around the research topic of choice. At the discretion of the research advisor, students who lack suitable preparation in some areas may be given the opportunity to take or audit additional undergraduate-level courses, and students who are already qualified may be exempt from some courses. Transfer of a limited number of graduate courses 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 Science

The department offers a program leading to the Master of Science (M.S.) degree in biomedical engineering. The M.S. 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.

Thirty semester hour units are required for the M.S. degree: two foundation courses (6 semester hour units), seven additional courses (21 semester hour units), and a professional education course (3 semester hour units).

Master of Science with thesis

By preparing and successfully defending an original research proposal, students in the first year of the M.S. program may apply to substitute a 9 semester hour unit thesis for three of the seven additional courses referred to above.

Thirty semester hour units are required for the M.S. with thesis degree: two foundation courses (6 semester hour units); four additional courses, which can include special topics courses (12 semester hour units); project-original research proposal (3 semester hour units); and a thesis (9 semester hour units).

Doctor of Philosophy

The department offers a program leading to the Ph.D. degree in biomedical engineering. Ninety semester hour units are required for a Ph.D. with prior B.S. degree: three foundation courses (9 semester hour units); graduate elective courses, which may be special topics courses (at least 15 semester hour units); research seminars for at least four semesters (4 or

more one-semester hour units); a project focused on the thesis proposal preparation and defense (3 semester hour units); and a thesis (up to 59 semester hour units). Seventy-eight semester hour units are required for a Ph.D. with prior M.Eng. or M.S. degree: three foundation courses (9 semester hour units), graduate elective courses (at least 3 semester hour units), research seminars for at least four semesters (4 or more semester hour units), a project focused on the thesis proposal preparation and defense (3 semester hour units), and a thesis (up to 59 semester hour units).

For more detailed information, please visit the website <http://engineering.tufts.edu/bme>.

Biopsychology

(FOR DEGREE REQUIREMENTS, SEE BIOLOGY OR PSYCHOLOGY.)

Biotechnology

FACULTY ADVISOR:

Professor Emmanuel Tzanakakis, *Chemical and Biological Engineering*

Biotechnology has applications in a number of diverse fields, including recent growth in gene and cell therapies, protein and tissue engineering, bioprocessing, bioinformatics and synthetic biology. The tools of biotechnology are now universally applied both to 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

Engineering Science 11 Engineering and Biology or **Biology 13** Cells and Organisms

Biology 41 Genetics

Biomedical Engineering/Chemical and Biological Engineering 62/262 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

Biometry 152 Biochemistry and Cellular Metabolism or **Biology/Chemistry 171** Organic Chemistry of Living Systems: Biochemistry

Four electives from:

Biomedical Engineering/Chemical and Biological Engineering 185 Drug Product Formulation

Biology 104 Immunology

Biology 106 Microbiology

Biomedical Engineering 143 Biological Systems Analysis

Chemical and Biological Engineering 159 Synthetic Biology

Biology 132 Biostatistics

Biomedical Engineering 165 Drug Delivery

Chemical and Biological Engineering 160 Biochemical Engineering

Chemical and Biological Engineering 161 Protein Purification

Biomedical Engineering 153 or **Chemical and Biological Engineering 164** Biomaterials and Regenerative Medicine

Biomedical Engineering 154 Tissue Engineering and Regenerative Medicine

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 eight SHUs 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:

Biomedical Engineering/Chemical and Biological Engineering 185 Drug Product Formulation

Biology 104 Immunology

Biology 105 Molecular Biology

Biology 106 Microbiology

Biomedical Engineering 152 Biochemistry and Cellular Metabolism

Biomedical Engineering 143 Biological Systems Analysis

Chemical and Biological Engineering 159 Synthetic Biology

Biology 132 Biostatistics

Biomedical Engineering 165 Drug Delivery

Chemical and Biological Engineering 160 Biochemical Engineering

Biomedical Engineering 153 or Chemical and Biological Engineering 164 Biomaterials and Regenerative Medicine

Biomedical Engineering 154 Tissue Engineering and Regenerative Medicine

Chemical and Biological Engineering 167 Metabolic and Cellular Engineering

Chemistry 135 Biophysical Chemistry

Chemistry 171 Organic Chemistry of Living Systems: Biochemistry

Eight SHUs of research may be counted toward electives.

MINOR IN BIOTECHNOLOGY

The minor in biotechnology 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

Two courses from the following:

Chemical and Biological Engineering 161 Biochemical Separation

Biomedical Engineering/Chemical and Biological Engineering 62/262 Molecular Biotechnology

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

One course from the following:

Biology 50 Experiments in Biology

Biomedical Engineering 175 Tissue Engineering Laboratory

Biomedical Engineering/Chemical and Biological Engineering 163 Recombinant DNA Techniques

Chemical and Biological Engineering 168 Biotechnology Processing Projects Laboratory

One course from the following:

Biomedical Engineering/Chemical and Biological Engineering 185 Drug Product Formulation

Biology 104 Immunology

Biology 105 Molecular Biology

Biology 106 Microbiology

Biomedical Engineering 143 Biological Systems Analysis

Chemical and Biological Engineering 159 Synthetic Biology

Biology 132 Biostatistics

Chemistry 135 Biophysical Chemistry

Chemical and Biological Engineering 160 Biochemical Engineering

Biomedical Engineering 153 or Chemical and Biological Engineering 164 Biomaterials and Regenerative Medicine

Biomedical Engineering 154 Tissue Engineering and Regenerative Medicine

GRADUATE PROGRAMS

Tufts sponsors graduate training in biotechnology through joint programs with the departments of ChBE, BME, Biology, 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 (Ph.D.)

Degree programs are designed for students who are interested in the engineering aspects of biotechnology (sponsored by the Departments of Chemical and Biological Engineering and Biomedical 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 offers three graduate-level certificate programs to qualified students in conjunction with the departments of biology, chemical and biological engineering, biomedical engineering, and chemistry. The certificate programs 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 in the aforementioned or related fields. Four courses are required for each certificate.

Certificate Program in Biotechnology

The 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

Biomedical Engineering/Chemical and Biological Engineering 153 Biomaterials and Regenerative Medicine

Biomedical Engineering/Chemical and Biological Engineering 154 Tissue Engineering and Regenerative Medicine

Chemistry 171 Organic Chemistry of Living Systems: Biochemistry

Chemistry 172 Advanced Biochemistry

Chemical and Biological Engineering 161 Protein Purification

Chemical and Biological Engineering 162 Molecular Biotechnology

Chemical and Biological Engineering 166 Principles of Cell and Microbe Cultivation

One of these three laboratory courses:

Biomedical Engineering 175 Tissue Engineering Laboratory

Biomedical Engineering/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, biomedical engineering, or chemistry that is relevant to biotechnology.

Certificate Program in Biotechnology Engineering

The 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:

Biomedical Engineering/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, biomedical engineering, or chemistry that is relevant to biotechnology.

For more detailed information, please visit the website <http://engineering.tufts.edu/chbe>.

Chemical and Biological Engineering

Professor Kyongbum Lee, Chair; *Metabolic engineering, tissue engineering, systems biology, metabolomics*
Professor Maria Flytzani-Stephanopoulos, Robert and Marcy Haber Professor in Energy Sustainability; *Environmental catalysis, clean energy technologies, nanostructured oxides, fuel cells*
Professor Christos Georgakis, *Modeling, optimization and process control, batch processing*
Associate Professor Matthew Panzer, *Inorganic and hybrid quantum dot/organic optoelectronic devices*
Associate Professor Daniel F. Ryder, *Modeling, process control, bioprocess engineering*
~~Associate Professor Emmanuel S. Tzanakakis, Stem cell engineering, tissue engineering, computational biology~~
Associate Professor Hyunmin Yi, *Nanofabrication, smart biopolymers, BioMEMS*
~~Associate Professor Ayse Asatekin, Advanced membranes for clean water and separations, macromolecular design, self-assembling polymers~~
Assistant Professor Nikhil Nair, *Systems bioengineering, synthetic biology, protein engineering, metabolic engineering*
Assistant Professor James Van Deventer, *Protein engineering, non-canonical amino acids, cancer, directed evolution, yeast display*
Assistant Professor Prashant Deshlahra, *Experimental and computational catalysis, clean energy, fuels, chemicals*
Assistant Professor Nav Nidhi Rajput *Molecular simulation, theoretical material science, supercomputing, renewable energy applications, synthesis-structure-property relationships*
Professor of the Practice Derek Mess, *Thermal barrier coating, solid oxide fuel cell ceramics*

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SECONDARY APPOINTMENTS:

Professor Linda M. Abriola, *Civil and Environmental Engineering; Groundwater hydrology, contaminant fate and transport*
Professor David L. Kaplan, *Biomedical Engineering; Biotechnology, biomaterials, tissue engineering*
Professor Soha Hassoun, *Computer Science; Computational methods for systems biology and metabolic engineering, computer-aided design for integrated circuits*
Associate Professor Qiaobing Xu, *Biomedical Engineering; Biomaterials, drug delivery, micro/nanofabrication, tissue engineering*

Chemical engineering builds on the sciences, especially chemistry and biology, to design processes and products that are 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.

Students who major in chemical engineering have considerable flexibility in choosing a program and are assisted in doing so by a departmental advisor. 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. Many students also 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. This curriculum is intended for students who desire an understanding of engineering fundamentals and will make their careers in related fields such as medicine, business and law. This degree is not ABET accredited.

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 B.S.Ch.E. degree program offered by the Chemical and Biological Engineering Department is to provide its undergraduate students

- a. A strong foundation in the pure sciences, including biology, chemistry, mathematics and physics.
- b. 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.
- c. Training in communication skills consistent with the requirements of both the technical professions and the broader community in which they live.
- d. 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:

- a. 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.
- b. 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.
- c. Offer a high-quality instruction that not only encompasses 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**FALL TERM**

EN 1 Applications in Engineering

Mathematics 32 Calculus I

Chemistry 1 or 11 Chemical Fundamentals with Laboratory

English 1 Expository Writing

SPRING TERM

Engineering Science 2 Introduction to Computing in Engineering

Mathematics 36 Applied Calculus II

Chemistry 2 or 12 Chemical Principles with Laboratory

Physics 11 General Physics I with Laboratory

Sophomore Year**FALL TERM**

Chemistry 31 and 33 Physical Chemistry I with Laboratory

Mathematics 42 Calculus III

Chemical and Biological Engineering 10 Chemical Process Principles

Biology 13 or Engineering Science 11 Cells and Organisms with Laboratory or Fundamentals of Biological Systems

Humanities/social sciences/arts elective

SPRING TERM

Chemical and Biological Engineering 11 Chemical Engineering Thermodynamics

Chemical and Biological Engineering 21 Transport Phenomena I

Mathematics 51 Differential Equations
Engineering Science 10 Introduction to Materials Science
Humanities/social sciences/arts elective

Junior Year
FALL TERM

Chemical and Biological Engineering 22 Transport Phenomena II
Chemical and Biological Engineering 39 Applied Numerical Methods for Chemical and Biological Engineers
Chemistry 51 and 53 Organic Chemistry I with Laboratory
Free elective

SPRING TERM
Chemical and Biological Engineering 45 Chemical and Biological Separations
Chemical and Biological Engineering 102 Reactor Design
Chemical and Biological Engineering Foundation elective
Chemical and Biological Engineering Foundation elective
Humanities or social sciences elective

Senior Year
FALL TERM
Chemical and Biological Engineering 51 Chemical and Biological Engineering Unit Operations Laboratory
Chemical and Biological Engineering 109 Process Dynamics and Control
Chemical and Biological Engineering Foundation elective
Chemical and Biological Engineering Concentration elective
Humanities or social sciences elective

SPRING TERM
Chemical and Biological Engineering 52 Chemical and Biological Engineering Projects Laboratory
Chemical and Biological Engineering 60 Product and Process Design
Chemical and Biological Engineering Concentration elective
Humanities/social sciences/arts elective
Free elective

Approved Foundation Elective Courses
Three foundation electives are required and are to be chosen from the following list. Exceptions must be approved by the department.

Chemistry 32 Physical Chemistry II
Chemistry 42 Quantitative Analysis
Chemistry 52 Organic Chemistry II
Chemistry 61 Inorganic Chemistry
Chemistry 132 Chemical Kinetics and Dynamics
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 155 Organic Spectroscopy
Chemistry 161 Advanced Inorganic Chemistry
Chemistry 162 Chemistry of Transition Elements
Chemistry 163 Diffraction Methods of Structure Determination
Chemistry 171 Biochemistry I
Chemistry 172 Biochemistry II

Biology 41 General Genetics
Biology 46 Cell Biology
Biology 62 Molecular Biotechnology
Biology 104 Immunology
Biology 105 Molecular Biology
Biology 106 Microbiology
Biology 134 Neurobiology
Biology 152 Biochemistry and Cellular Metabolism
Biology 163 Recombinant DNA Techniques
Biology 168 Biotechnology Processing Projects Laboratory
Biomedical Engineering 153 Biomaterials and Regenerative Medicine

Physics beyond Physics 11 with attribute value School of Engineering-Natural Sciences

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Mathematics 70 Linear Algebra
Mathematics 72 Abstract Linear Algebra
Mathematics 151 Partial Differential Equations I
Mathematics 161 Partial Differential Equations II
Mathematics 162 Statistics

For natural science courses accepted towards the Engineering degrees, refer to the School of Engineering list posted in the student services website. The following Chemical and Biological Engineering course is also accepted as natural science elective in addition to the School of Engineering list:

CHBE 163-121 Principles of Polymerization
Recombinant DNA Techniques
CHBE 122 Physical Chemistry of Polymers
CHBE 140 Surface and Colloid Chemistry

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The Senior Honors Thesis in Chemical and Biological Engineering

The Senior Honors Thesis program in ChBE is intended for those students who have a record of high performance in both Foundation and ChBE concentration courses and who have developed an interest and some background in a well-focused research topic. Students interested in writing a Senior Honors Thesis should consult their advisors, the guidelines described under Thesis Honors Program in this bulletin, and the ChBE Department Web pages.

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 Minor

Five courses are required to obtain this minor: Biology 152 or Biology/Chemistry 171; two courses from the following: Chemical and Biological Engineering/Biomedical Engineering/Biology 62/162, Chemical and Biological Engineering 161, or 166; one course from the following Biology 50, Biomedical Engineering 175, 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

Engineering Science 11 Engineering and Biology or **Biology 13** Cells and Organisms

Biology 41 Genetics

Biomedical Engineering/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** Organic Chemistry of Living Systems: Biochemistry

Four electives from:

Biomedical Engineering/Chemical and Biological Engineering 185 Drug Product Formulation

Biology 104 Immunology

Biology 106 Microbiology

Biomedical Engineering 143 Biological Systems Analysis

Chemical and Biological Engineering 159B Synthetic Biology

Biology 132 Biostatistics

Biology/Biomedical Engineering/Chemical and Biological Engineering 62/162 Molecular Biotechnology

Biomedical Engineering 165 Drug Delivery

Chemical and Biological Engineering 160 Biochemical Engineering

Chemical and Biological Engineering 161 Protein Purification

Biomedical Engineering 153 or **Chemical and Biological Engineering 164** Biomaterials and Regenerative Medicine

Biomedical Engineering 154 Tissue Engineering and Regenerative Medicine

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 eight SHUs 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:

Biomedical Engineering /Chemical and Biological Engineering 185 Drug Product Formulation
Biology 104 Immunology
Biology 105 Molecular Biology
Biology 106 Microbiology
Biomedical Engineering 152 Biochemistry and Cellular Metabolism
Biomedical Engineering 143 Biological Systems Analysis
Chemical and Biological Engineering ~~193~~Synthetic 159 Synthetic Biology
Biology 132 Biostatistics
Biomedical Engineering 165 Drug Delivery
Chemical and Biological Engineering 166 Biochemical Engineering
Biology/Biomedical Engineering/Chemical and Biological Engineering 62/162 Molecular Biotechnology
Biomedical Engineering 153 or **Chemical and Biological Engineering** 164 Biomaterials and Regenerative Medicine
Biomedical Engineering 154 Tissue Engineering and Regenerative Medicine
Chemical and Biological Engineering 167 Metabolic and Cellular Engineering
Chemistry 135 Biophysical Chemistry
Chemistry 171 Organic Chemistry of Living Systems: Biochemistry

Up to Eight SHUs of research may be counted toward electives.

CERTIFICATE PROGRAMS

The Chemical and 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 Biengineering, 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 and Doctor of Philosophy. General GRE test scores are required of applicants to all graduate degree programs.

Master of Science 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, which are offered periodically. Successful completion of these courses qualifies a student to apply to the master's degree programs.

Students enrolled in the Master of Science degree with thesis 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 courses are from a list of chemical engineering courses; the remaining courses may be in allied fields. A thesis (three-nine credits SHUS) 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 Science course-only (ie, nonthesis) degree program must take ten courses for letter grades. Generally, at least eight courses edits are from a list of chemical engineering courses; the remaining courses may be in allied fields.

Master of Science in Bioengineering: Cell and Bioprocess Engineering

Cell and Bioprocess Engineering is a track option of the Master of Sciences degrees in Bioengineering offered by the School of Engineering. Candidates for this track usually hold a Bachelor of Science degree in chemical or biochemical engineering with a suitable background in chemical and biological sciences. Candidates with degrees in biology, biochemistry and strong background in mathematics, chemistry and physics will also be considered. Students with degrees in physical science or other engineering disciplines who have no background in biology may become candidates upon satisfactory completion of appropriate undergraduate courses. For students without undergraduate 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, which are offered periodically. Successful completion of these courses qualifies a student to apply for the master's program. All Bioengineering master's degree candidates must take a common core curriculum totaling four credits courses. Candidates of the Cell and Bioprocess Engineering track must also take four required courses from a list of approved track-specific courses. An additional two graduate level elective courses are needed to complete the ten credit Master of Engineering Science course-only degree. Students accepted into the program will have the option of petitioning the admissions committee to pursue a Master of Science degree. A student petitioning the committee must have identified a research advisor who agrees to accept the student to their laboratory. Students enrolled in the Master of Science with thesis degree program must complete a two six SHU credit thesis (in lieu of the two elective credits courses) in addition to the eight credits of courses work.

Doctor of Philosophy

Doctoral degrees are offered both in Chemical Engineering and in Biotechnology Engineering. Candidates for the Doctor of Philosophy degree, except when otherwise recommended approved by the department, will have completed the seven courses required for the Master of Science degree following course requirements: a set of four core courses, typically taken in the first year of study; four elective graduate level courses for students entering the doctoral degree program with an MS engineering degree or six graduate level elective courses for students entering with a B.S. engineering degree. A minimum of two of the elective courses must be ChBE graduate course offerings. A series of qualifying examinations must be satisfactorily completed. These examinations are usually taken after one full year of residence during the first three academic semesters of study.

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 website <http://engineering.tufts.edu/chbe>.

Chemical Physics

(FOR DEGREE REQUIREMENTS, SEE CHEMISTRY OR PHYSICS.)

Chemistry

Professor Arthur L. Utz, *Chair; Physical and materials chemistry*
Professor Terry E. Haas, *Physical inorganic and materials chemistry*
Professor Jonathan E. Kenny, *Physical and environmental chemistry*
Professor Samuel P. Kounaves, *Analytical, environmental, and planetary chemistry*
Professor Mary Jane Shultz, *Surface chemistry, environmental and materials chemistry*
Professor Robert D. Stolow, *Organic chemistry, conformational studies*
Professor E. Charles Sykes, *Physical chemistry*
Professor Samuel W. Thomas III, *Organic and materials chemistry*
Professor Krishna Kumar, *Robinson Professorship in Chemistry, Bioorganic chemistry and chemical biology*
Associate Professor Clay Bennett, *Bioorganic, chemical biology and synthetic chemistry*
Associate Professor Joshua A. Kritzer, *Bioorganic chemistry and chemical biology*
Associate Professor Yu-Shan Lin, *Theoretical and biophysical chemistry*
Associate Professor Albert Robbat Jr., *Analytical chemistry*
Assistant Professor Luke Davis, *Inorganic and materials chemistry*
Assistant Professor Charles R. Mace, *Bioanalytical and materials chemistry*
Assistant Professor Rebecca A. Scheck, *Bioorganic chemistry and chemical biology*
Affiliate Professor Marc d'Alarcao, *Chemical biology and synthetic chemistry*
Affiliate Professor David R. Walt, *Bioorganic and materials chemistry*
Senior Lecturer Sergiy Kryatov, *Inorganic chemistry and chemical education*
Lecturer Diren Pamuk Turner, *Biochemistry 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, suggesting 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. The U.S. chemical industry remains one of the healthiest branches of the national economy: it employs almost a million people in high-paying manufacturing jobs. Chemicals are one of the few commodity groups in which the U.S. has maintained a good international trade balance during the past decade. 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 advisor, 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 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 look for more information on the department's website 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, 171, and one additional course in intermediate or advanced chemistry that has one of the following courses as a prerequisite: Chemistry 31, 32, 42, 52, 61, or 171. Research: Chemistry 81 and 82 (or Chemistry 195 and 199, Senior Thesis). Also required are Mathematics 32 and 34 and Physics 1 (or 11) and 2 (or 12). For more information please visit the department's website at <http://chem.tufts.edu>.

Major in Chemistry

Foundation: Chemistry 1, 11, or 16 and Chemistry 2 or 12. Intermediate: Chemistry 31, 33, 42, 51, 52, 53, 54; four additional courses in intermediate or advanced chemistry, excluding Chemistry 34. Two of the four additional chemistry courses may be substituted with intermediate or advanced courses in related fields (for details, please visit the department's website at <http://chem.tufts.edu>). Only one course of undergraduate research, either Chemistry 82 (Research II) or Chemistry 199 (the second semester of Senior Thesis) may be counted toward the four additional courses in intermediate or advanced chemistry. Also required are Mathematics 32 and 34 and Physics 1 (or 11) and 2 (or 12).

Major in Chemical Physics

Foundation: Chemistry 1, 11, or 16; Chemistry 2 or 12; Physics 1 or 11; Physics 2 or 12. Concentration: Ten or more advanced courses (at least 3 SHU's each), four courses in Chemistry (with a prerequisite of Chemistry 2 or 12), four courses in Physics (with a prerequisite of Phys 2 or 12), and two courses in Mathematics (Math 70 or courses with a prerequisite of Math 42, 44, or 70). The courses must include the following: Physics 13; one course in advanced laboratory training, either Physics 64 (counts as one advanced physics course) or both Chemistry 33 and 34 (count as one advanced chemistry course); either Chemistry 31 or Physics 52; either Chemistry 32 or Physics 61; and either Chemistry 51 or Chemistry 61. Faculty advisors in the chemistry and physics departments are available for consultation on 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 54 or Chemical and Biological Engineering 163), and 105. Course work in mathematics (Mathematics 34) and physics (Physics 2 or 12) is required as a 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, Mathematics 32; second year, Chemistry 51/53, 52/54, and 171, Mathematics 34, Physics 1 and 2 (or 11 and 12); third year, Chemistry 172, Biology 41, 105, and 50 (or 54 or Chemical and Biological Engineering 163); fourth year, Chemistry 31 and 42. To be eligible for *summa cum laude*, a student majoring in biochemistry must have done biology or chemistry research equivalent to Biology 93 or Chemistry 81.

GRADUATE PROGRAM

The Department of Chemistry offers M.S. and Ph.D. degrees in chemistry and chemistry/biotechnology, and a Ph.D. in chemical physics. Students interested in the joint chemistry/biotechnology or chemical physics program should look for more information on the department's website at <http://chem.tufts.edu>.

In the first year of graduate study, entering students meet with the department's graduate committee and register for 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 earn 30 graduate level semester hour units by passing (B- or better) at least eight chemistry department courses. 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 and 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 advisor) 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) Serve as a teaching assistant
- 2) Present a research topic to the research committee by the end of the third semester
- 3) Present a study topic as a public seminar and defend it in a private meeting with the research committee by the end of the fourth semester
- 4) Submit a third-year research report to the research committee by the end of the sixth semester
- 5) Prepare and defend an original research proposal by the end of the eighth semester
- 6) Defend a thesis

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 on the department's website at <http://chem.tufts.edu>.

CHILD STUDY and HUMAN DEVELOPMENT

ELIOT-PEARSON DEPARTMENT OF CHILD STUDY and HUMAN DEVELOPMENT

Professor Marina Bers, Chair; *Impact of innovative learning technologies for fostering learning positive youth development; design, study and implementation of developmentally appropriate programming languages and robotic systems for early childhood education and their associated curricular and teaching materials, assessment instruments and professional development strategies; the role of computational thinking and coding as a literacy of the 21st century in early childhood education*

Professor M. Ann Easterbrooks, Developmental risk and resilience; *family development; social and emotional development, infancy; evaluation of family support programs*

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 Tama Leventhal, Neighborhood influences on children, youth, and families; social policy

Professor Christine McWayne, Early childhood education; low-income, urban-residing children's school success; family engagement in children's early education; community-based research collaborations

Professor Jayanthi Mistry, Cultural perspectives on development; navigating multiple cultural worlds and identities; interpretive methods in the study of children and families

Professor Ellen E. Pinderhughes, Influences on family socialization processes among families with children at risk for problematic outcomes; adoption and foster care

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

Assistant Professor Eileen Crehan, Clinical research on sexuality, education, and developmental disabilities

Assistant Professor Sasha Fleary, Pediatric psychology; child health

Assistant Professor Sara K. Johnson, Civic engagement; identity development; advanced statistical methods

Senior Lecturer Julie Dobrow, Director, Center for Interdisciplinary Studies; Effects of media on children; ethnic and gender representations in media

Senior Lecturer Kerri Modry-Mandell, Fieldwork Administrator; Pediatric psychology; developmental psychopathology

Senior Lecturer Martha Pott, Personal, social and emotional development; biological and evolutionary roots of human development

Senior Lecturer W. George Scarlett, Children and the natural world; children's play; religious and spiritual development; behavior and classroom management; organized youth sports

Lecturer Mary Casey, Parent child relations; adolescent identity development; moral and civic engagement; philosophy of science; research methods

Lecturer Bruce Johnson, Early childhood curriculum; early care and education policy; teacher professional development

SECONDARY APPOINTMENTS:

Adjunct Professor Laurie Miller, Professor of Pediatrics and Adjunct Professor of Nutrition (Friedman School); Medical and developmental issues related to international adoption, health, nutrition, and developmental studies of rural children in Nepal and Uganda; interventions to improve nutritional outcomes

Adjunct Professor Diane M. Ryan, Associate Dean for Programs and Administration (Tisch College of Civic Life); Character-based leadership and leader development; mentorship, professional identity and career intentions

Affiliated Lecturer Renata Celichowska, Director of Dance, Department of Drama and Dance; Children's movement and dance education

Associate Research Professor Rachel Chazan Cohen, Tufts Interdisciplinary Evaluation Research (TIER); Evaluation of early childhood programs; home visiting; early childhood education workforce development

Assistant Research Professor Paul Chase, Institute for Applied Research in Youth Development, The role of intentional self-regulation in academic success and trajectories of academic development

Assistant Research Professor Rebecca Fauth, Tufts Interdisciplinary Evaluation Research (TIER);

Assistant Research Professor Jessica Goldberg, Tufts Interdisciplinary Evaluation Research (TIER); Social policies and programs for children and families; home visiting

Assistant Research Professor Hillary S. Schaefer, Institute for Applied Research in Youth Development, The intersecting roles of cognitive, affective, motivational, and social forces in character

Assistant Research Professor Jonathan M. Tirrell, Institute for Applied Research in Youth Development, The role of forgiveness in character development; cross-cultural positive youth development research and evaluation of international intervention programs promoting thriving among youth in poverty

The Department offers an interdisciplinary array of courses and experiences, which are complemented with observations and field work with children and youth in a wide range of applied settings, including hospitals, schools, clinics, daycare centers, educational television studios, museums, and juvenile courts. Students completing the Child Study and Human Development major select from the following areas of focus: child and family health/well-being, 21st century literacies: media and technology, or they may create an individual plan of study that allows them to explore multiple topics in developmental science.

Those majoring in child study and human development receive a strong foundation in applied developmental science, an interdisciplinary field that generates and uses theory and research about human development to improve the lives of children, youth, and families around the world.

Students who complete the major are likely to continue on to graduate work in child-related disciplines (e.g., pediatrics, clinical child psychology), or employment in various fields, such as early childhood education, clinical psychology, pediatric psychology, law and juvenile justice, public policy, and other disciplines that have the health, education, and welfare of children as their primary goal.

DEPARTMENT FACILITIES

Eliot-Pearson Children's School

Architecturally attached to the Department of Child Study and Human Development, the Eliot-Pearson Children's School is a laboratory school serving 85 children ages 2.9 to 6 (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

<https://ase.tufts.edu/epcs/>.

Evelyn G. Pitcher Curriculum Resource Laboratory

Adjoining the department is the Evelyn G. Pitcher Curriculum Resource Lab, a multi-purpose space with art/workshop studio, computers to access curricular resources online, seminar space with audio-visual capabilities, and a lending library of resource books and early childhood classroom materials. The lab hosts workshops, seminars and conferences for Tufts students, alumni and early childhood teachers and administrators from surrounding cities and towns, focusing on evidence-based best practices that support children's language and literacy development as well as science, technology, engineering, mathematics, and nature studies/sustainability education in urban settings. For more information, visit <http://ase.tufts.edu/pitcherCurriculumLab/>.

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/>.

Developmental Technologies Research Group (DevTech)

Established and directed by Dr. Marina Umaschi Bers, DevTech aims to understand how new technologies can play a positive role in children's development and learning. <http://ase.tufts.edu/devtech/>.

Tufts Interdisciplinary Evaluation Research (TIER) The Tufts Interdisciplinary Evaluation Research (TIER) is committed to conducting high-quality, collaborative evaluation research that contributes to expanding usable knowledge in fields such as applied developmental science, policy science, and urban planning, and to improving policies and programs for children, families, and communities. <http://ase.tufts.edu/tier/>.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Child Study and Human Development

The major in Child Study and Human Development requires ten courses, including Child Development 1 (no substitutes allowed), and an additional course from the following (CSHD 51, CSHD 61, CSHD 62, or CSHD 155), as well as CSHD 42. Students are required to have at least one applied or research experience as well as three courses from within one of the Department's three concentrations. With departmental approval, one "related fields" course can be from outside the department. Please see the Department's website at <https://as.tufts.edu/epcshd/prospective/undergraduate> for complete information on requirements.

UNDERGRADUATE MINOR PROGRAM

The Department of Child Study and Human Development offers a minor in child study and human development. Five courses are required, one of which is to be chosen from (CSHD 1, CSHD 51, CSHD 61, CSHD 62 or CSHD 155). Four additional electives are to be chosen from other course offerings 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 I or Part II of the foreign language (foundation) requirement.

GRADUATE PROGRAMS

The Department of Child Study and Human Development offers the Master of Arts degree with thesis or applied capstone 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 study and human development and the ways in which they envision using the education received at Tufts. Except in the case of Tufts undergraduate seniors, scores from the Graduate Record Examination are required. The deadline for PhD applications is December 15. The deadline for MA applications is January 15, although MA applications received after January 15 are considered, based on the availability of places. For more detailed information please visit the website <https://as.tufts.edu/epcshd/prospective/masters>.

Master of Arts (M.A.)

The Master of Arts degree requires the satisfactory completion of 32 credits of study. Students interested in engaging in child study and human development research conclude the program by writing a thesis; students interested in the more applied, practical aspects of child study and human development conclude the program with an intensive supervised internship. Each route offers a combination of required and elective courses. The M.A. degree program serves child study and human 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 Ph.D., Psy.D., and other programs in developmental or clinical psychology; in law schools; in medical schools; and in other degree-granting post-MA programs.

Doctor of Philosophy (Ph.D.)

The doctoral program in child study and human development prepares individuals for either academic or applied settings involving children, youth, 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 a strong background 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 advisors.

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.

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 study and human 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 for the proposal and defense of a dissertation.

Ph.D. in Human Developmental Economics (HDE)

The Eliot-Pearson Department of Child Study and Human Development (CSDH) and the Economics Department offer a joint Ph.D. program in Human Developmental Economics (HDE). This interdisciplinary doctoral program provides theoretical and methodological training in human development through the integrative study of social, emotional, economic, and behavioral processes as they contribute to socialization, decision making, and positive human development. Training involves course work in both departments, field work, theoretical and empirical qualifying papers, and dissertation research. Students focus their dissertation study in economics or human development based on the electives taken.

For more detailed information, please visit the website <https://as.tufts.edu/epcshd/>.

Chinese

(FOR DEGREE REQUIREMENTS, SEE INTERNATIONAL LITERARY AND CULTURAL STUDIES.)

Civic Studies

DIRECTOR:

Research Professor Peter Levine, Academic Dean and Lincoln Filene Professor of Citizenship and Public Affairs, Tisch College of Civic Life

TEACHING FACULTY:

Elizabeth Ammons, Harriet H. Fay Professor of Literature, English

Amaiah Bishara, Associate Professor, Anthropology

Hilary Binda, Senior Lecturer, Visual and Critical Studies and Director of Women's, Gender, and Sexuality Studies.

Robert Burdick, Lecturer, Urban and Environmental Policy and Planning

Gregory Carlton, International Literary and Visual Studies

Owen Cornwall, Lecturer, Religion

David Denby, Senior Lecturer, Philosophy

Deborah Donahue-Keegan, Lecturer, Education

Ioannis Evrigenis, Professor, Political Science

Kendra Field, Assistant Professor, History

Jonathan Garlick, Tisch College Senior Fellow for Civic Science

Kerri Greenidge, Lecturer, History, Africana Studies

James Glaser, Professor, Political Science and Dean of the School of Arts and Sciences

Paul Joseph, Professor, Sociology

Sheldon Krimsky, Professor, Urban and Environmental Policy and Planning

Erin Kelly, Professor, Philosophy

Keren Ladin, Assistant Professor, Occupational Therapy

Peter Levine, Academic Dean and Lincoln Filene Professor of Citizenship and Public Affairs, Tisch College of Civic Life

Keith Maddox, Associate Professor, Psychology

Margaret McMillan, Professor, Economics

Lionel McPherson, Associate Professor, Philosophy

Christine McWayne, Professor, Eliot-Pearson Department of Child Study and Human Development

Shameka Powell, Assistant Professor, Education

Jessica Remedios, Assistant Professor, Psychology

Diane Ryan, Tisch College Associate Dean for Programs and Administration

Emilio Spadola, Visiting Associate Professor, Anthropology

Samuel Sommers, Professor, Psychology

Vickie Sullivan, Professor, Political Science

Katrina Swett, Lecturer, Political Science

Abiodun Williams, Director, The Institute for Global Leadership

Civic Studies is an interdisciplinary field that focuses on critical reflection, ethical thinking, and action for social change, within and between societies. People who think and act together to improve society must address problems of collective action (how to get members to work together) and deliberation (how to reason together about contested values). They must also:

- Understand how power is organized and how it operates within and between societies.
- Grapple with social conflict, violence, and other obstacles to peaceful cooperation.
- Consider questions of justice and fairness when social tensions arise.
- Confront questions about appropriate relationships to outsiders of all types.
- Examine alternative ethical, political, and theological frameworks to encourage comparative reflection about different ways in which people live together in society.

The focus on civil society includes the study of collective action in social spheres that, while organized, may not be institutionalized or otherwise sanctioned by the state. It highlights the perspective of both individual and group agents.

Civic studies considers phenomena that are central to other disciplines—governments, law, markets, societies, cultures, and networks—but from the distinctive perspective of civic agents, i.e. individuals and groups who think together and act cooperatively. It includes principles and vantage points civic agents may use to evaluate existing social norms, institutions, governments, and ideologies. In these and other ways, Civic Studies brings critical scrutiny to status quo norms of social order.

Civic Studies engages with the importance of a society's criteria of membership, as well as the logic and dynamics of inclusion and exclusion, hierarchy and subordination, across social groups. Using empirical study and normative evaluation, it aims to understand how to challenge unjust inequalities and to enhance just forms of social inclusion.

Civic Studies brings together normative reflection, ethical analysis, empirical understanding, historical perspective, and the development of practical skills to deepen our understanding of social criticism and action for social change, as well as the circumstances that give rise to a need for it.

The major in Civic Studies has the following core commitments:

- A combination of classroom-based and experiential learning.
- Normative analysis and critical scrutiny of claims about justice.
- An explicit focus on conflict and possibilities for resolving it.
- The development of skills useful in nonprofits, governments, community groups, and social movements.

Peace and Justice Studies

A Peace and Justice Studies track within the Civic Studies major provides a special focus within Civic Studies for learning about the causes and effects of violence, and for developing nonviolent strategies for conflict resolution and just social transformation. A minor in Peace and Justice Studies is also available to students who are particularly interested in studying violence and alternatives to it.

Civil and Environmental Engineering

Professor Laurie G. Baise, *Department Chair, Geotechnical engineering, seismic hazard analysis, engineering seismology*

Professor Linda M. Abriola, *University Professor; Groundwater hydrology, multiphase flow and transport in porous media*

Professor Steven C. Chapra, *Louis Berger Chair of Civil and Environmental Engineering; Water quality modeling, advanced computer applications in environmental engineering*

Professor Luis Dorfmann, *Structural engineering and solid mechanics*

Professor David M. Gute, *Environmental and occupational epidemiology*

Professor Daniel A. Kuchma, *Design, behavior, and modeling of concrete structures*

Professor Shafiqul Islam, *Hydroclimatology, hydroepidemiology, water diplomacy*

Professor Masoud Sanayei, *Structural engineering, bridge structural health monitoring, building floor vibrations*

Professor Helen Suh, *Air pollution health effects, environmental exposure assessment, epidemiology*

Associate Professor Wayne Chudyk, *Drinking water quality and toxic materials, groundwater monitoring*

Associate Professor John L. Durant, *Chemical fate and transport, water quality, urban air pollution*

Associate Professor Daniele S. Lantagne, *Public health engineering, global health, water-borne pathogens*

Associate Professor Babak Moaveni, *Structural engineering, structural health monitoring, structural dynamics*

Associate Professor C. Andrew Ramsburg, *Environmental remediation, emerging contaminants, water reuse*

Associate Professor Christopher Swan, *Geotechnical and geo-environmental engineering*

Associate Professor Robert C. Viesca, *Applied mechanics in earth sciences and engineering*

Assistant Professor Jonathan R. Lamontagne, *Hydraulic engineering, flood risk, climate change*

Assistant Professor Amy J. Pickering, *Water quality, sanitation, developing countries, climate, child health*

Professor of the Practice Brian Brenner, *Bridge design, structural engineering*

Professor of the Practice Eric M. Hines, *Structural engineering, offshore wind energy*

Professor of the Practice James F. Limbrunner, *Hydrology, integrated water resources management*

Research Professor John T. Germaine, *Geotechnical, laboratory testing, soil behavior, physical properties*

Research Professor Richard P. Hooper, *Hydrology and catchment biogeochemistry, information systems*

Research Assistant Professor Ki-Do Eum, *Environmental epidemiology, data analysis*

Research Assistant Professor Neelakshi Hudda, *Air pollution, environmental engineering*

Senior Lecturer Mark A. Woodin, *Environmental and occupational epidemiology*

Lecturer Anne Marie C. Desmarais, *Environmental health*

EMERITI:

Emeritus Professor Linfield C. Brown, *Water quality modeling, environmental engineering and statistics*

Emeritus Professor Lewis Edgers, *Geotechnical and geo-environmental engineering*

Emeritus Professor Richard M. Vogel, *Water resources, environmental statistics, hydrology and hydraulics*

Emeritus Associate Professor Stephen H. Levine, *Environmental, ecological and economic systems modeling*

Emeritus Senior Lecturer Lee R. Minardi, *Computer-aided design, geometric modeling, applied mechanics*

SECONDARY APPOINTMENTS:

Adjunct Professor Doug Brugge, *University of Connecticut, Community Health and Health Care; Asthma, air pollution, environmental justice*

Adjunct Professor Grant Garven, *Earth and Ocean Sciences; Groundwater geology and hydrology*

Adjunct Professor Jeffrey K. Griffiths, *Tufts University School of Medicine; Global health, infectious diseases*

Adjunct Professor Mark Kachanov, *Mechanical Engineering; Solid mechanics, applied mathematics*

Adjunct Professor Paul H. Kirshen, *University of Massachusetts Boston, Open Channel Flow, Hydraulic Engineering, Physical Limnology, Lake Hydrodynamic and Water Quality Modeling*

Adjunct Professor Elena Naumova, *Associate Dean; Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy, Public health, infectious diseases, biostatistics, epidemiology, nutrition and growth*

Adjunct Professor Kurt D. Pennell, *250th Anniversary Professor, School of Engineering, Brown University; Contaminant remediation, engineered nanomaterials, environmental toxicology, metabolomics*

Adjunct Associate Professor Marco Pilotti, *Università degli Studi di Brescia, Open channel flow, physical limnology, lake hydrodynamic and water quality modeling*

PART-TIME FACULTY:

Visiting Scholar Annette T. Huber-Lee, *Integrated water and land planning, economics of water*

Visiting Scholar Richard A. Plumb, *Geotechnical engineering, soil mechanics, rock mechanics*

Lecturer Lucy Jen, *Geotechnical engineering*

Lecturer Po-Shang Chen, *Structural engineering*

Lecturer Paul Dombrowski, *Site remediation, environmental engineering*

Lecturer Magaly Koch, *Remote sensing*

Lecturer Ryan Marshall, *Structural engineering, computer aided design*

Lecturer Juan Pestana, *Geotechnical engineering, geotechnical earthquake engineering*

Civil and Environmental Engineering (CEE) is a diverse discipline at the interface of humans and the natural and built environments. The focus of this generation of civil and environmental engineers is to improve and expand infrastructure and protect the environment and human health, while adapting to effects from climate change and natural hazards. Civil and environmental engineers work on the big topics of the day such as water, energy, climate, infrastructure, hazards, and health using modern tools to sense, simulate, and visualize these complex natural and built systems and to work toward optimized, sustainable and resilient solutions for the future. Civil and environmental engineers work across a wide range of complex environmental and infrastructure systems that are needed by a modern society to sustain economic growth and protect the environment and public health. These activities include the development and testing of new materials, structural health monitoring and rehabilitation, management and availability of clean water, energy infrastructure solutions for the future, mathematical modeling of built and natural environments, bioremediation and exposure assessment.

UNDERGRADUATE PROGRAMS

The Department of Civil and Environmental Engineering (CEE) offers four primary undergraduate degrees: the Bachelor of Science in Civil Engineering (BSCE) and the Bachelor of Science in Environmental Engineering (BSEvE), the Bachelor of Science in Engineering with a Program in Architectural Studies (BSE-ARCH), and Bachelor of Science in Engineering with a Program in Environmental Health (BSE-EH). The programs leading to the BSCE and BSEvE are accredited by the Engineering Accreditation Commission (EAC) of ABET (www.abet.org), and satisfy requirements necessary to sit for the Fundamentals of Engineering (FE) examination, an important step toward registration as a licensed professional engineer. Depending upon a student's background and interests, there are numerous opportunities to utilize advanced placement credits, obtain a minor, complete dual majors, study abroad, and participate in internship programs. The overall goals of the undergraduate programs are for students to learn the fundamental engineering principles, to master engineering methods for solving challenging problems, and to effectively communicate engineering solutions to both technical and non-technical audiences. The CEE faculty is dedicated to accomplishing these goals through the integration of teaching, research, and professional practice.

Bachelor of Science in Civil Engineering (BSCE)

The BSCE degree program prepares students for a career in civil and environmental engineering such as engineering consulting, engineering design, construction, water resource management, and sustainability, as well as careers in business and in the public sector. The program provides instruction in five subareas: environmental engineering, geotechnical engineering, public health engineering, structural engineering, and water resources engineering. The mission of the BSCE program is to provide students with an educational experience that builds a sound foundation for professional practice and provides technical skills that serve as a basis for career advancement and life-long learning. Program objectives are achieved by developing a broad understanding of civil and environmental engineering, fundamental engineering principles, and connections with the humanities, arts, and social sciences. The curriculum emphasizes the application of basic sciences, computing, and mathematics for engineering design. Students completing the BSCE program are also well qualified for graduate study in engineering, public health, urban planning, architecture, construction, business management, and law.

Degree Requirements

The BSCE curriculum is designed to satisfy program requirements established by EAC-ABET. Students typically complete this program of study with at least 127 credit hours comprising 18 credit hours of study in the humanities, social sciences

and arts, 34 credit hours of study in mathematics and basic sciences, and 59 credit hours of study in engineering topics. Required courses include: MATH 32, MATH 34, MATH 42, CHEM 1, PHY 11, ENG 1 or ENG 3, EN 1, ES 2 or COMP11, ES 5, ES 8, ES 9, ES 18, ES 55, ES 56, CEE 12, CEE 22, CEE 32, CEE 42, CEE 52, CEE 80, CEE 81, two design electives, and one analysis elective. The degree program also requires at least 12 credit hours of technical elective, 5 credit hours of electives in mathematics and basic science to include EOS 1, EOS 2, EOS 5, ES 11, or BIO 13, and 4 credit hours of free elective.

The faculty coordinator for the BSCE program is Prof. Babak Moaveni. For details, see:
<https://engineering.tufts.edu/cee/current/undergraduate/majors/bsce>

Bachelor of Science in Environmental Engineering (BSEvE)

The BSEvE degree program prepares students for a career in environmental engineering, environmental science, or environmental health. The BSEvE curriculum builds and applies knowledge of physical, chemical, biological, and earth science along with principles of conservation of mass, momentum and energy to solve engineering problems related to environmental quality. Students completing the BSEvE are well prepared for careers related to sustainability, chemical fate and transport, water supply and treatment, water resource management and recovery, environmental restoration, air quality control, and public health engineering. Students completing the BSEvE are also well qualified for graduate study in engineering, public health, health professions, and environmental science.

Degree Requirements

The BSEvE curriculum is designed to satisfy program requirements established by EAC-ABET. Students typically complete this program of study with at least 129 credit hours comprising 21 credit hours of study in the humanities, social sciences and arts, 41 credit hours of study in mathematics and basic sciences, and 51 credit hours of study in engineering topics. Required courses include: MATH 32, MATH 34, MATH 42, CHEM 1, CHEM 2, PHY 11, ES 11 or BIO 13, EOS 2, ENG 1 or ENG 3, EM 52, EN 1, ES 2 or COMP11, ES 7, ES 8, ES 18 or CEE 187, ES 55, ES 56 or CEE 156, CEE 12, CEE 32, CEE 34, CEE 36, CEE 52, CEE 80, CEE 81, two design electives, and one analysis elective. The degree program also requires a minimum of 12 credit hours of technical elective, and a minimum of 4 credit hours of free elective.

The BSEvE program director is Prof. Andrew Ramsburg. For details, see:
<https://engineering.tufts.edu/cee/current/undergraduate/majors/bseve>

Bachelor of Science in Engineering – Program in Architectural Studies (BSE-ARCH)

The BSE-ARCH 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 perspective. The flexibility of the BSE-ARCH 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.

Degree Requirements

Students typically complete this program of study with at least 121 credit hours comprising 18 credit hours of study in the humanities, social sciences and arts, 26 credit hours of study in mathematics and basic sciences, 21 credit hours of study in art and architecture topics, and 34 credit hours of study in engineering topics. Required courses include: MATH 32, MATH 34, MATH 42, CHEM 1, PHY 11, ENG 1 or ENG 3, EN 1, ES 2 or COMP11, ES 5, ES 9, ES 18, CEE 22, CEE 42, CEE 81, CEE 187 or CEE 188, DRWM 26 or DRWM 63 or GRAM20, FAH 1, FAH 8, FAH 96 and two electives in mathematics and natural science. The degree program also requires 6 credit hours of design electives, 6 credit hours of art and architecture electives, 12 credit hours of technical elective, and 4 credit hours of free elective.

The faculty coordinator for the BSE-ARCH program is Prof. Masoud Sanayei. For details, see:
<https://engineering.tufts.edu/cee/current/undergraduate/majors/bsearch>

Bachelor of Science in Engineering– Program in Environmental Health (BSE-EH)

The BSE-EH is offered for students wishing to pursue professional careers at the intersection of public health, health sciences, and engineering. Historically, programs in environmental health were established to promote research on the control of infectious disease, the purification of water supplies, and the sanitary disposal of human waste. Today, focal points of concern have been broadened to such challenging issues as non-point source environmental pollution; the influence of the built environment on the health of populations; epidemiological aspects of chronic illnesses; occupational health; international aspects of environmental health, particularly in developing nations; risk assessment and risk management.

Degree Requirements

The BSE-EH curriculum is designed to satisfy program requirements established by the School of Engineering. There is also an option for interested students to complete the pre-health professional requirements established by the University. Students typically complete this program of study with 122 credit hours comprising 21 credit hours of study in the humanities, social sciences and arts, 38 credit hours of study in mathematics and basic sciences, and 29 credit hours of study in engineering topics. Required courses include: MATH 32, MATH 34, MATH 42, BIO 13, CHEM 1, PHY 11, BIO 14 or CHEM 2 or PHY 12, ENG 1 or ENG 3, EC 5 or EC 8, EC 30, EN 1, ES 2 or COMP 11, ES 8, CEE 32, CEE 52, CEE 57, CEE 94, CEE 154, CEE 156, CEE 187, and one elective in natural science. The degree program also requires 21 credit hours of track electives, 9 credit hours of programme electives, and 4 credit hours of free elective.

The faculty coordinator for the BSE-EH program is Prof. Daniele Lantagne. For details, see:

<https://engineering.tufts.edu/cee/current/undergraduate/majors/bseeh>

Bachelor of Science in Engineering – Program in Area of Student Interest

This Bachelor of Science in Engineering (BSE.) program provides students with considerable flexibility to customize an engineering degree program to their interests. The amount of flexibility in this program requires careful planning by the student with guidance from their faculty advisor.

Degree Requirements

The BSE program comprises a minimum of 120 credit hours with at least 18 credit hours of study in the humanities, social sciences and arts, 30 credit hours of study in mathematics and basic sciences, and 45 credit hours of study in engineering topics. Required courses include: MATH 32, MATH 34, MATH 42, CHEM 1, PHY 11, ENG 1 or ENG 3, EN 1, and ES 2. The degree program also requires 21 credit hours of foundation electives, 38 credit hours of engineering electives, and 6 credit hours of free elective.

The faculty coordinator for the BSE planned program is Prof. Andrew Ramsburg. For more information on this degree program contact Prof. Andrew Ramsburg.

Bachelor of Science in Engineering Science (BSES)

The Bachelor of Science in Engineering Science is designed for students seeking a technically based engineering science degree program. For more information on this degree program contact Senior Associate Dean Jennifer Stephan.

Bachelor of Science (BS)

The Bachelor of Science (BS) provides a broad liberal education within the School of Engineering, but a less technical one than any other degree in the School of Engineering. Students working toward this degree normally place a heavier emphasis on the humanities and social sciences than students working in the other programs. For more information on this degree program contact Senior Associate Dean Jennifer Stephan.

UNDERGRADUATE MINOR PROGRAMS**Architectural Engineering Minor**

The Department of Civil and Environmental Engineering offers students in School of Arts & Sciences a five course minor in

Architectural Engineering. This minor provides curricular recognition for the technological track in Architectural Studies. Course requirements for the Architectural Engineering Minor have prerequisites of MATH 32 and PHY 11. Requirements for the minor include: ES 5, ES 9, ES 18, and two approved electives. The faculty coordinator for the minor in Architectural Engineering is Prof. Masoud Sanaye. For details, see:
<https://engineering.tufts.edu/cee/current/undergraduate/minors>

Geosystems Engineering Minor

The Department of Civil and Environmental Engineering offers non-CEE students a five course minor in Geosystems Engineering. This minor provides students an opportunity to study engineering topics related to the subsurface as it relates to geohazards, geotechnical engineering, and geohydrology through either a soils or water track. Course requirements for the Geosystems Engineering Minor have prerequisites of MATH 32, Chem 1, and PHY 11. Requirements for the minor with the Soils track include: ES 5, ES 9, CEE 42, and two approved electives. Requirements for the minor with the Water track include: CEE32, ES 8, CEE 12, and two approved electives. The faculty coordinator for the minor in Geosystems is Prof. Laurie Baise. For details, see:
<https://engineering.tufts.edu/cee/current/undergraduate/minors>

GRADUATE PROGRAMS

Doctor of Philosophy (Ph.D.)

Students entering the doctoral program in Civil and Environmental Engineering should meet the admission requirements of the graduate school, gain acceptance by the Civil and Environmental Engineering Department, and hold a Master of Science or Bachelor of Science degree in Civil and Environmental Engineering or a related discipline. The Ph.D. is a research-oriented degree that requires in-depth knowledge of a specific topic of study. Programs of study are highly individualized, but consist of two main components: course work and independent research.

The outcomes for the Ph.D. graduate program are: (1) an in-depth technical knowledge related to one of the subdisciplines within Civil and Environmental Engineering (Environmental Health, Environmental Engineering and Water Resources, Geosystems Engineering, Offshore Wind Engineering, or Structural Engineering and Mechanics); (2) an ability to conduct independent research on a topic in Civil and Environmental Engineering; (3) a scholarly contribution in the field of study with a demonstrated record of scholarship; and (4) communication of results of research activity both orally and in writing.

PROGRAM OF STUDY

Students are required to complete the equivalent of a three-year program of full-time graduate study for the doctoral degree. In general, the first two years of the Ph.D. program will be devoted to course work; a minimum of twelve courses beyond the baccalaureate level must be completed. Students who enter the program with a Master of Science degree in Civil and Environmental Engineering must complete a minimum of five courses beyond the Master of Science degree. Unlike bachelor's degree and some master's degrees, progress toward the doctoral degree is measured by achievement, not time or number of courses completed. That notwithstanding, it is often constructive for planning purposes to consider that it takes on average about five calendar years of concentrated study beyond the bachelor's degree to complete the requirements for the doctoral degree. Doctoral-level research leads to fascinating discoveries and novel technologies. While exhilarating at times, a doctoral research project demands steady commitment generated by self-motivation and careful planning.

QUALIFYING EXAMINATION

For admission to doctoral candidacy, a Ph.D. student must successfully complete a qualifying examination. Typically, this examination is taken after the student has completed the major part of their required coursework, preferably within eighteen months of matriculation. The qualifying examination is administered by faculty members in the student's subdiscipline area and consists of written and oral components. The qualifying examination is designed to evaluate the student's overall knowledge of their discipline based on their program of study, and their ability to interpret and critique relevant research concepts and formulate responses to both fundamental and applied problems. Potential outcomes include failure, conditional pass, and pass. The student will be informed of the outcome in a meeting with the advisor and in writing by the Department Chair. An outcome of pass will promote the Ph.D. Student to a Ph.D. Candidate. The

terms of any conditional pass must be clearly delineated and agreed upon by the examining committee. Students who do not pass the exam are eligible to petition the faculty for permission to re-take the exam. Such petitions can only be made once, and are reviewed and accepted/declined by vote of the program faculty. Students who fail the qualifying exam and do not petition (or who petition and are denied a second opportunity) will be dismissed from the program.

DISSERTATION COMMITTEE

An individualized curriculum plan must be discussed and approved by the student's dissertation committee within twelve months of starting the Ph.D. Formation of the dissertation committee is the responsibility of the student, with the understanding that the committee must comprise at least 4 members, half of which are to be members of the faculty in the Department of Civil and Environmental Engineering at Tufts University. At least one member of the committee must be from outside the department, and one member must be from outside Tufts University. It is also required that the majority of the committee members be Graduate faculty. Members of the graduate faculty include any full-time faculty member having a doctoral degree.

DISSERTATION PROPOSAL

A dissertation proposal must be presented and approved at least twelve months *before* the dissertation defense. The proposal should be prepared in consultation with the dissertation committee. The Ph.D. proposal should be of a quality suitable for submission to a competitive funding agency. It is very desirable that candidates and advisors actually submit this proposal to a national funding agency. The outcome of the proposal defense is decided by the dissertation committee. Potential outcomes include failure, conditional pass, and pass. Failure of the proposal defense constitutes grounds for dismissal of the candidate. A conditional pass requires that a candidate reconsider the proposal and re-take the proposal defense within six months. Successful completion of the dissertation proposal defense (i.e., an outcome of pass) is a significant milestone towards completion of the Ph.D. degree. In all cases the candidate will be informed of the outcome in a meeting with the advisor and in writing by the Department Chair.

DISSERTATION

The final requirement for the doctorate degree is a dissertation. The dissertation demonstrates the candidate's ability to perform independent research of high quality and conveys expertise in relevant research techniques and methodologies. The candidate should seek regular meetings with the committee, approximately every six months. Upon completion of the approved research, scholarly competence is demonstrated through the preparation of a written dissertation of the research. It is expected that the Ph.D. dissertation will lead to published journal articles. The number of publishable articles will be decided by the candidate and the advisor in consultation with the dissertation committee, but at least one article must be submitted to a peer-reviewed journal for review prior to scheduling a Ph.D. dissertation defense. Doctoral defenses are open to the public. Candidates are required to submit the details (date, time, location) of the meeting, a dissertation abstract, and a listing of all committee members to the administrative staff two-weeks prior to the scheduled defense. Potential outcomes include failure and a pass, and are decided by majority vote of the committee. Failure of the thesis defense requires that a student substantially rework the dissertation and defend the modified dissertation within twelve months. Candidates passing the dissertation defense are typically required to modify the dissertation as directed by the committee. In either case the candidate will be informed of the outcome in a meeting with the advisor and in writing by the Department Chair.

The final dissertation must be submitted in accordance with university regulations. Tufts University has established requirements and deadlines for submission of the final dissertation. See the Arts, Sciences and Engineering [Graduate Student Handbook](#) for more information.

For more information, please refer to the CEE website: <https://engineering.tufts.edu/cee/current/phd/cee>
Master of Science (M.S.)

Instruction leading to the Master of Science degree is offered with concentrations in applied data science, environmental and water resources, environmental health, geosystems, offshore wind energy, and structural engineering and mechanics. Candidates for the master's degree program in environmental and water resources engineering, geosystems engineering, offshore wind energy, and structural engineering and mechanics are expected to have an adequate background in science, mathematics, and engineering science. Candidates for the master's program in applied data science and environmental health should have a background that emphasizes natural and applied sciences with adequate preparation in mathematics, biology and chemistry. The School of Engineering requires that graduate applicants submit

Graduate Record Examination (GRE) scores.

All of our M.S. programs can be completed in one year without a thesis or in two years with a thesis. M.S. programs without thesis are typically completed in three semesters. A written thesis is optional for the M.S. degree program, and two of the ten required courses may be taken as master's thesis research. Students who choose to complete a thesis are expected to form a thesis committee and present a thesis proposal to their committee within twelve (12) months of entering the M.S. program. The thesis committee should be composed of at least three members, with the chair being the student's advisor within the Department. One of the committee members may be from outside the Department of Civil and Environmental Engineering. If the master's candidate elects to complete a written thesis, the thesis must be defended orally and approved by the committee.

The outcomes for the M.S. graduate program are (1) an ability to apply knowledge of technical skills when working in one of the Civil and Environmental Engineering tracks (Environmental Health, Environmental Engineering and Water Resources, Geosystems Engineering, and Structural Engineering and Mechanics); (2) an ability to apply both engineering and management skills when practicing Civil and Environmental Engineering; (3) written and verbal communication of technical results.

For more information, please refer to the CEE website: <https://engineering.tufts.edu/cee/current/ms>

Interdisciplinary Programs

Water: Systems, Science and Society (WSSS)

The Water: Systems, Science and Society (WSSS) graduate program was established to provide the interdisciplinary perspectives and tools to manage global water related problems. Students participating in the WSSS program must enroll in and fulfill the requirements of a graduate degree within one of the participating schools to ensure a strong knowledge base in their chosen field. WSSS students take courses in three of the four core areas and participate in cross-cutting seminars. Students in the research track address interdisciplinary, problem-focused projects in one of six research areas. Students in the practicum track complete a professional interdisciplinary experience and participate in a special WSSS research practicum.

The WSSS requirements are completed in addition to the student's degree requirements, but through the use of electives and co-listed courses, the WSSS program usually will not add significant time to completion of a graduate degree program. Upon satisfactory completion of these activities, students receive a Certificate in Water: Systems, Science, and Society as well as their graduate degree. Details of the program are available at the WSSS website: <https://environment.tufts.edu/wsss/>

Bioengineering (M.S.)

The Bioengineering program provides a broad engineering and biotechnology curriculum, while offering a focus on a specific engineering track that best fits students' interests and career objectives. The bioengineering master's program has six tracks: Bioinformatics, Biomaterials, Biomechanical Systems and Devices, Cell and Bioprocess Engineering, Environmental Biotechnology, and Signals and Systems.

The bioengineering master's program has two components: an interdisciplinary core curriculum, including one class outside of students' chosen sub-specialty to increase the breadth of bioengineering knowledge, and courses required by the student's home department for each chosen track. The majority of students in CEE will select the Environmental Biotechnology track. Additional information on this program is provided on the School of Engineering website: <http://engineering.tufts.edu/bioengineering/>

Joint and Dual Degrees with Urban and Environmental Policy

For graduate students who are interested in urban and environmental policy, the Department of Civil and Environmental Engineering participates in joint and dual degree program offered in association with the Department of Urban and Environmental Policy and Planning. Additional information on this program is provided on the UEP website:

<https://as.tufts.edu/uep/programs/joint>

Continuing Education Programs

Certificate Program in Civil and Environmental Engineering

Prepare to attend graduate school or improve your knowledge of civil and environmental engineering to join the workforce. At Tufts, we provide the opportunity for academically talented, highly motivated adult students, with at least a Bachelor of Science or Bachelor of Arts degree (BS or BA) in any discipline with the appropriate mathematics and science background. The concentrated and rigorous Certificate program is particularly well-suited for individuals preparing to re-enter the workforce, mid-level professionals looking to move into the field of civil and environmental engineering or those preparing for graduate school. Accepted students are required to develop an individualized plan of study with their academic advisors, based on their academic history and professional goals.

The certificate requires four graduate-level courses in Civil and Environmental Engineering. This flexible program allows the student to cluster course electives around a particular interest or specialty area. Courses may be chosen from our regular department offerings or related fields. The Civil and Environmental Engineering certificate can be completed in one year as a full-time program of study.

For more detailed information, please refer to the CEE website
<https://engineering.tufts.edu/cee/prospective/certificate/cert-cee>

Certificate Program in Environmental Management

Environmental managers in industry, government, and consulting know that changes in environmental compliance requirements can lead to challenges and opportunities. Complex regulations, emerging environmental technologies, international environmental treaties, and multinational corporate environmental programs will determine the direction that environmental managers must take in the future. The Certificate in Environmental Management provides students with the tools and techniques to understand the future of environmental management.

Students in this program take graduate-level courses offered by the Departments of Civil and Environmental Engineering and Urban and Environmental Policy to develop a five-course program that includes environmental technology, environmental health, and environmental policy. Students can take courses to enhance their knowledge for professional advancement, including life-cycle analysis, GIS, groundwater hydrology, hazardous waste treatment technology, epidemiology, toxicology, corporate environmental management, and environmental law. Courses in global health, primary prevention of infectious disease and sanitation in developing nations are also open to certificate students as are courses in data analytics and wind energy.

The program is open to students with a bachelor's degree. Students should have undergraduate course work in engineering or the natural and physical sciences, including mathematics.

This five-course, graduate-level certificate, offered through the Department of Civil and Environmental Engineering, is designed to be pursued on a part-time basis by professionals seeking advanced training or by students preparing to enter a master's degree program. The program can also be completed full-time in one academic year. In most cases, courses taken as a certificate student can be transferred into a master's degree program in the Department of Civil and Environmental Engineering.

For more information, contact the program administrator, Angela Foss, at 617-627-2320 or visit the website
<https://engineering.tufts.edu/cee/current/certificate-programs/em>

Classical Studies

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 Classical Studies*

Associate Professor Marie-Claire Beaulieu, *Greek religion, epigraphy, 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 Riccardo Strobino, *Greek, Latin, and Arabic Traditions*

Senior Lecturer J. Matthew Harrington, *ancient art and archaeology, digital humanities, historiography, Latin and Greek literatures, comparative Greek and Latin linguistics*

Senior Lecturer Anne Mahoney, *Classical tradition and reception; linguistics; ancient drama; ancient mathematics; Latin, Greek, and Sanskrit language and literature*

Lecturer Andreola Rossi, *Greek & Roman epic, Greek & Roman historiography, the history and culture of the Augustan period and Latin language*

Lecturer Susan E. Setnik, *Greek and Latin language*

AFFILIATED FACULTY:

Professor Ioannis D. Evrigenis, *Political Science; Political philosophy, Greek and Roman Political Thought*

Associate Professor Christiana Olfert, *Philosophy; Ancient philosophy, Early Modern philosophy, ethics*

Assistant Professor Jennifer Eyl, *Religion; Early-Christianity, Gender and sexuality in antiquity, Hellenistic philosophies*

Senior Lecturer David J. Proctor, *History; Medieval Western Europe, Southeastern Europe, Byzantium, church-state relations*

The Department of Classical Studies is dedicated to the study of Greek, Roman, and others cultures of the Ancient World, and the understanding of its continuing impact on contemporary life through courses in history, archaeology, art, architecture, science, philosophy, religion, mythology, and the literatures of Greece and Rome. Classical Studies is constantly changing in light of new discoveries, new methodologies, new interpretations, and new relationships with other areas of study. In many ways, Classical Studies 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 Classical Studies meet the requirements of four classes of students:

- 1) those who have no professional interest in Classical Studies 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 Classical Studies 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:

- a. CLS 31 or GRK 131; CLS 32 or LAT 132
- b. CLS 37 and 38, or two in Greek and Roman archaeology (CLS 27, 164, 168)
- c. Two more classes in CLS, LAT, GRK numbered above 100 in addition to any taken in fulfillment of (a) and (b)
- d. Four other courses, of which at least two must be in CLS, LAT (3 or above), or GRK (any level) and at most two may be in SKT (any level) or related fields. Latin and Greek language courses are strongly recommended.

Major in Greek

Ten courses:

- a. CLS 31 or GRK 131
- b. CLS 37
- c. Four courses in Greek, one of which may be GRK 3, at least 3 at 100-level; not including GRK 131 if taken in place of CLS 31, but if a student takes both CLS 31 and GRK 131, then GRK 131 can be counted here
- d. Four other courses in CLS, GRK, LAT, SKT, at least 2 at 100-level

Major in Latin

Ten courses:

- a. CLS 32 or LAT 132
- b. CLS 38
- c. Five courses in Latin above Latin 3, at least 3 at 100-level; not including LAT 132 if taken in place of CLS 32, but if a student takes both CLS 32 and LAT 132, then LAT 132 can be counted here
- d. Three other courses in CLS, LAT, GRK, SKT, at least 2 at 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 usually placed in Latin 3. Students with three or four years of preparation in Latin are usually 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 a advanced placement into Latin 21 or above and credit for Latin 3 (3 semester hours). 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.

Students who complete or place out of Latin 3 have completed part I of the foundation language requirement. To complete part II in Latin a student must take Latin 21 and 22, in either order; there is no Latin 4 course.

Students with two years of secondary school preparation in ancient Greek are normally placed into Greek 2 or Greek 3. Students with three or four years of preparation in ancient Greek are normally placed in Greek 3 or above, depending on previous records, together with placement examination and individual consultation. In ancient Greek, 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 complete or place out of Greek 3 have completed part I of the foundation language requirement. To complete part II in Greek a student must take two more courses, one of which may be Greek 22.

UNDERGRADUATE MINOR PROGRAM

The Department of Classical Studies 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 Classical Studies

The master's program in Classical Studies at Tufts is designed for students who wish to go beyond the bachelor's level to attain a broader and deeper knowledge of the Classical Studies for one or more of the following purposes: teaching, further graduate study, digital technology, or publishing. With its strong language component and faculty strength in literature, history, archaeology, and digital humanities, 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 Classical Studies at the secondary level.

REQUIREMENTS

Candidates must successfully complete ten graduate courses in Classical Studies. Two must be in upper-level Latin and two must be in upper-level Greek; one must be in history, and one must be in classical archaeology. Candidates 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.

Reading knowledge of Latin or Greek and one modern foreign language (usually German or French) is tested by examination.

To demonstrate research and presentation, the candidate may submit for evaluation by a faculty committee either two qualifying 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 ten courses. Students usually find that writing a thesis takes a full term of uninterrupted work. An oral examination based on the qualifying papers or thesis is required.

A comprehensive written examination integrating course work with knowledge of the reading lists in Greek and Latin literature is required.

Master of Arts in Classical Studies with Initial Teacher Licensure in Latin and Classical Humanities

The master's program in Classical Studies with licensure allows students to pursue intensive study of the classical world beyond the bachelor's level and simultaneously to acquire the credentials for a professional teaching career in public education. Students in this program have an opportunity to study literature, history, archaeology, and digital humanities in the Classical Studies Department. Concurrently they prepare for a career in teaching (grades 5-12) through coursework and supervised teaching offered by the Education Department at Tufts. In strengthening their language, research, and teaching skills, graduates are also prepared to pursue a Ph.D. degree at another institution.

REQUIREMENTS

Candidates must successfully complete six graduate courses in Classical Studies. Two must be in upper-level Latin and two must be in upper-level Greek. Candidates 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.

Candidates must successfully complete six graduate courses in Education: one at the introductory level; one in human development and learning; one in the social, cultural, and historical foundations of education; one in exceptionalities in learning; two courses in second language instruction with an emphasis in Latin and Greek; and one in supervised teaching worth six semester hour units.

Reading knowledge of Latin or Greek and one modern foreign language (usually German or French) is tested by examination.

To demonstrate research and presentation, the candidate may submit for evaluation by a Classical Studies faculty committee either two qualifying 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 six courses. Students usually find that writing a thesis takes a full term of uninterrupted work. An oral examination based on the qualifying papers or thesis is required.

A comprehensive written examination integrating course work with knowledge of the reading lists in Greek and Latin literature is required.

Approval by two departments is necessary for a degree in this program. Appropriate subject knowledge, language proficiency, and research skills must be approved by the Classical Studies Department. Successful completion of the Latin Practicum, completion of the Massachusetts requirements for initial teacher licensure, and an endorsement of teaching skills must be approved by the Education Department.

Master of Arts in Digital Tools for Premodern Studies

The central intellectual focus of this program is the study of the creation, transmission, preservation, and transformation of knowledge across time and culture, from Classical Antiquity through Premodern times. The program puts a heavy focus on digital techniques in order to facilitate the study of such a broad field. Students will thus acquire a deeper knowledge of the humanities while learning and practicing computing skills in a hands-on research environment. Graduates will be well prepared to pursue Ph.D. programs and academic careers or careers in publishing, media, and technology.

Requirements

Candidates must successfully complete eleven (11) courses at the graduate level. Two will be devoted to a common core course (Computational Methods for the Humanities, COMP 5/CLS 160) and a programming class (COMP 10); Two will be selected among advanced offerings in the study of classical literature (Latin, Greek, Sanskrit or other approved language). Four courses will be electives selected from a preapproved list. Three courses will be devoted to a research project.

Students must select the four electives from at least two different departments or programs. These four courses can be either specialized seminars or general survey courses with separate graduate sections. To meet these course requirements, students will be able to select from an array of courses according to their particular academic and vocational interests and needs.

Students are required to complete a research project equivalent in scope to a Master's thesis. This project will fulfill the equivalent of 3 courses, one usually taken in the fall of the second year of the program, and the other two in the spring. This project is conducted and evaluated from two perspectives which illustrate two complementary sets of skills, namely the production of good data and the appropriate and insightful analysis of that data. For this reason, the project may have a single deliverable similar in scope to a thesis, or two deliverables similar in scope to Qualifying Papers. This project may originate from coursework, and students are encouraged to start elaborating their project during their first year, in any case no later than the summer before their second year. A thesis committee must be constituted and a defense scheduled as outlined in the Graduate Student Handbook.

Reading knowledge of Latin and Greek and one modern foreign language (usually German or French) is tested by examination. Latin or Greek may be replaced with another language, in which case the other language must be approved upon enrollment in the program.

A comprehensive written examination integrating course work with knowledge of the reading lists in Greek and Latin literature or other approved language is required.

For more detailed information, please visit the website [http://ase.tufts.edu/Classical Studies](http://ase.tufts.edu/Classical%20Studies).

Clinical Psychology

(FOR DEGREE REQUIREMENTS, SEE PSYCHOLOGY.)

Cognitive and Brain Sciences

(FOR DEGREE REQUIREMENTS, SEE PSYCHOLOGY.)

Cognitive Science

A joint Ph.D. in Cognitive Sciences is offered through the departments of Computer Science, Psychology, Education, and Child Development. Prospective students apply to one of the departments participating in the cognitive science Ph.D. program and indicate in their application their intention to apply to the joint program, and address their interest in Cognitive Science in their personal statement. Once admitted to the program, students will have to complete the Ph.D. requirements of their home department as well as those of the Cognitive Science program, and their research will be in the intersection of a field in their home department and Cognitive Science.

For further information, see <http://cogsci.tufts.edu> or contact J.P. de Ruiter <jp.deruiter@tufts.edu> for general questions, Matthias Scheutz <matthias.scheutz@tufts.edu> for Computer Science/Cognitive Science, Ari Goldberg <ariel.goldberg@tufts.edu> for Psychology/Cognitive Science, David Hammer <david.hammer@tufts.edu> for Education/Cognitive Science, or Eileen Crehan <eileen.crehan@tufts.edu> for Child Development/Cognitive Science.

(FOR MAJOR IN COGNITIVE AND BRAIN SCIENCES, SEE PSYCHOLOGY.)

(FOR MINOR IN COGNITIVE AND BRAIN SCIENCES, SEE PHILOSOPHY.)

Community Environmental Studies

FACULTY ADVISOR:

Justin Hollander, *Urban and Environmental Policy and Planning*

Environmentalists and concerned citizens alike face the challenge of keeping pace with politically and technically complex issues. The considerable sophistication of the environmental movement constantly creates new challenges for 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, and to enhance the skills of professionals already in the field. The certificate is offered by the graduate Department of Urban and Environmental Policy and Planning.

The certificate requires the completion of four courses (12 credits)—one core course and three electives—in such varied subjects as environmental policy, land use planning, sustainability, mediation, law and economics.

The program is open to individuals with a bachelor's degree and is especially suited to those in community and environmental organizations who want to increase their expertise; midcareer professionals who want to apply their skills to environmental concerns; and business people working with communities on issues relating to sustainability, the environment and public health.

For more information, contact the Program Administrator, Angela Foss, at 617-627-2320, or visit

<http://as.tufts.edu/uep/programs/certificate>.

Community Health

Lynne Pepall, Department Chair and Professor of Economics

FACULTY:

Andrea Acevedo, Assistant Professor, Community Health

Madina Agénor, Assistant Professor, Community Health

Jennifer Allen, Professor, Community Health

Adolfo Cuevas, Assistant Professor, Community Health

Karen Kosinski, Lecturer, Community Health

Keren Ladin, Assistant Professor, Community Health and Occupational Therapy

Alecia McGregor, Assistant Professor, Community Health

Fernando Ona, Assistant Professor, Public Health and Community Medicine

Rosemary C.R. Taylor, Associate Professor of Sociology

Shalini A. Tendulkar, Lecturer, Community Health

Mark Woodin, Senior Lecturer, Department of Civil and Environmental Engineering

Community Health (sometimes called Public Health) is an interdisciplinary field focused on the prevention of disease, promotion of health, and prolongation of life among communities and/or populations. Community health actions, programs and policies aim to provide conditions in which people can be healthy. In addition, Community Health is focused on the elimination of inequities in health status across communities and/or populations. Community Health spans diverse aspects of health and society and encourages students to explore health issues from a variety of disciplinary perspectives, including, but not limited to: anthropology, sociology, biology, psychology, history, economics, engineering, nutrition, philosophy, classics and political science. Through courses and fieldwork, Community Health students analyze: (1) social, economic, political and environmental factors that influence health and illness, (2) how communities define and develop solutions to address priority health issues, (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 and public health programs.

CORE REQUIREMENTS FOR THE MAJOR

To complete a major in Community Health, students must take a total of twelve courses. In addition to a broad academic experience, students complete a 150-hour internship for which they receive three semester hour units. There are seven required courses and students may select five approved electives.

REQUIRED COURSES

1. Introduction to Community Health (CH 1) *
2. Health Care in America: Policies and Politics (CH 2)
3. Introduction to Global Health (CH 56)
4. Community Health Research Methods (CH 30) or approved equivalent
5. Principles of Epidemiology (CE/CH 154)
6. Introduction to Statistics (CH 31) or approved equivalent
7. Community Health Internship (CH 180)**

* It is STRONGLY recommended that students take CH 1 as their first Community Health course.

**Students must complete prerequisites. See Course Requirements at CH. *Note:* Students may complete CH 180/The Internship during one of four semesters: the second semester of junior year, summer leading to senior year, fall or spring of senior year.

ELECTIVE COURSES FOR PRIMARY MAJOR

Community Health majors are required to select and complete five electives as follows:

- One mid-level or upper-level CH elective
- One upper-level CH elective
- Two CH or approved electives in another Department or Program
- One upper-level approved elective with a research component

Information about mid- and upper-level courses, as well as approved electives and research courses are available on the Community Health website (<http://ase.tufts.edu/commhealth>) or from the Community Health office (see below for contact information).

EXPERIENTIAL LEARNING: INTERNSHIP (CH 180) The internship is an integral part of the major in Community Health and is required for all students who complete the CH major. For many students, the 150-hour internship proves to be one of the most valuable learning experiences by establishing a link between theory and practice. Students arrange their internship placements, and the Department of Community Health is available to provide support, guidance and resources to students when finding and securing an internship. To make an informed choice and find the best fit for the placement, students should be in the Boston area during the search and interview process. All sites must be approved by the department. Placements have included community health centers, local hospitals, schools, social service/community action agencies, advocacy organizations, government offices, or shelters. Some examples include Boston Public Health

Commission, Mass. General Hospital, Cambridge Health Alliance, AIDS Action Committee, offices at the State House, Groundwork Somerville, and the Medford Health Department/Office of Prevention. Students are required to do their internships in the greater Boston area enabling the Community Health Internship Administrator and assigned faculty member to be in close contact with the internship Site Supervisor. In addition to the work onsite (150 hours at the agency or institution rather than working remotely), students attend meetings throughout the semester, and complete several writing assignments/presentations for CH 180. To receive academic credit, a grade of B- or better is required for the internship.

PROGRAM POLICIES

Pass/Fail: No course submitted for credit in the major can be taken on a pass/fail basis.

Academic Standing: All courses submitted for credit in the major must have a grade of C- or better, except for the internship. Students must pass the internship (CH 180) with a grade of B- or better.

Courses taken at Other Institutions: Any course that transfers to Tufts through the online transfer of credit SIS approval procedure as CH 320 can automatically be used to fulfill the requirement for "CH or Approved Electives from other Departments or Programs". Any course that transfers to Tufts as a regular course number (ex. CH 31, CH 56, CH 107, etc.) can be used to fulfill the requirement(s) that the regular CH course fulfills. No more than three courses taken at other institutions may count toward the major. See the CH website for more information.

More information may be obtained from the program office at 574 Boston Avenue, Suite 208, by calling 617-627-3233, or by e-mail (ch@tufts.edu). Visit our website at <http://ase.tufts.edu/commhealth>.

Computer Engineering

(FOR DEGREE REQUIREMENTS, SEE ELECTRICAL AND COMPUTER ENGINEERING.)

Computer Science

Professor Kathleen Fisher, Chair; *Programming languages*

Professor Lenore J. Cowen, *Computational biology, theory of computation, algorithm design and analysis*

Professor Jeff Foster, *Programming languages*

Professor Robert J. K. Jacob, *Human-computer interaction*

Professor Soha Hassoun, *Computational systems biology, computer-aided design for integrated circuits*

Professor Susan Landau, *Cybersecurity*

Professor J. P. de Ruiter, *Cognitive foundations of communication*

Professor Matthias Scheutz, *Artificial intelligence, cognitive science, human-robot interaction*

Professor Donna Slonim, *Computational biology*

Professor Diane L. Souvaine, *Computational geometry, algorithm design and analysis*

Associate Professor Emeritus Anselm C. Blumer, *Artificial intelligence, machine learning, computational biology*

Associate Professor Remco Chang, *Visualization, visual analytics, computer graphics*

Associate Professor Alva Couch, *Network and system administration, data management, scientific computing, visualization*

Associate Professor Samuel Z. Guyer, *Compilers, programming languages*

Associate Professor Norman Ramsey, *Programming languages and systems, functional programming*

Assistant Professor Fahad Dogar, *Networking, distributed systems, mobile computing, cloud computing*

Assistant Professor Michael Hughes, *Machine learning, computer vision*

Assistant Professor Liping Liu, *Bayesian modeling, computational sustainability, spatial data analysis*

Assistant Professor Raja Sambasivan, *Systems, networking, cloud computing, problem diagnosis*

Assistant Professor Elaine Short, *Human-robot interaction, assistive technology, artificial intelligence, machine learning*

Assistant Professor Jivko Sinapov, *Developmental robotics, computational perception, artificial intelligence, machine learning*

Senior Lecturer Martin Allen, *Artificial intelligence, machine learning, algorithms, theory of computation*

Senior Lecturer Ming Chow, *Computer games, computer security and privacy*

Senior Lecturer Mark Sheldon, *Data structures, programming languages, software systems, software design*

Lecturer Karen Edwards, *Geometric topology*

Lecturer Megan Monroe, *Visualization*

Lecturer Richard Townsend, *Compilers, functional programming, high-level synthesis*

Visiting Assistant Professor Matias Korman, *Computational geometry*

SECONDARY APPOINTMENTS:

Adjunct Professor Marina Bers, *Child Development; Human-computer interaction, collaborative learning systems, virtual communities*

Adjunct Professor Bruce Boghosian, *Mathematics; Quantum computing, scientific and distributed computing*

Adjunct Professor Gregory Crane, *Classics; Ancient Greek literature, computing and its impact on learning*

Adjunct Professor Roni Kharon, *Computer Science, Indiana University; Machine learning, artificial intelligence, computational learning theory*

Adjunct Professor Misha Kilmer, *Mathematics; Numerical linear algebra, linear algebra, scientific computing and visualization*

Adjunct Professor Eric L. Miller, *Electrical and Computer Engineering; Signal and image processing*

Adjunct Professor Karen Panetta, *Electrical and Computer Engineering; Human-computer interaction, multimedia studies*

Adjunct Associate Professor Mark Hempstead, *Electrical and Computer Engineering; Computer architecture*

Adjunct Associate Professor Csaba Tóth, *Mathematics, California State University; Computational geometry*

Adjunct Assistant Professor Shuchin Aeron, *Electrical and Computer Engineering; Statistical signal processing, network information theory*

Research Assistant Professor Ethan Danahy, *Center for Engineering Educational Outreach; Technology solutions for engineering education*

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, including certificates. Both the Arts and Sciences and Engineering programs are included in the general accreditation conferred on the University by NEASC. In addition, the Bachelor of Science in Computer Science (B.S.C.S.) program offered through the School of Engineering is accredited by the Computing Accreditation Commission (CAC) of ABET, Inc. (<http://www.abet.org>).

UNDERGRADUATE CONCENTRATION REQUIREMENTS — COLLEGE OF LIBERAL ARTS

Major in Computer Science

The major in Computer Science requires 10 courses: eight courses in computer science and two courses in mathematics. The computer science courses must include Computer Science 15, 40, 80 or 105, 160, and 170 and the remaining courses

must be numbered above 15. Only one of Computer Science 80 or 105 may be counted toward the major. The mathematics courses are Calculus II (which can be taken as Mathematics 34 or 39) and Discrete Mathematics (which can be taken as Mathematics 61 or Computer Science 61). The introductory courses Computer Science 10 and 11, as well as Mathematics 4, 14, 30, and 32, do not count toward the major. Computer Science 53, 55, 99, 153, 154, and 155 do not count toward the major. No more than one Directed Study (93, 94, 193, 194) may be counted toward the major. The courses to be counted toward the major 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 97, 98, 111, and 181; as well as Mathematics 70 or 72, 145, 165, and 166.

For an ABET CAC accredited program, see the B.S.C.S. in the School of Engineering, described below.

UNDERGRADUATE PROGRAMS — SCHOOL OF ENGINEERING

Bachelor of Science in Computer Science

The mission of the Computer Science in Engineering 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 foundation 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 lifelong 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 (B.S.C.S.) program offered through the School of Engineering is accredited by the Computing Accreditation Commission (CAC) of ABET, Inc. (www.abet.org).

Our program objectives include success in industry careers and graduate school. Two to five years after graduation, graduates of the B.S.C.S. program will have:

1. Succeeded and advanced in professional careers in or related to computing or software.
2. Been admitted to and advanced in graduate study in computer science.

Outcomes of the B.S.C.S. program include that:

1. Graduates should be able to use computer science theory to analyze algorithms and to reason about properties of programs, including structure, behavior, and performance.
2. Graduates should be able to solve problems by using principled methods to create, extend, and improve software.
3. Graduates should have had practice applying their knowledge and skills to open-ended problems with more than one good answer.
4. Graduates should have practice working in teams.

Additionally, the B.S.C.S. degree aims to empower our students with ABET Computing Accreditation Commission outcomes 1-6, including the ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]

The Bachelor of Science in Computer Science (B.S.C.S.) requires 120 semester-hours of study, including introductory,

foundation, HASS, breadth, and concentration courses. Introductory courses (10 courses) include Engineering 1; Engineering science 2 or an elective with attribute value "SOE-Engineering"; Mathematics 32, 34 or 39, and 42 or 44; Computer Science 61 (Mathematics 61 may be substituted for Computer Science 61); Mathematics 70 or 72; two courses selected from Physics 11, Chemistry 1 or 16, and Biology 13; and one natural science or mathematics elective. For natural science courses accepted towards the Engineering degrees, refer to the online course catalog for courses with attribute "Engineering Requirements" and value "SOE-Natural Sciences." For mathematics courses, refer to the online course catalog for courses with attribute "Engineering Requirements" and value "SOE-Mathematics". The foundation requirement (five courses) includes Computer Science 11 and 15, Engineering Science 3 and 4, and a statistics course chosen from Mathematics 166, Engineering Science 56, Electrical Engineering 24 or 104, Biomedical Engineering 141, Biology 132, and Physics 153. The Humanities, Social Sciences, and Arts (HASS) requirement (six courses) includes English 1 or 3 and five courses in Humanities, Arts, or Social Sciences. Of these five courses, one must be Humanities, and one must be Social Science. Allowable courses in Humanities, Arts, and Social Sciences are listed in the online course catalog with attribute "Engineering Requirements" and possible values "SOE-HASS-Humanities," "SOE-HASS-Arts," and "SOE-HASS-Social Sciences," respectively. The breadth requirement includes one course in ethics and social context (Philosophy 24 or Engineering Management 54); and nine semester hour units chosen either from Humanities, Arts, and Social Sciences, or from selected courses covering the broader context of engineering. A list of selected courses appropriate for fulfilling the last nine semester hour units of the breadth requirement is available from the department. The concentration requirement (11 courses) includes Computer Science 40, 80 or 105, 160, 170, 97, and 98; and five elective courses in computer science, three of which must be numbered above 100. Only one of Computer Science 80 or Computer Science 105 may be counted toward the degree. At most three semester hour units of Independent Study or Research (Computer Science 93, 94, 191, 193, or 194) and four semester hour units of thesis (Computer Science 197) may be utilized as concentration electives. At least two credit hours must be chosen from Computer Science 27, 55, 116, 120, or 155. At most one course numbered 55 or 155 may be counted toward the degree. Computer Science 53, 153, and 154 may not be used as concentration electives. Internship credit (Computer Science 99) may not be counted toward the concentration requirement, though four semester hour units of Computer Science 99 may be counted toward the breadth requirement. For a research experience, students should consider partly fulfilling concentration elective requirements via a senior thesis.

At the student's option, one concentration elective may be replaced by one course in Mathematics, selected from the following choices:

Mathematics 51 - Differential Equations
Mathematics 63 - Number Theory
Mathematics 87 - Mathematical Modeling and Computation
Mathematics 125 - Numerical Analysis
Mathematics 126 - Numerical Linear Algebra
Mathematics 133 - Complex Variables
Mathematics 135 - Real Analysis I
Mathematics 136 - Real Analysis II
Mathematics 145 - Abstract Algebra I
Mathematics 146 - Abstract Algebra II
Mathematics 155 - Partial Differential Equations I
Mathematics 156 - Partial Differential Equations II
Mathematics 163 - Computational Geometry
Mathematics 165 - Probability
Mathematics 166 - Statistics

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
Engineering 1
Mathematics 32
Physics 11, Chemistry 1 or 16, or Biology 13

English 1

SPRING TERM

Engineering Science 2 or elective with attribute SOE-Engineering

Mathematics 34 or 39

Physics 11, Chemistry 1 or 16, or Biology 13

Humanities, social sciences, or arts elective

Sophomore Year

FALL TERM

Computer Science 11 *Introduction to Computer Science*

Mathematics 42

Natural science or mathematics elective

Engineering Science 3 *Introduction to Electrical Engineering*

Humanities, social sciences, or arts elective

SPRING TERM

Computer Science 15 *Data Structures*

Computer Science or Mathematics 61 *Discrete Mathematics*

Engineering Science 4 *Introduction to Digital Logic Circuits*

Mathematics 70 or 72 *Linear Algebra*

Humanities, social sciences, or arts elective

Junior Year

FALL TERM

Computer Science 40 *Machine Structure and Assembly-Language Programming*

Computer Science elective

Engineering Management 54 *Engineering Leadership*

Humanities, social sciences, or arts elective

Free elective

SPRING TERM

Computer Science 160 *Algorithms*

Computer Science elective

Humanities, social sciences, or arts elective

Breadth elective (humanities, social sciences, arts, or engineering)

Free elective

Senior Year

FALL TERM

Computer Science 97 *Senior Capstone Project I*

Computer Science 105 *Programming Languages*

Computer science elective

Probability & Statistics (Engineering Science 56 or Electrical Engineering 24)

Breadth elective (humanities, social sciences, arts, or engineering)

SPRING TERM

Computer Science 98 *Senior Capstone Project II*

Computer Science 170 *Theory of Computation*

Computer science elective

Computer science elective

Breadth elective (humanities, social sciences, arts, or engineering)

Bachelor of Science in Data Science

Data Science refers to the principles and practices in data analysis that support data-centric real-world problem solving.

The Bachelor of Science in Data Science (B.S.D.S.), jointly administered by the departments of Computer Science and

Electrical and Computer Engineering, is offered to students in the School of Engineering who desire to concentrate on applying computing to scientific and engineering analysis and problem solving. The B.S.D.S. is designed both as a stand-alone major and a double major option for those students in the School of Engineering who wish to add data science to an existing engineering major. The B.S.D.S. degree is only available to students in the School of Engineering. Double majoring in the B.S.D.S. and Bachelor of Science in Computer Science (B.S.C.S.) programs is not practical and will not be permitted due to overlap between the major concentrations.

The mission of the B.S.D.S. is to prepare students for Data Science careers in engineering, science, medicine, and other disciplines. The objectives of the B.S.D.S. program include that graduates should have, after five years:

1. Succeeded and advanced in professional careers in or related to data science, analysis, and interpretation, and/or
2. Been admitted to and advanced in graduate study in data science and related fields.

The outcomes of the Bachelor of Science in Data Science include the following:

1. Graduates will demonstrate facility in a variety of data analysis techniques, including machine learning, optimization, statistical decision-making, information theory, and data visualization.
2. Graduates will be qualified to engage in interdisciplinary projects with data analytics components, including facility in communicating with engineers, scientists, and computing professionals.
3. Graduates will have been exposed to the ethical and scientific obligations of the data analyst.

The B.S.D.S. is not accredited by the Computing Accreditation Commission or Engineering Accreditation Commission of ABET. For an ABET-accredited degree, see the Bachelor of Science in Computer Science (B.S.C.S.), Bachelor of Science in Computer Engineering (B.S.Cp.E.), or Bachelor of Science in Electrical Engineering (B.S.E.E.).

The Bachelor of Science in Data Science (B.S.D.S.) requires 120 semester-hours of study, including introductory, foundation, HASS, breadth, and concentration courses. Introductory courses (10 courses) include an Engineering 1 course; Engineering Science 2; Mathematics 32, 34 or 39, 42 or 44, and 61; Physics 11; Chemistry 1 or 16; one of Physics 12, Chemistry 2, or Biology 13; and a natural science elective. For natural science courses accepted towards the Engineering degrees, refer to the online course catalog for courses with attribute "SOE-Natural Science." The foundation requirement (five courses) includes Computer Science 11 and 15, Mathematics 70 or 72, one course in ethics and social context (Philosophy 24 or Engineering Management 54), and a statistics course chosen from MATH 166 or Electrical Engineering 24 or 104.

The Humanities, Social Sciences, and Arts (HASS) requirement (six courses) includes English 1 or 3 and five courses in Humanities, Arts, or Social Sciences. Of these five courses, one must be Humanities, one must be Social Science, and two must be in the same department. Allowable courses in Humanities, Arts, and Social Sciences are listed in the online course catalog with attribute "SOE-HASS-Humanities," "SOE-HASS-Arts," and "SOE-HASS-Social Sciences," respectively.

The disciplinary breadth requirement includes three courses in a related application discipline including physics, biology, chemistry, and others. Each student must plan a set of three courses and petition the Data Science program directors for approval.

The concentration requirement (11 courses) includes Computer Science 40, 135, and 160, Mathematics 128 or Computer Science 136, and five Data Science electives, three of which must be numbered above 100. Those three must include: (A) one course in data infrastructure (including Computer Science 51, 112, 115, 116, 117, 118, and 151); (B) one course in data analytics and/or interfaces (including Computer Science 52, 152, 171, 175, and 177); and (C) one course in computational and theoretical aspects of data science (including Computer Science 131, 136, 137, 138, 153, and 160; Mathematics 123, 125, and 126; and Electrical Engineering 109, 127, 130, 133, and 140); plus 2 additional courses from (A)-(C) as well as Mathematics 123, 125, 126, 133, 153, 155, 156, 165, and 166, Mechanical Engineering 150, and Civil and Environmental Engineering 187; and at most three semester hour units of Independent Study or Research (Computer Science 93, 94, 191, 193, or 194; Electrical Engineering 93, 94, 95, 96, 191, or 192) and at most four semester hour units of thesis (Computer Science 197 or Electrical Engineering 197). A capstone experience including the two courses Computer Science 87 and 88 (Senior Capstone Project in Data Science I and II) is required. For a research experience, students should consider partly fulfilling concentration elective requirements via a senior thesis, coordinated with the

capstone experience and breadth elective choices.

While only one of Mathematics 126 and Computer Science 136 is required among the concentration classes, students are encouraged to take both classes using a data science elective slot.

The following sample program is one way of satisfying the above requirements; further information regarding options and procedures is available from the program website <http://engineering.tufts.edu/cs/bachelor-science-data-science>.

First Year

FALL TERM

Mathematics 32

Physics 11

English 1

Engineering 1

SPRING TERM

Mathematics 34

Computer Science 11 *Introduction to Computer Science*

Chemistry 1 or 16

Engineering Science 2 or elective with attribute value SOE-Engineering

Sophomore Year

FALL TERM

Mathematics 42 or 44

Computer Science 15 *Data Structures*

Computer Science/Mathematics 61 *Discrete Mathematics*

Physics 12, Chemistry 2, or Biology 13

Humanities, social sciences, or arts elective

SPRING TERM

Mathematics 70 or 72

Engineering Management 54 *Engineering Leadership*

Computer Science 40 *Computer Architecture*

Natural science elective

Free elective

Junior Year

FALL TERM

Computer Science 135 *Machine Learning*

Data science elective

Statistics (Electrical Engineering 24)

Disciplinary breadth elective

Humanities, social sciences, or arts elective

SPRING TERM

Computer Science 160 *Algorithms*

Data science elective

Disciplinary breadth elective

Humanities, social sciences, or arts elective

Free elective

Senior Year

FALL TERM

Computer Science 87 Senior Capstone Project in Data Science I

Computer Science 136 Statistical Machine Learning, or **Electrical Engineering 140** Stochastic Processes (or other Data

Science elective)

Data science elective

Disciplinary breadth elective

Humanities, social sciences, or arts elective

SPRING TERM

Computer Science 88 Senior Capstone Project in Data Science II

Mathematics 126 Numerical Linear Algebra

Data science elective

Humanities, social sciences, or arts elective

Free elective

UNDERGRADUATE MINOR PROGRAM

Minor in Computer Science

The undergraduate minor in Computer Science is open to undergraduates in the Schools of Arts and Sciences and Engineering, and consists of five courses, including Computer Science 15; two courses chosen from Computer Science 40, 105, 160, and 170; Computer Science/Mathematics 61; and one additional elective course in computer science numbered above 15. Only one of Computer Science 80 or 105 may be counted toward the minor. All courses to be counted toward the minor must be completed with a grade of C- or better. Computer Science 53, 55, 153, 154, and 155 may not be used as the computer science elective.

POST-BACCALAUREATE PROGRAM IN COMPUTER SCIENCE

The post-baccalaureate 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 to graduate study in computer science. For more information, visit the website <https://engineering.tufts.edu/cs/current/certificate-postbac>.

The program requires five Tufts courses:

Computer Science 15 Data Structures*

Computer Science 61 or **Mathematics 61** Discrete Mathematics

Choose two:

Computer Science 40 Machine Structure and Assembly Language Programming

Computer Science 105 Programming Languages**, ***

Computer Science 160 Algorithms***

Computer Science 170 Theory of Computation***

One elective:

One computer science elective above **Computer Science 15******

*Prerequisite course **Computer Science 11**: *Introduction to Computer Science* is available to individuals without a previous programming course.

Only one of **Computer Science 80 and **105** may be counted toward the program.

***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.

**** Computer Science 53, 55, 153, 154, and 155 may not be utilized as the Computer Science elective.

CERTIFICATE PROGRAMS

Certificate 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-paced technology field.

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. Courses may be chosen from our regular department offerings or from our Computer Science 150 Special Topics offerings, which are offered in particularly “hot” areas of interest or in a unique specialty area of Tufts faculty. For more information, please visit the website <https://engineering.tufts.edu/cs/current/certificate-pos-tba.c>.

Certificate in Data Science

The Certificate in Data Science is a post-graduate degree that prepares students for employment and further study in this quickly evolving field. The Certificate in Data Science is jointly administered by the departments of **Computer Science** and **Electrical and Computer Engineering**. The Certificate in Data Science requires a minimum of five courses, including Electrical Engineering 104 and Computer Science 135. Three electives must include: (A) one course in data infrastructure (including Computer Science 112, 115, 116, 117, 118, and 151); (B) one course in data analysis and/or interfaces (including Computer Science 152, 167, 171, 175, and 177; Mechanical Engineering 150; and Civil and Environmental Engineering 187); and (C) one course in computational and theoretical aspects of data analysis (including Computer Science 131, 136, 137, 138, 153, 160, and 236; Mathematics 123, 125, 126, 133, 153, 155, 156, 165, and 166; and Electrical Engineering 109, 127, 130, 133, and 140). Students lacking the prerequisites for these courses must complete those prerequisites as part of the certificate; these include Mathematics 32, 34, and 70, and Computer Science 11, 15, and 61.

Upon successful completion of certificate requirements with grades of B- or better, the student may either receive the certificate or apply for admission to the Master of Science in Data Science (M.S.D.S.) program. If accepted to the M.S.D.S. program, all graduate credits earned toward the certificate with a grade of B- or better may be transferred to apply toward M.S.D.S. requirements.

Certificate in Human-Computer Interaction

In an interdisciplinary collaboration between the Department of Psychology, the Department of Computer Science, the Department of Mechanical Engineering—Human Factors Engineering Program, 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, visit the website <https://engineering.tufts.edu/cs/hci-certificate>.

The certificate requires four courses.

1. Two foundation courses:

Computer Science 171 Human-Computer Interaction

Psychology 53 Introduction to Engineering Psychology or Engineering Psychology 61 Introduction to Human Factors Engineering

2. One or more of the following:

Computer Science 86 Object Oriented Programming for GUIs

Engineering Psychology 161 Human Factors in Product Design

Engineering Psychology 162 Man-Machine System Design

Engineering Psychology 166 Applied Design of Software User Interfaces

Psychology 130 Advanced Engineering Psychology

3. Electives:

Computer Science 20 Web Programming

Computer Science 175 Computer Graphics

Electrical Engineering 120 Computer Animation for Technical Communications

Occupational Therapy 105 Assistive Technology

Engineering Psychology 215 Interface Design in Complex Systems

(Students may substitute other Tufts graduate courses, subject to the approval of the certificate advisor.)

MASTER OF SCIENCE

Master of Science in Computer Science

The Master of Science degree requires 30 semester hour units at the 100 level or above. At least 24 semester hour units must be earned by taking approved courses. The remaining six semester hour units may be earned by a combination of approved courses, a master's project or 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 first obtain the approval of the department.

Students must also demonstrate competency as expected from a high-quality undergraduate program in computer science, particularly in the areas of discrete mathematics, computer architecture and assembly language, programming languages, data structures and analysis of algorithms, and theory of computation. These topics are covered, respectively, in Computer Science 61, 40, 105, 160, and 170. The courses 105, 160, and 170 may be taken as part of the master's degree program.

Students may also include a master's project or thesis in lieu of one or more courses. The project includes a written report which must be approved by a member of the faculty. Substantial projects, typically involving research, can earn up to three semester hour units through the courses Computer Science 293 and 294. Alternately, a master's thesis, defended orally, may be counted as between three and six semester hour units, through the courses Computer Science 295 and 296.

The courses Computer Science 153 and 154 may not be used as electives in the Master of Science in Computer Science. At most one course numbered Computer Science 155 may be used as an elective for the Master of Science in Computer Science.

Master of Science in Data Science

Data Science refers to the principles and practices in data analysis that support data-centric real-world problem solving. The Master of Science in Data Science (M.S.D.S.), administered jointly by the departments of Computer Science and Electrical and Computer Engineering, prepares students for future careers and/or further study in Data Science.

Outcomes of the program include are that:

1. Graduates will demonstrate facility in a variety of data analysis techniques, including machine learning, optimization, statistical decision-making, information theory, and data visualization.
2. Graduates will be qualified to engage in interdisciplinary projects with data analytics components, including facility in communicating with engineers, scientists, and computing professionals.

The M.S.D.S. is built upon a disciplinary core of statistics and machine learning, with depth provided by courses in each of the following categories:

- A. Data infrastructure and systems: those systems and strategies that are core to interacting with data, including computer networks, computer security, internet-scale systems, cloud computing, and others.
- B. Data analysis and interfaces: those components of computing concentrated around effective human interaction with computers, including human-computer interaction, graphics, visualization, and others.
- C. Computational and theoretical aspects of data science: mathematical foundations, including information theory, signal and image processing, and numerical analysis.
- D. Practice of data science: examples of effective use of data science in practice, including case studies and applications of data science principles to real-world problems.

The M.S.D.S. is a one-year program that may be completed either in 9 or 12 months of study. Prerequisites for the M.S.D.S. include a Bachelor of Science degree in a science, technology, engineering, or mathematics (STEM) field. Applicants with Bachelor's degrees in non-STEM fields may begin study with a Certificate in Data Science that—in an additional term—gives the applicant a sample of the program.

Requirements for the degree include a minimum of 30 semester hour units of study, and must include Electrical Engineering 104 and Computer Science 119 and 135. Three electives must include: (A) one course in data infrastructure

(including Computer Science 112, 115, 116, 117, 118, and 151); (B) one course in data analysis and/or interfaces (including Computer Science 152, 167, 171, 175, and 177; Mechanical Engineering 150; and Civil and Environmental Engineering 187); and (C) one course in computational and theoretical aspects of data analysis (including Computer Science 131, 136, 137, 138, 153, 160, and 236; Mathematics 123, 125, 126, 133, 153, 155, 156, 165, and 166; and Electrical Engineering 109, 127, 130, 133, and 140). A practice requirement may be fulfilled by (D) a course in the practice of Data Science (Computer Science 154) or a master's project in Data Science (Computer Science 283). Two more electives from categories (A)-(D) are chosen in consultation with the student's advisor.

One way of completing the program is as follows:

FALL TERM

Electrical Engineering 104 *Probability and Statistics*
Computer Science 135 *Introduction to Machine Learning*
Data science elective
Data science elective

SPRING TERM

Computer Science 119 *Big Data*
Data science elective
Data science elective
Data science elective

SPRING OR SUMMER TERM

Computer Science 154 or master's project in Data Science

Combined BS/M.S.D.S. option

The M.S.D.S. may be combined with appropriate Tufts BS programs in Engineering or Arts and Sciences. Applicants should conform to application deadlines for combined degrees. In addition, applicants to the combined degree programs should take prerequisite undergraduate courses for the M.S.D.S. program toward their undergraduate requirements, including Computer Science 11 and 15; Mathematics 70 or 72; and Computer Science/Mathematics 61.

Master of Science in Computer Engineering

The Departments of Computer Science and Electrical and Computer Engineering also jointly offer a Master of Science in Computer Engineering. This one-year professional program builds the skills necessary for employment in Computer Engineering. Please see the detailed program description listed under **Electrical and Computer Engineering**.

Master of Science in Bioengineering – Bioinformatics Track

The Department of Computer Science is the home for the Bioinformatics track of the interdisciplinary Master of Science in Bioengineering program. This interdisciplinary Master of Science program utilizes computational approaches to biomedical problems. For more information, please see the program description listed under **Chemical and Biological Engineering**, and the track website at <http://engineering.tufts.edu/bioengineering>.

Master of Science in Human-Robot Interaction

Human-Robot Interaction (HRI) is an interdisciplinary effort aimed at understanding and improving all aspects of interactions between humans and robots. It draws on knowledge from computer science, mechanical and electrical engineering, as well as psychology, philosophy, anthropology, and legal fields, among various others. Prospective students apply to the joint HRI programs through one of three host departments: **Computer Science, Electrical and Computer Engineering, and Mechanical Engineering**. For more details, please see

<http://hri.tufts.edu/academics/MSprogramRequirements.htm>.

DOCTORAL PROGRAM

Doctor of Philosophy in Computer Science

Students may have either a bachelor's degree or a master's degree in computer science or a related field to be admitted to the Ph.D. program. Doctoral study consists of preliminary coursework and study, qualifying exams, and creative research culminating in a written dissertation. Detailed requirements and procedures for the Ph.D. program are outlined on the department web pages at <https://engineering.tufts.edu/cs/current/phd>.

Joint Doctor of Philosophy: Computer Science and Human-Robot Interaction

Human-Robot Interaction (HRI) is an interdisciplinary effort aimed at understanding and improving all aspects of interactions between humans and robots. It draws on knowledge from computer science, mechanical and electrical engineering, as well as psychology, philosophy, anthropology, and legal fields, among various others. For more details, please visit the program description at <http://hri.tufts.edu/academics/PhDprogramRequirements.htm>.

Joint Doctor of Philosophy: Computer Science and Cognitive Science

Cutting across the information and life sciences, cognitive science is a paradigmatic multi- and inter-disciplinary research program with enormous future societal benefits, especially as intelligent artificial agents are becoming part of our lives. A graduate student in the Cognitive Science program is required to meet the requirements of their home department (Psychology, Child Study and Human Development, or Computer Science) as well as the requirements for the Cognitive Science program. In the Computer Science/Cognitive Psychology joint Ph.D. program, in addition to the Computer Science Ph.D. requirements, a minimum of 12 cognitive science courses are required: five core courses and seven electives. For more details, please see <http://cogsci.tufts.edu/academics/>.

Computer Science Certificate Program

Faculty advisor:

Professor Robert Jacob

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—machine learning, computational biology, advanced programming languages, robotics, networks and cloud computing, visualization, 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, visit the website

<http://www.cs.tufts.edu/Other-Graduate-Programs/computer-science-certificate-program.html>.

Theatre, Dance, and Performance Studies

(FOR DANCE INFORMATION, SEE DANCE)

Professor Heather S. Nathans, Chair; Theatre history, dramatic literature and criticism, directing; Alice and Nathan Gantcher Professor of Judaic Studies

Professor of the Practice Jennifer Burton, Filmmaking and Film Studies

Lecturer Renata Celichowska, Director of Dance; Dance Studies

Senior Lecturer Linda Ross Girard, Costume Design; Director of Undergraduate Studies in Drama

Professor Barbara Wallace Grossman, Theatre history, dramatic literature and criticism, directing, voice

Professor of the Practice Khary Jones, Filmmaking and Film Studies

Mellon Assistant Professor, Kareem Khubchandani, Performance Studies, Queer Studies, Southeast Asian Studies

Lecturer Brian J. Lilienthal, Lighting Design

Fletcher Foundation Assistant Professor of Dramatic Literature, Lily Mengesha, Performance Studies, Indigenous Studies

Associate Professor Noe Montez, Theatre history, dramatic literature and theory, directing; Director of Graduate Studies in Drama

Senior Lecturer Daniel McCusker, Dance; Head of Dance Performance

Associate Professor Tasha Oren, Film, Media, and Television Studies

Lecturer Meghan Pearson, Costume Production and Technology

Professor Emeritus Laurence Senelick, Fletcher Professor of Oratory; Dramatic literature and theory, theatre and film history

Senior Lecturer Ted Simpson, Head of Design; Set Design

Lecturer Adam Smith, Sound Engineering

Senior Lecturer Sheridan Thomas, Head of Acting

Lecturer Jo Williams, Stage Management and Production Manager

The Department of Theatre, Dance, and Performance Studies celebrates the power of scholar-artists to engage with their society, pose challenging questions, and re-imagine the role of the arts in contemporary culture. We are deeply committed to sustaining a diverse and inclusive community. Our work is enriched by students, faculty, and colleagues able to share differing opinions and experiences with respect and compassion. The courses we offer and the works we produce challenge us to recognize, value, and give voice to social justice issues. We tell stories that recognize the humanity and lived experience of people of color, LGBTQ citizens, and people with disabilities. We believe that the arts offer a unique opportunity to expand our understanding of what it means to be a more open, representative, and collaborative community.

With over twenty-five full-time and part-time faculty and staff in areas including acting, dance, design, directing, dramatic history and literature, dramaturgy, film, production, and technical theatre, we offer an undergraduate major and minor in Theatre and Performance Studies, a minor in Dance, and an MA/PhD program in Theatre and Performance Studies.

Our undergraduate program provides a strong liberal arts approach to the intellectual, historical, and aesthetic dimensions of performance. Theatre, Dance, and Performance Studies courses and performances explore a wide range of styles and techniques.

Whatever your area of interest within the field may be, you will be able to explore it at Tufts. You will also enjoy opportunities for close collaboration with fellow students and actively engaged mentorship from department faculty and staff.

The MA/PhD program trains students in performances of identity and power, drawing on careful study of the lived experiences and representations of those who live in minoritarian positionalities. Students enjoy one-on-one working relationships with award-winning professors and in a region that boasts some of the most impressive archives in the country, as well as several professional theatre companies and dance troupes.

PERFORMANCE ACTIVITIES

Courses and productions are open to all Tufts students, regardless of major. If you have questions about the audition process or how to get involved, you are welcome to contact us.

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, and even producing. Students 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.

We stage three major faculty-directed productions per year in Drama, plus two faculty-directed Dance concerts. The season is rounded out by numerous student-directed shows each semester, as well as our twice-annual "Dance MashUp."

Students may receive course credit for their involvement in departmental productions.

Several student groups are active throughout the year in the theatre and other spaces on campus. These groups include Pen, Paint, and Pretzels (3Ps), the largest theatre organization at Tufts; Torn Ticket II, which is dedicated to musical theatre; and Bare Bodkin, specializing in student-written work. There are other performance opportunities with Cheap Sox (improvisational comedy), HYPE! (mime), and Traveling Treasure Trunk (children's theatre).

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Theatre and Performance Studies

The major in theatre and performance studies provides a balanced mix of study and practice, understanding and process, creativity, adaptability, and analytical thinking. With its focus on effective communication and imaginative exploration, a theatre and performance studies 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. Majors often complete double majors in combination with many other departments and programs.

The TPS major consists of eleven courses and related requirements, including:

1. One course in Foundational Theatre History and/or Theory of Theatre, Dance, and Performance Studies. Drama (TPS) 2, 3, or 4 (or equivalent course)
2. Three courses in Theatre and related Arts, History and Theory (or equivalent course)
3. Two Courses in Practical Performance
4. One Theatre Technology Course
5. One Visual Design Course
6. Three courses in or related to the student's specific area of interest, chosen in consultation with their major adviser.
One of these must be an upper level course.
7. Two required crews (0 credit, pass/fail) on a faculty-directed major production

Each TPS major is expected to gain experience in the creative aspects of theatre and/or dance through involvement in the production program of the university. Graduating magna cum laude or summa cum laude with a TPS major is contingent not only on scholastic achievement, but on significant participation in productions.

Students considering a TPS major should take either the First Year Showcase class or Introduction to Theatre and will find it advantageous to complete at least one of the required history/literature courses, the crew requirements, 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 courses, production responsibilities, and capstone or thesis projects later. We strongly recommend that students who plan to pursue professional training or graduate school take more than the eleven-course course minimum, especially in their intended area of specialization. Prospective majors may find a recommended course plan at: <http://dramadance.tufts.edu/documents/dramaMajor4YearPlan.pdf>. (Please note that our courses are being re-numbered and those will go into effect in spring of 2020.)

UNDERGRADUATE MINOR PROGRAMS

Minor in Theatre and Performance Studies

The TPS minor consists of a minimum of five courses taken in the department: two in literature/history (including either Drama/TPS 2, 3, or 4) and three other courses selected in a plan approved by the designated minor advisor. TPS minors have the option of choosing an emphasis in acting, directing, design, technical theatre, or theatre studies. TPS minors are also required to serve on either one prep crew or one run crew for a departmental major production.

GRADUATE PROGRAM in Theatre and Performance Studies

The graduate program in Theatre and Performance Studies trains scholar-artists to develop projects in theatre history, performance studies, critical theory, and textual analysis in various theatrical traditions, performance cultures, and global contexts. Gender, race, ethnicity, sexual identity, and class function as primary subjects of scholarly and performative inquiry for many projects undertaken by faculty and students alike. We believe that people of color, individuals living with disability, transgender populations and first-generation students produce new ways of looking and knowing that facilitate thinking and working in a diverse classroom. Consequently, we welcome students from underrepresented communities.

Enrollment is small to provide individual attention to the scholarly, pedagogical, and artistic projects that shape the student experience at Tufts. In addition to drawing upon Tufts' esteemed Theatre, Dance, and Performance Studies faculty, we offer students the opportunity to take courses across the Boston Consortium for Higher Education.

The Department of Theatre, Dance, and Performance Studies training is directly linked to teaching, professionalization, and service. Graduate students serve as teaching assistants in a variety of theatre history, dramatic literature and analysis, and performance courses. Opportunities to develop and teach courses in students' areas of specialization also exist within the department, Tufts' acclaimed Experimental College, and through adjunct appointments across Greater Boston. Additionally, our students serve as actors, directors, designers and dramaturgs on campus and throughout greater Boston.

Graduate faculty mentor students' professionalization by actively facilitating publication, conference presentations, and membership in professional organizations including the American Society for Theatre Research (ASTR), the Association for Theatre in Higher Education (ATHE), the Mid-America Theatre Conference (MATC), and many more. Students receive travel and research support on an annual basis, courtesy of the Sherwood Collins Fund. Additionally, the department offers workshops and short courses in pedagogy, professional development, and strategies for navigating the academic job market and alternative job markets for students who wish to pursue careers in arts administration, editing, grant writing, higher education administration, library studies, publishing and technical writing. Graduates of the program are qualified and competitive for a variety of employment possibilities.

Tufts Theatre and Performance Studies faculty engage in active service within the university, across the field of theatre studies, and in state and national bodies of civic engagement. Professors currently function as the Members of the American Society for Theatre Research and the American Theatre and Drama Society's executive committees, ATHE's Vice President for Advocacy, leaders the Latinx, Indigenous, and the Americas Focus Group, and the Massachusetts Cultural Council. Previously, faculty have served on the National Council on the Arts, and the United States Holocaust Memorial Council. We look to recruit students who view service and leadership as important to their scholarly trajectories.

The full *Graduate Handbook* for the MA/PhD in Theatre and Performance Studies is available at:

<http://dramadance.tufts.edu/documents/gradHandbook.pdf>

M.A./Ph.D. in Theatre and Performance Studies

The M.A./Ph.D. program is not designed to grant a terminal M.A. degree. Instead, it is expected that students will proceed beyond the M.A. degree to Ph.D. study whether at Tufts or elsewhere. Students who enter the program at the Master's level must apply to the department to be admitted to the doctoral program upon completion of the Master's thesis and/or coursework.

For admission to the M.A./Ph.D. program, a prospective student must present a completed undergraduate record of high scholastic proficiency with a firm grounding in drama and theatre, film, dance, and performance/ performance studies. Other desirable foundation subjects include: fine arts, music, philosophy, history, languages, literature and the social sciences.

Master of Arts

Use the online application to apply for the M.A./Ph.D. in Theatre and Performance Studies and check the status of your application. All materials (apart from test scores) should be submitted electronically.

International students are required to complete the TOEFL, with a minimum score of 600 on the paper-based test or 100 on the TOEFL iBT.

A complete application should include:

- A resume of previous professional, academic, and theatrical experience (including non-English languages studied or spoken)
- A copy of all previous transcripts of grades
- A personal statement of no more than 1000 words, which speaks to your scholarly interests, academic goals, and your reasons for applying to Tufts.
- Three letters of recommendation which discuss your scholarly and professional achievements and contributions to the arts and humanities
- A writing sample which reflects a scholarly discussion of a topic in or related to theater (e.g., part of a Master's thesis, a term paper, a research article)

The Department of Theatre, Dance, and Performance Studies generally accepts three graduate students per year.

REQUIREMENTS AND RESIDENCE

A minimum of nine 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 Theatre and Performance Studies:

- 1) The student must demonstrate a reading knowledge of a non-English language by passing an examination or an approved course no later than the end of the first year. A native speaker or student whose undergraduate record indicates successful performance in a language course at the advanced level may be exempt.
- 2) The student must take a minimum of four courses in graduate seminars at the 200 level, or other special topics seminars offered by the department. Also, certain related courses in other departments may be credited toward the Master of Arts degree in Theatre and Performance Studies (not more than one in a semester), with prior consent of the advisor.
- 3) 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/TPS 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, her, or their 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, her, or their 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, supported with the appropriate medical or university documentation, and the voting consent of the graduate faculty.

Doctor of Philosophy

For admission to graduate work for the Ph.D. degree in Theatre and Performance Studies, a prospective candidate must present a completed graduate and/or undergraduate record of high scholastic proficiency with a firm grounding in drama and theatre, film, dance, and performance/ performance studies. Other desirable foundation subjects include: fine arts, music, philosophy, history, literature, languages, and social sciences. In general, the student is expected to offer for admission the equivalent of a Tufts M.A. in Theatre and Performance Studies.

For admission to the program the applicant is generally expected to offer the equivalent of a Tufts Master of Arts degree in Theatre and Performance Studies and to provide evidence of experience in theatrical production on his, her, or their résumé. 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. All Ph.D. students must take at least eight seminars within the department, including required courses Drama 220: Research Methods and Materials, Drama 221: Theatre Pedagogy, Curriculum, and Professional Development, Drama 261: Classical Dramatic Theory and Criticism, and Drama 262: Modern and Postmodern Dramatic Theory. 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. (Please note that our courses will receive new abbreviations in Spring 2020 when Drama/DR becomes TPS.)

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.

NON-ENGLISH LANGUAGE

A student must demonstrate a reading knowledge of a non-English language by passing an examination or an approved course no later than the end of the first year. A native speaker or student whose undergraduate record indicates successful performance in a language course at the advanced level may be exempt.

COMPREHENSIVE EXAMINATIONS

At the beginning of the second and third year of the PhD program, the student will complete comprehensive examinations to establish his, her, or their candidacy for the doctoral degree. These examinations will be both written and followed by an oral defense.

INTERNSHIP

To demonstrate visible skills for multiple career sectors and to demonstrate the ability to take on artistic and/or administrative projects for academic institutions, the program requires the completion of a 120-150 hour internship in art making, arts administration, and/or arts activism, to be completed during the PhD program.

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 advisor. Ordinarily the student will complete the dissertation while in residence; although for special reasons he, she, or they 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 most of them available during the period of residence. A doctoral candidate is expected, as part of the course load, to enroll in a minimum of two seminars each semester (200-level courses).

For more detailed information, please visit the website <http://ase.tufts.edu/drama-dance>.

DANCE

Full-time Lecturer Renata Celichowska, *Director of Dance; Modern, ballet, dance research, history, education, and creative process*

Senior Lecturer Daniel McCusker, *Modern, ballet, repertory, and creative process*

(Please note that our full-time Dance faculty is supplemented by a host of visiting artists every year, with areas of specialization including African and African Diasporic Dance, Ballet, Contemporary Jazz, Dance on Camera, Dance Therapy, Hip Hop/B-Boying, International Folk Dance, Kathak, Modern, and T'ai Chi).

The Dance Program in the Department of Theatre, Dance, and Performance Studies offers dance courses appropriate for students working at all levels, from those new to dance, to dancers with extensive previous experience.

The objectives of this non-conservatory program are 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 minor in dance, and dance courses may be used toward the Theatre and Performance Studies major (see TPS), and toward the fulfillment of arts, world civilization, and cultural distribution requirements. Dance performances choreographed by faculty, students, and Boston-area artists are presented on campus throughout each semester.

Dance Minor

The Dance minor requires 16 credits from among 2 and 3 credit courses focusing upon techniques and processes for embodying, creating, performing, and analyzing movement forms within their cultural and/or historical context. Requirements include a minimum of one International Dance Tradition, one technical concert dance form, one creative process course, 6-8 dance elective courses, and a 2-credit capstone research project (choreographic, performative, or written). Only lecture courses in dance may be submitted for transfer approval, except for those in Tufts abroad programs. More information about dance may be obtained at 617-627-2555, at the department office, or at <http://ase.tufts.edu/drama-dance/dance/>.

Earth and Ocean Sciences

Associate Professor Anne F. Gardulski, Chair; Sedimentology, stratigraphy, structural geology

Professor Grant Garven, Groundwater geology and hydrology, groundwater chemistry

Professor Jack C. Ridge, Quaternary, glacial, and environmental geology; geomorphology; field geology; paleomagnetism

Assistant Professor Andrew C. Kemp, Coastal systems, sea level change, oceanography, modern and paleo-climate change

Lecturer Noel A. Heim, Invertebrate paleontology, evolutionary trends, and paleobiology

ASSOCIATED FACULTY:

Professor Samuel Kounaves, Chemistry; Analytical, environmental, and planetary chemistry

Professor Laurie Baise, Civil and Environmental Engineering; Geotechnical and earthquake engineering

The Earth and ocean sciences are an interdisciplinary exploration of Earth's 4.5-billion-year history and a study of the geological processes that form and shape the rocks and minerals of our planet. Earth and ocean sciences have their own bodies of knowledge, but also draw on principles from biology, chemistry, astronomy, physics, and mathematics. Earth scientists study a variety of problems, such as the search for natural resources including water, unraveling the causes and effects of climate change, tracing the evolution of organisms and ecosystems through geologic time, and understanding the origin of the planetary bodies in our solar system. The program in Earth and Ocean Sciences, complemented by courses in supporting sciences, will prepare students well for graduate study or careers in an array of fields. Tufts University has well-equipped geological laboratories and an excellent collection of geologic materials for study and research. Research experiences with faculty and field trips in the northeastern and southwestern United States offer abundant opportunities to study a variety of geological phenomena.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The Department of Earth and Ocean Sciences offers two programs: the geological sciences major, for students who wish to pursue graduate study in Earth and ocean sciences and related fields, or work at entry-level jobs; and the environmental geology major, which emphasizes breadth and flexibility for students seeking a double major, teaching certification, entry to medical programs, or careers in multidisciplinary fields, such as environmental law.

Geological Sciences Major Students intending to continue with Earth and ocean sciences after graduation should complete the following courses: EOS 1 or 2, 11, and 22. In addition, students must select a total of seven more courses from the following groups: three courses from EOS 12, 13, 32, 42, and 52; one course from EOS 131 and 133; and three additional EOS or approved related fields courses. In addition, students must complete CHEM 1 or 11, and PHY 1 or 11, and one course from MATH 21 or 32, COMP 11, or BIO 132. The Chemistry and Physics courses must be taken with labs. CHEM 2, PHY 2 or 12, MATH 32 and 34, research experience, and a six-week summer field camp are strongly recommended.

Environmental Geology Major

Students electing this option should complete either EOS 1 or 2, nine additional EOS courses, plus CHEM 1 or 11 and PHY 1 or 11 with labs. Approved related fields science and mathematics courses may replace as many as three of the nine additional EOS courses for Arts and Sciences students. Engineering students with a double major in environmental geology may use upper-level engineering courses to substitute for up to two of the nine additional EOS courses with prior written consent. No more than a total of four EOS courses may be replaced by engineering and related fields courses for engineering students.

UNDERGRADUATE MINOR PROGRAMS

Geology Minor

The Department of Earth and Ocean Sciences offers a minor in geology available to students in the School of Engineering. The faculty advisor for this minor is Professor Anne Gardulski.

Five courses are required for the minor. They normally include:

EOS 1 The Dynamic Earth or EOS 2 Environmental Geology

EOS 22 Structural Geology or EOS 32 Geomorphology

EOS 131 Groundwater

Two electives selected from the following:

EOS 1 The Dynamic Earth **EOS 2** Environmental Geology **EOS 5** Oceanography **EOS 11** Mineralogy **EOS 12**

Igneous and Metamorphic Petrology **EOS 22** Structural Geology

EOS 32 Geomorphology

EOS 42 Sedimentology and Stratigraphy **EOS 51** Global Climate Change **EOS 52** Paleoclimate **EOS 104** Geological Applications of GIS

EOS 115 Quaternary and Glacial Geology

EOS 133 Field Methods in Hydrogeology

Note that EOS 1, 2, 11, 12, 22, 51, 52, 131, and 133 are generally offered every year, but EOS 32, 42, and 115 are offered in alternate years. Schedule planning for these courses is important.

Geoscience Minor

The Department of Earth and Ocean Sciences offers a minor in geoscience available to Arts and Sciences students who are majoring in archaeology, biology, chemistry, computer science, mathematics, physics and astronomy, or quantitative economics. The faculty advisor for this minor is Professor **Anne Gardulski**.

Five courses are required for the minor. They normally include:

EOS 1 The Dynamic Earth or **EOS 2** Environmental Geology

Four EOS electives are also selected, in consultation with the faculty advisor. These courses are intended to complement the student's major and scientific or mathematical interests.

Geoengineering Minor

The Department of Civil and Environmental Engineering 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 **Laurie Baise** is the advisor 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

Civil and Environmental Engineering 146 Foundation Engineering

Civil and Environmental Engineering 149 Earth Support Systems

Prerequisites for the above course sequence are Mathematics 34 and Physics 12.

For more detailed information, please see the website <http://eos.tufts.edu>.

Economics

Professor Daniel Richards, *Chair; Industrial organization, macroeconomics*

Professor Marcelo Bianconi, *Applied macroeconomics and finance, applied econometrics*

Professor Ujjayant Chakravorty, *Resource and environmental economics, energy and water resources, climate change*

Professor Yannis Ioannides, *Max and Herta Neubauer Chair in Economics; macroeconomics, growth, urban economics, housing*

Professor Margaret McMillan, *Director of Economics and Public Policy Ph.D. Program, Development economics*

Professor Gilbert E. Metcalf, *DiBiaggio Chair in Citizenship and Public Service, Director of Graduate Studies, Public finance, applied microeconomics*

Professor Lynne Pepall, *Industrial organization, applied microeconomics*

Professor Enrico Spolaore, *Seth Merrin Chair, Political economics, international economics, macroeconomics, economic growth/development*

Professor Jeffrey Zabel, *Director of Human Developmental Economics Ph.D. Program, Econometrics, labor economics*

Associate Professor Drusilla Brown, *International trade theory and policy*

Associate Professor Thomas Downes, *Public finance, economics of education*

Associate Professor Silke Forbes, *Industrial organization, economics of organizations*

Associate Professor Emeritus David Garman, *Applied econometrics*

Associate Professor Laura Gee, *Applied microeconomics, behavioral and experimental economics*

Associate Professor Edward Kutsoati, *Director of Undergraduate Studies; Money and financial markets, applied microeconomics*

Associate Professor Melissa McInerney, *Health and labor economics*

Associate Professor Adam Storeygard, *Development and growth, urban economics*

James L. Paddock Assistant Professor Kyle Emerick, *Agricultural economics, economic development, food and nutrition*

Assistant Professor Federico Esposito, *International trade, international finance*

Assistant Professor Alan Finkelstein Shapiro, *Macroeconomics, macro-labor, international macroeconomics, monetary economics*

Assistant Professor Cynthia Kinnan, *Development economics, contract economics*

Assistant Professor Eoin McGuirk, *Development economics, political economics, applied microeconomics*

Gunnar Myrdal Assistant Professor Elizabeth Setren, *Labor economics, education*

Senior Lecturer Anna Hardman, *Urban economics, housing, international migration, development economics*

Professor of the Practice Judith Bentkover, *Health economics*

B.L.R. Professor of the Practice Christopher Manos, *Finance, entrepreneurship*

SECONDARY APPOINTMENTS:

Adjunct Associate Professor Jenny Aker, *Development economics*

Adjunct Professor Michael Klein, *International economics, macroeconomics*

Adjunct Professor William Masters, *Development economics, food and food industry*

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 to 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 website at <http://ase.tufts.edu/economics/undergrad/requirements.htm>. 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 somewhat less structured and allows some greater 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. There are required mathematics courses, normally completed by the end of the sophomore year;. There are also core economics courses, which cover the elements of economic theory and method; and elective courses, and which should normally be completed by the end of the junior year. Finally, there are elective economics courses selected by the student subject to additional 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 Principles of Economics with Environmental Applications (Economics 8) or equivalent.

MATHEMATICS COURSE(S)

Economics majors must complete Mathematics 32 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 Advanced Placement tests).

Majors graduating in the classes of 2018, 2019, and 2020 only may substitute Mathematics 30 and one other course with appropriate math content for Mathematics 32, provided the second course is approved by the Department. Students who make this substitution (which is generally not advised) must still take the four core and five elective courses described below. Students pursuing this option should also recognize 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: Intermediate Microeconomics (Economics 11), Intermediate Macroeconomics (Economics 12), Statistics (Economics 13), 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 166, formerly Mathematics 162, Engineering Science 56, Electrical Engineering 104 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 12, students can take Economics 18 or 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 courses numbered at the 100 level or above. See the handbook for details.

Beginning with the class of 2019, all majors are required to take at least one upper level seminar class.

Upper level seminars are courses that focus on a specialized topic in the field of economics. Because of this specialized focus, all seminars have at least one of the core courses (Economics 11, Economics 16, Economics 12/18, Economics 13, Economics 15/107) as a prerequisite. In addition, seminars are small classes that place an emphasis on class interactions, the writing of papers, and the reading of journal articles. Seminar courses provide alternative ways to have “hands-on” research experience that underlie the seminar requirement. This experience could be offered by a required research paper. However, courses that ask students to complete a series of short policy briefs, a critical literature review, or a group project that requires substantive research and writing may count as seminars. Courses that satisfy the seminar requirement are denoted with an ampersand (&) in the department’s course offerings located at <http://ase.tufts.edu/economics/courses/offering.htm>

Option II: Major in Quantitative Economics

PREREQUISITE

Principles of Economics (Economics 5) or Principles of Economics with Environmental Applications (Economics 8) or equivalent.

MATHEMATICS COURSES

Mathematics 32 and Mathematics 34 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. Students should be aware that Mathematics 39 and 44 can be offered as substitutes for Mathematics 32, 34, and 42. One additional mathematics course is also required: Mathematics 70 or 72.

CORE COURSES

Five core courses are required: Intermediate Microeconomics (Economics 11); Statistics (Economics 13), Foundations of Quantitative Economics (Economics 16) or Microeconomic Theory I (Economics 203), Quantitative Intermediate Macroeconomics (Economics 18) or Macroeconomic Theory I (Economics 205), and Econometrics (either Economics 107 or 202). Students must complete Economics 11 before taking Economics 16 or 203. In turn, students must complete Economics 16 or 203 before taking Economics 18 or 205. No course offered as a core course can also be used as an elective course. In place of Economics 13, students can take Mathematics 166, formerly Mathematics 162, Engineering Science 56, Electrical Engineering 104 or Economics 201.

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 elective course must be open only to students who have completed the relevant quantitative prerequisite course (Economics 16, 18, or 107) or its equivalent.

The third restriction varies depending on the student’s graduation year. Beginning with the class of 2019, all majors are required to take at least one upper level seminar class. Upper level seminars are courses that focus on a specialized topic in the field of economics. Because of this specialized focus, all seminars have at least one of the core courses (Economics 11, Economics 16, Economics 12/18, Economics 13, Economics 15/107) as a prerequisite. In addition, seminars are small classes that place an emphasis on class interactions, the writing of papers, and the reading of journal articles. Seminar courses provide alternative ways to have “hands-on” research experience that underlie the seminar requirement. This experience could be offered by a required research paper. However, courses that ask students to complete a series of short policy briefs, a critical literature review, or a group project that requires substantive research and writing may count as seminars. Courses that satisfy the seminar requirement are listed with an ampersand (&) in the Department’s Course Offerings.

Quantitative Economics majors graduating before 2019 must include in their four electives *either* at least one of the upper level seminar classes described above; *or* at least one of the 100-level economics courses that are explicitly designated as a “research-paper course,” or a senior thesis credit. Research-

paper courses are denoted with an asterisk (*) in the department's course offerings located at <http://ase.tufts.edu/economics/courses/offerings.htm>.

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 the 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 Principles of Economics with Environmental Applications (Economics 8) 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, Mathematics 166, formerly Mathematics 162, Engineering Science 56, or Electrical Engineering 104)

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.

Minor in Finance

The minor in Finance is a six-course interdisciplinary minor that gives students a foundation in the formal economics of financial markets and supplements that foundation with important mathematical and philosophical tools. The courses in the minor address the study of intertemporal pricing, theoretical and empirical analysis of decision-making under uncertainty, and both positive and normative issues in settings of asymmetric information.

As described below, the six courses in the minor include the three core classes, two electives, and a capstone seminar. Within this structure, Economics 50 may not be double-counted for both a Finance minor and either an Economics or a Quantitative Economics Concentration. Either Economics 157 or Philosophy 197 may be taken in connection with a concurrent internship with the consent of the course instructor and the Finance minor advisor. At most, one Finance minor elective may be double-counted as an Economics or Quantitative Economics major elective. No more than two courses, regardless of SHUs, used toward the minor may be used toward a foundation, distribution, or concentration requirement.

CORE COURSES

The core classes for the minor in Finance are Economics 50, Introduction to Finance; Mathematics 32,

Calculus 1; and either Philosophy 24, Introduction to Ethics, or Philosophy 38, Rational Choice.

ELECTIVE COURSES

Finance minors must complete any two of the following classes to fulfill their electives requirement: ELS 103, Entrepreneurial Finance; Economics 150, Financial Economics; Economics 151, Monetary Economics; Economics 152, Topics in Money and Finance; Economics 154, Uncertainty Methods in Economics and Finance; Economics 159, Quantitative Financial Economics; and Economics 169, Quantitative International Finance.

CAPSTONE COURSE EXPERIENCE

In order to fulfill the Capstone Course requirement, each Finance minor must complete either Economics 157, Topics in Finance and Entrepreneurship, or Philosophy 197, Ethics, Law and Society.

For questions about the minor in Finance, please contact Professor Chris Manos, who serves as advisor to the program.

GRADUATE PROGRAM

Master of Science

The Economics Department offers a Master of Science (M.S.) program. 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, mathematics and statistics. Students lacking this minimum training, but possessing a good background in a related discipline, may be admitted with the understanding that additional work will be required. The department offers a mathematics review course (Math Camp), which lasts one week and takes place at the end of August, before the first day of classes in the Fall term. All applicants, except Tufts undergraduates in arts and sciences, must submit the Graduate Record Examination (GRE) with their application.

The Master of Science Program in Economics has two tracks: Course-Based and Research-Based. The M.S. Course-Based track is a thirty semester hour unit program, which can be completed in one year, without a thesis. The M.S. Research-Based track is a forty-three semester hour unit program to be completed in two years, with a master's thesis. Both MS Programs carry STEM certification.

All entering students will be admitted to the Master of Science program in Economics and will be asked about their potential interest in pursuing either the M.S. Course-Based or the two-year M.S. Research-Based degree. All students are required to complete the three core sequence classes: Statistics and Econometrics; Microeconomic Theory I and II; and Macroeconomic Theory I and II. The standard course load for a full-time student is four courses per semester.

Course-Based Master of Science in Economics

The Course-Based track requires completion of six core courses (Economics 201–Economics 206), and two electives, for a total of thirty semester hour units. Electives include courses offered in the Department of Economics, courses offered in other departments at the School of Arts, Sciences, and Engineering, and at the Fletcher School, as well as at other consortium schools (Boston College, Boston University, and Brandeis University). In order to receive the Master of Science Course-Based degree, a student must complete a one-year residency requirement and must pass eight semester courses.

Research-Based Master of Science in Economics

The requirements for the Research-Based degree, in addition to the thirty semester hour unit requirement of the Course-Based track, include thirteen semester hour units: two master thesis credits, an Economics Research Seminar, and an Applied Econometrics course. To be admitted into the Research-Based Master of Science degree in the second year, students must demonstrate good standing in the first year of the program.

Specifically, a full-time M.S. Research-Based student will have to (1) show math competency by the end of the first (Fall) semester; (2) receive a final grade of B or better in all six courses (**Economics 201–Economics 206**), and a grade of A or better in at least two of those classes; (3) demonstrate ability to

conduct independent research. Students in the M.S. Research-Based degree must complete twelve credits. The thesis must be a major research project conducted under the supervision of the member of the department. The completed thesis must be presented and successfully defended in an oral examination administered by a thesis committee. In order to receive the Master of Science Research-Based degree, a student must complete a two-year residency requirement and must pass twelve semester courses.

Financial aid, scholarships, teaching and research assistantships and other opportunities are available. The department considers all teaching and research experience to be an integral part of the program.

JOINT MASTER OF SCIENCE IN ECONOMICS AND URBAN AND ENVIRONMENTAL POLICY

In addition to the regular master's program, the Economics Department also offers a two-year program, in conjunction with the Department of Urban and Environmental Policy and Planning, leading to the joint degree of Master's in Economics and Urban and Environmental Policy. Applicants to this program must be accepted by both departments.

For more detailed information, please visit the website: <http://ase.tufts.edu/economics/grad/joint.htm>.

Ph.D. PROGRAM IN HUMAN DEVELOPMENT ECONOMICS

The Eliot-Pearson Department of Child Study and Human Development (CSHD) and the Department of Economics are pleased to offer a joint Ph.D. program in Human Developmental Economics (HDE) drawing on the strengths of the two departments and recent trends and complementary advances in both disciplines. This interdisciplinary doctoral program aims to better understand human development through the study of cultural, social, emotional, economic and behavioral interactions as they contribute to socialization and decision making.

For more detailed information, please visit the website: <http://ase.tufts.edu/economics/grad/phdHDE.htm>

Ph.D. PROGRAM IN ECONOMICS AND PUBLIC POLICY

The Department of Economics and the Fletcher School of Law and Diplomacy are pleased to offer a joint Ph.D. program in Economic Policy. This program is designed to produce new scholars and policy-makers to address critical issues centered on economic development, the rising demand for energy associated with economic growth, and the environmental and climate consequences of such progress. The program blends training in microeconomics, macroeconomics, and econometrics with an understanding of institutional detail and political economy, giving students the tools necessary to address questions in economic development, energy and environmental policy within an interdisciplinary framework that is needed for policy effectiveness. Dissertation research under faculty guidance will further train students in the practice of independent and original scholarship.

For more detailed information, please visit the website at:

<http://ase.tufts.edu/economics/grad/phdEPP.htm>

Education

Professor David Hammer, Chair; STEM Education, Director, Educational Studies
Professor Bárbara M. Brizuela, Dean of Academic Affairs, Mathematics Education
Professor Andrew Izsák, Director, STEM Education, Mathematics Education
Assistant Professor Julia Svoboda Gouvea, Science Education
Assistant Professor Brian Gravel, Director, Elementary STEM Education, Science Education
Assistant Professor Shameka Powell, Critical Educational Studies, Literacy
Senior Lecturer Linda Beardsley, Undergraduate Program; Middle and High School Teacher Education
Senior Lecturer Steven Cohen, Director, Undergraduate Program; Middle and High School Teacher Education
Senior Lecturer Steven Luz-Alterman, Associate Chair; School Psychology
Senior Lecturer Silas Pinto, Director, School Psychology
Senior Lecturer Cynthia Robinson, Director, Museum Studies
Senior Lecturer Laura Rogers, Coordinator, Teacher Preparation Programs
Senior Lecturer Erin Seaton, School Psychology, Learning and Development
Lecturer Susan Barahal, Director, Art Education
Lecturer Pamela Bower-Basso, Art Education
Lecturer Ryan Redmond, Interim Director, Middle and High School Teacher Education
Lecturer Noelle Roop, School Psychology

SECONDARY APPOINTMENTS:

Associate Professor Freedon Oeur, Sociology
Adjunct Associate Professor Kristen Bethke Wendell, Engineering Education

The department is home for the study of how people learn and how to help people learn. Much of our work focuses on K-12 schools, but we study education in other contexts as well, including museums and universities. Many of our students are preparing to work in schools, as teachers or as school psychologists; some are preparing for careers in museums and some for careers in education research. Students in other departments with a variety of interests related to schools, teaching and learning, and educational theory, policy and practice may take our courses, enhancing a range of possible career directions.

Our programs for prospective educators prepare students for the scholarship of professional practice, such as in teachers' exploration and assessment of their students' ideas and reasoning, in school psychologists' examination of children's strengths and needs, or in museum educators' study of visitors' learning experiences.

Scholarship in education also includes research, such as in studies of the cultural, historical, and philosophical influences that shape schools as institutions, in investigations of the nature and dynamics of learning in particular academic disciplines, or in analyses of teachers' thinking. Faculty in the department conduct research on learning and teaching in STEM disciplines (Science, Technology, Engineering, and Mathematics) as well as on educational inequities and the dynamics of race, gender, and power in institutional contexts. Students have opportunities to participate in this research, which often takes place in collaboration with other academic departments on campus as well as with the Center for Engineering Education and Outreach.

UNDERGRADUATE PROGRAMS

The department offers both a minor and a major in Education. The minor requires 5 courses (15 credit hours) as arranged with an advisor. The major requires 10 courses (30 credit hours) and is a co-major only, ideally to complement the student's primary major. Because students may come from a range of primary majors, and have a variety of particular interests, the major in Education involves custom design: Students work with their advisors to craft their programs, which they submit for approval to the Undergraduate Committee of the Education Department.

For more information, please see ase.tufts.edu/education/programs/undergraduate.

Please note: The minor and the major are designed for the scholarly study of learning and teaching. They are not state-approved programs for license. Students who are interested in initial licensure should consider pursuing a combined degree program, bachelor's degree with a Master of Arts in Teaching. See the combined degree program page for more

information at <http://ase.tufts.edu/education/programs/combinedDegree>.

COMBINED DEGREE PROGRAMS

The department offers combined degree programs in Teacher preparation in the following areas:

- B.F.A./M.A.T. in Art Education
- B.A. or B.S./M.A.T. in Middle and High School Education

These demanding Bachelors/Masters programs permit Tufts undergraduate students to complete the 120 credit-hour undergraduate degree and 30 credit-hours master degree in five years. Applicants are urged to seek academic advising as early as possible if they are considering this path.

For more information, please see <http://ase.tufts.edu/education/programs/combinedDegree/index.htm>

GRADUATE PROGRAMS

The department offers a range of graduate programs. These include three Master of Arts in Teaching (M.A.T.) programs for licensure in Middle and Secondary Education, Elementary Education, and Visual Art. The department also supports two Master of Arts (M.A.) programs toward credentials in (1) German and (2) Latin and the classical humanities.

The Master of Arts/Educational Specialist program (M.A./Ed.S.) in School Psychology prepares students for state licensure and national certification as school psychologists. The M.A. in Museum Education prepares students for careers in museum settings.

The M.A. in Educational Studies is a flexible degree to support students who are interested to advance their expertise in a program of study they design with an advisor. The Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) programs in STEM Education focus on the study of learning and teaching in STEM disciplines.

Most students are full-time; some programs support part-time study. To accommodate employed teachers who must conduct advanced work on a part-time basis, many of the department's graduate courses are offered in late afternoons, evenings, and summer sessions.

For more information on any program, please see ase.tufts.edu/education/programs/.

Master of Arts in Teaching (M.A.T.) Degree: Middle and Secondary

The department's state-approved M.A.T. degree programs prepare candidates to teach in a range of academic fields; completion of an M.A.T. satisfies requirements for initial licensure in Massachusetts. The Urban Teacher Training Collaborative (UTTC) provides opportunities for students to work as year-long interns in one of our partnering public schools, including the Boston Arts Academy, Codman Academy, Fenway High School in Boston; Malden High School and Linden STEAM Academy in Malden, Medford High School and Somerville High School. The UTTC is the oldest program of its kind in the region, with a long-standing commitment to teacher preparation.

Master of Arts in Teaching (M.A.T.) Degree: Elementary STEM

The department offers a state-approved program in elementary education, with a specialization in STEM fields. Students are prepared to teach all subjects in a general education classroom, while spending additional time developing expertise in the teaching of science, technology, engineering, and mathematics. Students are placed in partnering urban districts (in collaboration with the UTTC) as interns throughout the entire school year. Graduates receive initial teaching licensure for elementary grades 1–6 with the Sheltered English Immersion Endorsement, and they have the opportunity for an additional license in Moderate Disabilities.

The Elementary STEM program is not accepting students for AY 2019-2020.

Master of Arts (M.A.) Degrees: German and Latin and Classical Humanities

The M.A. in German with Teaching Licensure is a 14-course program satisfying requirements for initial state licensure in German, offered in conjunction with the Department of International Literary and Cultural Studies. The M.A. in Classics with Teaching Licensure is also 14 courses, satisfying requirements for initial state licensure in Latin and Classical Humanities, offered in conjunction with the Department of Classics.

Master of Arts in Teaching (M.A.T.) Degree: Art Education

This program prepares the artist to teach in elementary, middle, and high schools. Students explore art making and works

of art through a variety of cultural, historical and socio-political lenses to make art accessible and sustainable for all students in diverse communities and with a focus on interdisciplinary and global connections. The program is offered in affiliation with the Tufts School of the Museum of Fine Arts and leads to licensure as a teacher of visual art for grades pre-K to 8, or 5 to 12.

Master of Arts (M.A.)/Educational Specialist (Ed.S.) Degrees: School Psychology

This three-year program combines advanced course work with a specific sequence of field-based training and supervision in the core areas of assessment, intervention and consultation. These are anchored in a developmental perspective promoting the social, emotional and intellectual growth of children and adolescents. Problem-solving methods are emphasized as critical to understanding and proposing solutions to challenges in educational settings. Students complete a minimum of 1,950 hours of supervised field experience over the three years. Attendance during the summers is required. Students earn the Master of Arts and Educational Specialist degrees leading to initial licensure as a school psychologist in Massachusetts and eligibility for national certification.

Master of Arts (M.A.) Degree: Museum Education

This interdisciplinary program prepares students for museum careers such as teaching; outreach; community engagement; evaluation; and school, family, teacher, and public program development and management. Graduates work in art, history, science, and children's museums all over the world.

Master of Arts (M.A.) Degree: Educational Studies

The M.A. in Education is a flexible program for students who wish to advance their expertise, explore new directions, and chart new lines of inquiry in education. It requires 30 credit hours across coursework and independent study, at the 100-level or higher, with at least 18 credits from the Department of Education. Enrolled students will work with an academic advisor to design their course plans, internship, and/or capstone experiences to meet their intellectual and professional needs.

Master of Science (M.S.), Doctor of Philosophy (Ph.D.) Degrees: STEM Education

Students work in mathematics, science, and/or engineering education. The M.S. program is preparation for research, curriculum development, and teacher development in school districts, research institutions, and other educational settings, as well as for further study. The Ph.D. program is preparation for research leadership, including as faculty in higher education. The program involves collaborating faculty from Child Development, Mechanical Engineering, Computer Science, Biology, Chemistry, Mathematics, Physics and Astronomy, the Center for Engineering Educational Outreach, and the Center for Science and Mathematics Teaching. Students have the options of pursuing the Physics Education Track, in collaboration with the Department of Physics and Astronomy, and the Cognitive Science Track, as part of the Cognitive Science Program.

Admission Requirements

All graduate programs require letters of recommendation and personal statements. All except Art Education require GRE general test scores; these are waived for current and recent Tufts undergraduates.

- Art education applicants submit a portfolio as a part of their application.
- Applicants seeking licensure as teachers of German, Latin, or Spanish, submit a writing sample in the language of specialization and complete an interview in that language.
- School psychology candidates must have completed an undergraduate major in psychology or prerequisite course work in developmental psychology, abnormal psychology, and statistics. Experience working with children, adolescents and/or families in an educational or mental health setting is preferred and applicants must shadow a practicing school psychologist.
- Ph.D. applicants submit writing samples of their scholarly work.

For more information or to apply, please see gradstudy.tufts.edu/admissions.

Massachusetts Tests for Educator Licensure

Students who plan to teach in Massachusetts must pass the Massachusetts Tests for Educator Licensure (MTEL) 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. The department offers information sessions, study

guides, and tutoring as needed in preparation for these exams.

Electrical and Computer Engineering

Professor Eric L. Miller, *Chair; Signal processing, image processing*

Professor Mohammed Nurul Afsar, *Microwaves, design and measurements*

Professor Jeffrey A. Hopwood, *Microelectronics, plasma engineering*

Professor Karen Panetta, *Simulation, multimedia*

Professor Douglas Preis, *Electromagnetics, signal processing, audio engineering*

Professor Sameer Sonkusale, *Mixed-signal VLSI design, sensor electronics*

Professor Aleksandar Stanković, Alvin H. Howell Professor in Electrical Engineering; *Energy processing systems, control and estimation*

Associate Professor Shuchin Aeron, *Statistical signal processing in sensor networks, network information theory*

Associate Professor Chorng Hwa Chang, *Computer engineering, communication networks*

Associate Professor Mark Hempstead, *Computer architecture*

Associate Professor Usman Khan, *Signal processing and control, graph theory*

Associate Professor Valencia J. Koomson, *High-speed/low-noise integrated circuits for optical RF communications, optoelectronic VLSI*

Associate Professor Tom Vandervelde, *Optoelectronic materials, thermophotovoltaics, photovoltaics*

Associate Professor Mai Vu, *Network information theory, energy-efficient and wireless communications, signal processing*

Professor of the Practice Ronald Lasser, *Product development and innovation management*

Professor of the Practice Brian Tracey, *Signal processing, image processing, acoustics*

Research Assistant Professor Kevin Grossklaus, *Optoelectronics, Thin film deposition, Energy materials, Materials characterization, III-V semiconductors*

Lecturer, Brian Aull, *Photon counting image sensors based on the integration of silicon Geiger-mode avalanche photodiode arrays with all-digital CMOS readout circuits*

Lecturer, Steven Bell, *image processing, computer vision, software systems*

Lecturer, Joel Grodstein, *VLSI, Computer Architecture, Computer-Aided Design*

SECONDARY APPOINTMENTS:

Professor Sergio Fantini, *Biomedical Engineering; Biomedical instrumentation, medical optics, near infrared imaging of the brain, optical mammography*

Professor Mark Cronin-Golomb, *Biomedical Engineering; Optical instrumentation, laser tweezers, atomic force microscopy, nonlinear optics*

Professor Soha Hassoun, *Computer Science; CAD, VLSI design*

Professor William Messner, *Mechanical Engineering; Automatic control systems with an emphasis on applications to data storage systems, robotics, microfluidics, and biological systems and instrumentation*

Professor Fiorenzo Omenetto, *Biomedical Engineering; Ultrafast nonlinear optics, nanophotonics, biopolymer multifunctional materials, photonic crystals, photonic crystal fibers*

Associate Professor Alva Couch, *Computer Science; Parallel computing, computer graphics*

Associate Professor Jason Rife, *Mechanical Engineering; Navigation, robotics, controls*

The Electrical and Computer Engineering Department educates tomorrow's technical leaders. Our students and faculty invent and design the electrical and electronic systems, optoelectronic materials, computational platforms, mathematical algorithms, and communications networks used throughout our society.

The department offers degree programs in electrical engineering and computer engineering for students in the School of Engineering. Minors in music engineering, computer science, engineering management, entrepreneurial leadership, and multimedia arts are also available for ECE students.

Electrical engineers apply 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. As software is as crucial to robust design as hardware, the computer engineer is skilled in software development and system architecture.

The department teaches courses in digital circuits and systems, microelectronics and very large-scale integrated circuit design, computer architecture, circuits, linear systems, signal and image processing, microwaves and microwave devices, electronic materials and solar cells, power and energy systems, communications, and 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 that give them a sound basis for professional practice, advanced education, active citizenship, and lifelong learning. At its core is the goal that students learn the fundamental principles of electrical and computer engineering and master engineering methods to solve challenging and diverse problems. Further, the department strives to have each student develop the leadership and communications skills necessary to relate these solutions to both technical and non-technical communities. The faculty is dedicated to accomplishing this mission through the integration of teaching and research.

Bachelor of Science in Electrical Engineering

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 a range of specialized areas. Students may study a wide variety of topics, including sustainable energy systems, semiconductor integrated circuits, VLSI design, biomedical engineering, microwaves and telecommunications, antennas and antenna systems, digital signal and image processing, control systems, communications and information theory, semiconductor and optoelectronics materials, power electronics and power systems, 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, signals, and systems, digital and analog electronics, microprocessors, electromagnetic fields, automatic control and communication.

The objectives of the Electrical Engineering program are:

- The graduate will have demonstrated a professional impact in their employment or graduate work.
- The graduate will be a leader among their peers and/or a leader in innovation.
- The graduate will conduct themselves in a professional and ethical manner.
- The graduate will understand the societal impact of their work in a global context.

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 program are listed below. They are presented in one possible arrangement for completing the program. For the professional degrees accredited by the Engineering Accreditation Commission of ABET a minimum of 120 semester hour units are required, including at least 30 in college level math and basic science subjects appropriate to the discipline, and at least 45 in engineering topics, consistent with ABET general and program criteria. Please see the following URL for the formal degree sheets associated with this program:

<http://students.tufts.edu/academic-advice-and-support/academic-advising/engineering-advising/guidance-academic-policies-engineering/requirements-graduation-engineering/engineering-degrees>

First Year

FALL TERM

Mathematics 32

Physics 11 with lab

English 1

EN 1: Applications in Engineering

SPRING TERM

Engineering Science 2

Mathematics 34 or 36

Physics 12 with Lab

Humanities, arts, or social sciences elective

Sophomore Year

FALL TERM

Engineering Science 3 Introduction to Electrical Systems

Mathematics 42

Mathematics 70 or 72

Chemistry 1 or 16

Humanities, arts, or social sciences elective

SPRING TERM

Engineering Science 4 Introduction to Digital Logic Circuits

Electrical Engineering 21 Electronics I with Lab

Mathematics 51

Computer Science 11

Department foundation elective

Junior Year

FALL TERM

Electrical Engineering 14 Microprocessor Architecture and Applications

Electrical Engineering 22 Electronics II with Lab

Electrical Engineering 23 Linear Systems

Free elective

Humanities, arts, or social sciences elective

SPRING TERM

Electrical Engineering 18 Electromagnetic Waves

Electrical Engineering 31 Junior Design Project

Electrical Engineering 24, Probabilistic Systems Analysis

Department foundation elective

Natural science elective

Senior Year

FALL TERM

Electrical Engineering 97 Senior Design Project (2 SHU)

Electrical Engineering 105 Feedback Control Systems

Electrical Engineering 107 Communications Systems I

Department concentration elective*

Department concentration elective*

SPRING TERM

Electrical Engineering 98 Senior Design Project (2 SHU)

Department concentration elective*

Department concentration elective*

Humanities, arts, or social sciences elective

Free elective

*Department concentration electives are selected from a list provided by the department. The selections are subject to the approval of the departmental advisor.

Bachelor of Science in Computer Engineering

In both required and elective courses throughout the curriculum, computer analysis is used extensively in the study of electrical systems, components, and materials. Students wishing to investigate the analysis and design of digital computers more intensively, as well as the analysis, design, and operation of systems in which computers are an integral part, may follow the Computer Engineering program.

The objectives of the Computer Engineering program are:

- The CompE graduate will demonstrate a professional impact in her/his employment or graduate work.
- The CompE graduate will be a leader among his/her peers or a leader in innovation.
- The CompE graduate's work product will reflect a concern for others.

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. For the professional degrees accredited by the Engineering Accreditation Commission of ABET a minimum of 120 semester hour units are required, including at least 30 in college level math and basic science subjects appropriate to the discipline, and at least 45 in engineering topics, consistent with ABET general and program criteria. Please see the following URL for the formal degree sheets associated with this program:

<http://students.tufts.edu/academic-advice-and-support/academic-advising/engineering-advising/guidance-academic-policies-engineering/requirements-graduation-engineering/engineering-degrees>

First Year

FALL TERM

Mathematics 32

Physics 11 with lab

English 1

EN 1: Applications in Engineering

SPRING TERM

Engineering Science 2

Mathematics 34 or 36

Physics 12 with Lab or Chemistry 1

Humanities, arts, or social sciences elective

Sophomore Year

FALL TERM

Engineering Science 3 Introduction to Electrical Systems

Mathematics 70 or 72

Mathematics 42

Physics 12 or Chemistry 1

Humanities, arts, or social sciences elective

SPRING TERM

Engineering Science 4 Introduction to Digital Logic Circuits

Electrical Engineering 21 Electronics I with Lab

Mathematics 51

Computer Science 11 Introduction to Computer Science

Humanities, arts, or social sciences elective

Junior Year

FALL TERM

Electrical Engineering 14 Microprocessor Architecture and Applications

Electrical Engineering 23 Linear Systems

Computer Science 15 Data Structures

Mathematics 61

Free elective

SPRING TERM

Electrical Engineering 26 Digital Logic Systems

Electrical Engineering 31 Junior Design Project

Electrical Engineering 24, Probabilistic Systems Analysis

Computer engineering concentration elective*

Humanities, arts, or social sciences elective

Senior Year

FALL TERM

Electrical Engineering 97 Senior Design Project (2 semester hour units)

Electrical Engineering 103 Introduction to VLSI Design

Electrical Engineering 126 Computer Engineering

Electrical Engineering 128 Operating Systems

Natural sciences elective

Free elective

SPRING TERM

Electrical Engineering 98 Senior Design Project (2 semester hour units)

Computer engineering concentration elective*

Computer engineering concentration elective*

Computer engineering concentration elective*

Humanities, arts, or social sciences elective

*Computer engineering electives are selected from a list provided by the department. The selections are subject to the approval of the departmental advisor.

Bachelor of Science in Engineering Physics

The Department of Electrical and Computer 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 advisors 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.

The program leading to this degree is not accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc. Please see the following URL for the formal degree sheets associated with this program:

<http://students.tufts.edu/academic-advice-and-support/academic-advising/engineering-advising/guidance-academic-policies-engineering/requirements-graduation-engineering/engineering-degrees>

Bachelor of Science in Data Science

Data Science refers to the principles and practices in data analysis that support data-centric real-world problem solving. The Bachelor of Science in Data Science (B.S.D.S.), jointly administered by the departments of Computer Science and Electrical and Computer Engineering, is offered to students in the School of Engineering who desire to concentrate on applying computing to scientific and engineering analysis and problem solving. The B.S.D.S. is designed both as a standalone major and a double major option for those students in the School of Engineering who wish to add data science to an existing engineering major. The B.S.D.S. degree is only available to students in the School of Engineering. Double-majoring in the B.S.D.S. and Bachelor of Science in Computer Science (B.S.C.S.) programs is not practical due to overlap between the major concentrations.

The mission of the B.S.D.S. is to prepare students for Data Science careers in engineering, science, medicine, and other disciplines. The objectives of the B.S.D.S. program are that graduates should have, after five years:

- Succeeded and advanced in professional careers in or related to data science, analysis, and interpretation, and/or
- Been admitted to and advanced in graduate study in data science and related fields.

The outcomes of the Bachelor of Science in Data Science include the following:

- Graduates will demonstrate facility in a variety of data analysis techniques, including machine learning, optimization, statistical decision-making, information theory and data visualization.
- Graduates will be qualified to engage in interdisciplinary projects with data analytics components, including facility in communicating with engineers, scientists, and computing professionals.
- Graduates will have been exposed to the ethical and scientific obligations of the data analyst.

The B.S.D.S. is not accredited by the Computing Accreditation Commission or Engineering Accreditation Commission of ABET. For an ABET-accredited degree, see the Bachelor of Science in Computer Science (B.S.C.S.), Bachelor of Science in Computer Engineering (B.S.Cp.E.), or Bachelor of Science in Electrical Engineering (B.S.E.E.).

The Bachelor of Science in Data Science (B.S.D.S.) requires thirty-eight courses including introductory, foundation, HASS, breadth, and concentration courses. The disciplinary breadth requirement includes three courses in a related application discipline including physics, biology, chemistry, and others. Each student must plan a set of three courses and petition the Data Science program directors for approval. The required courses for the program are listed below. They are presented in one possible arrangement for completing the program. Further information regarding options and procedures is available from the Data Science program website

<http://engineering.tufts.edu/cs/bachelor-science-data-science>

Please see the following URL for the formal degree sheets associated with this program:

<http://students.tufts.edu/academic-advice-and-support/academic-advising/engineering-advising/guidance-academic-policies-engineering/requirements-graduation-engineering/engineering-degrees>

First Year

FALL TERM

Mathematics 32

Physics 11

English 1

EN 1: Applications in Engineering

SPRING TERM

Mathematics 34

Computer Science 11 Introduction to Computer Science

Chemistry 1 or 16

Engineering Science 2

Sophomore Year

FALL TERM

Mathematics 42 or 44

Computer Science 15 Data Structures

Computer Science 61 Discrete Mathematics

Physics 12, Chemistry 2, or Biology 13.

Humanities, Social Sciences, and Arts elective #1

SPRING TERM

Mathematics 70 or 72

Engineering Management 54 Engineering Leadership

Computer Science 40 Computer Architecture

Natural Science Elective

Free elective #1

Junior Year

FALL TERM

Computer Science 135 Machine Learning

Data Science elective #1

Statistics (Electrical Engineering 24)

Disciplinary Breadth elective #1

Humanities, Social Sciences, and Arts elective #2

SPRING TERM

Computer Science 160 Algorithms

Data Science elective #2

Disciplinary Breadth elective #2

Humanities, Social Sciences, and Arts elective #3

Free elective #2

Senior Year

FALL TERM

Computer Science or Electrical Engineering 87 Senior Capstone Project in Data Science I

Computer Science 136 Statistical Machine Learning, or Electrical Engineering 140 Stochastic Processes (or other Data Science elective #5)

Data Science elective #3

Disciplinary Breadth elective #3

Humanities, Social Sciences, and Arts elective #4

SPRING TERM

Computer Science or Electrical Engineering 88 Senior Capstone Project in Data Science II

Mathematics 128 Numerical Linear Algebra

Data Science elective #4

Humanities, Social Sciences, and Arts elective #5

Free elective #3

UNDERGRADUATE MINOR PROGRAMS

(See disciplinary minor programs for restrictions.)

Computer Science

The department offers a minor in computer science for those students pursuing the B.S.E.E. or B.S.C.P.E. degree. Details are available from the Department of Computer Science.

Engineering Management

The Engineering Management minor is a leadership-focused course of study that emphasizes real-life experience and engineering practice. The minor is available to students in the School of Engineering. Details are available from the Tufts Gordon Institute.

Entrepreneurial Leadership

The Entrepreneurial Leadership Program provides hands-on educational opportunities for students interested in founding their own companies or working in entrepreneurial environments. The minor is open to all Tufts Arts and Sciences and School of Engineering students. Details are available from the Tufts Gordon Institute.

Music Engineering

The minor in Music Engineering provides students with experiences at the intersection of music and technology. Students learn the technologies behind music-making, both traditional and modern, and how new technologies can be applied to musical goals. The minor is available to students in both the School of Engineering and the School of Arts and Sciences.

Multimedia Arts

This interdisciplinary minor is offered through the Communications and Media Studies program. For specific information about the policies governing requirements and electives, visit <http://ase.tufts.edu/cms/mma.html>.

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, non-degree 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, visit <http://gradstudy.tufts.edu/programs/certificates>.

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 148** Silicon Radio Frequency IC Design
- EE 161** Microwave Integrated Circuits
- EE 193SBC** Satellite-Based Communications
- EE 194W** Wireless Communications
- EE 127** Information Theory

Students may substitute other Tufts graduate courses, subject to the approval of the certificate faculty advisor.

Certificate Program in Computer Engineering

The department offers a program leading to a certificate in computer engineering jointly administered with the department of computer science. The certificate requires fifteen semester hours and all courses must be at the 100 level or above. At least five lecture-based courses must be taken from a published list of computer engineering core courses. From these core courses, at least one course must be taken from each of the following three core areas (1) Computer Networking; (2) Computer Architecture; 3) Computer Software/Systems. Both bridge course (e.g. EE 200 and EE 201) may count as one of the five computer engineering core courses. For more information, see Computer Engineering in this bulletin, visit <http://gradstudy.tufts.edu/programs/certificates>.

GRADUATE PROGRAM

Master of Science in Electrical Engineering

The department offers a program leading to the M.S. degree in electrical engineering. The Master of Science degree requires thirty semester hour units, all courses must be at the 100 level or above. For full-time students, four semester hour units must be the Electrical and Computer Engineering Seminar. Students wishing to have the designation of "with thesis" must sign up for the MS thesis course. A maximum of twelve MS Thesis semester hour units may count toward the degree. This course takes the form of a creative thesis work, written and defended orally, and performed under the supervision of a faculty member. Students choosing not to complete an MS thesis may complete additional course work in the department or related departments which can include up to six semester hour units of MS project, six semester hour units of directed study, or six semester hour units of internship. Grades in all courses must be B- or better.

The ECE department also offers a specialized Signals and Systems track within the M.S. degree in Bioengineering. This track educates biotechnology engineers in (1) analysis and processing of signals with an emphasis on biomedical image processing and image formation and (2) design, control and synthesis of systems for biotechnology, e.g., development of miniaturized devices, circuits and systems, or controller design for bioreactors.

Master of Science in Computer Engineering

The department offers a program leading to the M.S. degree in computer engineering jointly administered with the department of computer science. The Master of Science degree requires thirty semester hour units and all courses must be at the 100 level or above; grades in all courses must be B- or better. At least four lecture-based courses must be taken from a published list of computer engineering core courses. From these core courses, at least one course must be taken from each of the following three core areas (1) Computer Networking; (2) Computer Architecture; 3) Computer Software/Systems. Only one bridge course (e.g. EE 200 and EE 201) may count as one of the four computer engineering core courses.

For full-time students, four semester hour units must be the Electrical and Computer Engineering Seminar. Students wishing to have the designation of "with thesis" must sign up for the MS thesis course. A maximum of twelve MS Thesis semester hour units may count toward the degree. This course takes the form of a creative thesis work, written and defended orally, and performed under the supervision of a faculty member. Students choosing not to complete an MS thesis may complete additional course work in the department or related departments which can include up to six semester hour units of MS project, six semester hour units of directed study, or six semester hour units of internship.

Master of Science in Data Science

The Master of Science in Data Science (M.S.D.S.), administered jointly by the departments of Computer Science and Electrical and Computer Engineering, prepares students for future careers and/or further study in Data Science. The M.S.D.S. is built upon a disciplinary core of statistics and machine learning, with depth provided by courses in each of the following:

1. *Data infrastructure and systems*: those systems and strategies that are core to interacting with data, including computer networks, computer security, internet-scale systems, cloud computing, and others.
2. *Data analysis and interfaces*: those components of computing concentrated around effective human interaction with computers, including human-computer interaction, graphics, visualization, and others.
3. *Computational and theoretical aspects of data science*: mathematical foundations including information theory, signal and image processing, and numerical analysis.
4. *Practice of Data science*: examples of effective use of Data Science in practice, including case studies and applications of Data Science principles to real-world problems.

The M.S.D.S. is a one-year program that may be completed either in 9 or 12 months of study. Prerequisites for the M.S.D.S. include a Bachelor of Science degree in a Science, Technology, Engineering, or Mathematics (STEM) field. Applicants with Bachelor's degrees in non-STEM fields may begin study with a Certificate in Data Science that -- in an additional term, gives the applicant a sample of the program. Requirements for the degree include a minimum of 30 semester hour units of study, and must include Electrical Engineering 104 and Computer Science 119, 135. Three electives must include (A) one course in data infrastructure, (B) one course in data analysis and/or interfaces, (C) one course in computational and theoretical aspects of data analysis. Two more electives are chosen from categories (A)-(D) are chosen in consultation with the student's advisor. A final course may be fulfilled by (D) a course in the practice of Data Science, or a master's project in Data Science. Please consult the program's web page for details concerning acceptable courses for fulfilling the requirements (A)-(D).

Master of Science in Material Science and Engineering

Tufts offers a program leading to the M.S. degree in Materials Science and Engineering administered through the School on Engineering. The Master of Science degree requires thirty semester hour units and all courses must be at the 100 level or above; grades in all courses must be B- or better. At least five courses must be taken from a published list of materials science and engineering (MSE) approved courses in addition to the completion of one of the listed MSE core courses. Students wishing for their MS degree to have the designation of "with thesis" must sign up for MS thesis, up to twelve semester hour units may count for the degree. This course takes the form of a creative thesis work, written and defended orally, and performed under the supervision of a faculty member. Students choosing not to complete an MS thesis may complete additional course work in related departments which can include up to six semester hour units of MS project, six semester hour units of directed study, or six semester hour units of internship.

Master of Science in Human Robot Interaction

The Department of Electrical and Computer Engineering offers students in human-robot interaction (HRI) a course-based, one-year M.S. program. This requires students to complete 30 semester hour units of courses, including five core HRI courses and five additional courses. The degree will stipulate "non-thesis." The Department of Electrical and Computer Engineering does not offer a thesis option in HRI. Advising of Electrical and Computer Engineering HRI students will be handled by a designated faculty or staff member formally affiliated with the Department of Electrical and Computer Engineering.

The 15 remaining semester hour units must fulfill the following requirements. At least three of the five required electives must be taken from a list of approved Electrical and Computer Engineering electives. Each remaining elective must be a 100-level or 200-level course from one of the following departments: Bio, BME, CEE, Chem, ChemE, CS, Math, MechE, and Physics. Only courses listed with 3 or more semester hour units can count as electives. Please consult the program's web page for details concerning acceptable courses for fulfilling these requirements.

Doctor of Philosophy in Electrical Engineering

The department offers a program leading to the Ph.D. in electrical engineering. Students in the program must already have a Bachelor's of Science degree in electrical and computer engineering or a related field. High achieving applicants to the Ph.D. program who do not have the M.S. degree may be considered for admission to the direct-to-PhD program. This is an accelerated program for advanced students who are deemed able to handle the rigors of PhD research with a lower requirement for introductory coursework. Applicants without a M.S. degree who are not accepted into the Direct-to-PhD program are automatically considered for admission as an M.S./Ph.D. student, where they will be expected to complete the Master of Science degree program, and on completion of that program will 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 (a) have exhibited merit in a qualifying examination process and (b) have identified a faculty member who has agreed to be their dissertation supervisor. The qualifying examination is comprised of 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.

Doctoral candidates are expected to plan a program of research under the direction of their dissertation supervisor and with the guidance of a faculty research-committee. On completion of this research, the candidate must prepare and publicly defend a dissertation.

Ph.D. students in electrical engineering must take at least 56 semester hour units beyond the M.S. degree. These semester hour units include a minimum of 18 semester hour units of lecture-based class work, 8 semester hour units of Electrical Engineering Seminar, and a dissertation. The dissertation effort is usually assigned 30 semester hour units. At least three semester hour units of class-based course work must be taken from outside the field of electrical and computer engineering.

M.S./Ph.D. students are required to fulfill all of the requirements of both the M.S. and PhD programs, a full 84 semester hour units. Students in the Direct-to-PhD program have a reduced credit requirement of 69 semester hour units. Direct-to-PhD students need to complete 30 semester hour units of lecture-based class work, 3 additional lecture-based semester hour units from outside of the department, 6 semester hour units of Electrical Engineering Seminar, and 30 dissertation semester hour units.

Typical areas available for dissertations include solid-state materials with an emphasis on optoelectronic and solar energy applications, microwave devices and systems, power systems and control, electromagnetics, antennas, plasma engineering, signal and image processing, VLSI and mixed-analog integrated circuits, microprocessor applications,

computer architecture, communication systems, information theory, computer and wireless networks, and power electronics.

For detailed information, please visit the website <http://www.ece.tufts.edu>.

Joint Doctor of Philosophy in Electrical and Computer Engineering and Materials Science and Engineering

Students accepted into the Electrical and Computer Engineering Department can apply to participate in the joint-PhD program with Materials Science and Engineering (MSE). The application can take place at the same time as the student is initially applying to Tufts or after they have joined. Upon completion of the program students will earn one PhD with the designation of Joint-PhD in Electrical and Computer Engineering and Materials Science and Engineering. Students participating in the program must complete all the requirements of their “home department,” Electrical and Computer Engineering in this case. In addition to those requirements, students also must complete four MSE core courses and four MSE electives. Some or all of these requirements could be in the student’s home department and tend to fit into a student’s schedule and departmental requirements rather than being in addition to those requirements. Students in the program have an advisor in their home department and one from the materials associated faculty. In ECE, materials faculty work in the areas of semiconductor, bio, energy, photonic, and plasma materials.

Center for Engineering Education and Outreach

DIRECTORS:

Merredith Portsmore, Research Assistant Professor

Core FACULTY:

Research Assistant Professor Ethan Danahy, secondary appointment in Computer Science

Affiliated Faculty

Chris Rogers, Chair, Mechanical Engineering

Kristen Wendell, Mechanical Engineering, secondary appointment in Department of Education

Brian Gravel, Department of Education

Meghan Mueller, Clinical Sciences, Cummings School

Tom Vandervelde, Electrical and Computer Engineering

Daniel Hannon, Mechanical Engineering

Marina Bers, Eliot-Pearson Department of Child Study and Human Development

The Center for Engineering Education and Outreach (CEEO) has three main areas of interest: research in K-college engineering education, outreach to the local and global community of teachers, and educational tool development. It is best known for its work developing educational technologies such as ROBOLAB, the educational version of the LEGO Robotics software, SAM Animation, stop-action animation movie making software, and Visual Classrooms, a digital tool for collaboration and communication in the classroom. Over 60 engineering undergraduates work with the Center every semester to go into local classrooms to help teachers bring hands on engineering to their students. CEEO affiliated faculty have numerous research project studying engineering education at the K-12 and college-level, related to student and teacher learning.

TEACHER ENGINEERING EDUCATION PROGRAM

The Teacher Engineering Education Program (TEEP) is a flexible, online, graduate credit-earning program. The program imparts the knowledge and provides the resources for any practicing teacher to expand or change their approach, meet NGSS standards, and integrate hands-on engineering principles into their coursework. All courses are fully online and asynchronous with two courses in engineering content and two in engineering pedagogy, totaling 16 credit hours over four semesters. The program uses a cohort model and participants are required to start during the fall semester. Participants must be practicing formal or informal K-12 teachers to enroll. Please visit teep.tufts.edu for more information or contact [\(teep@tufts.edu\)](mailto:teep@tufts.edu).

Research in K-16 Engineering Education

Graduate-level research in engineering education can be pursued through the Department of Education's STEM Education program or through CEEO-affiliated faculty. This includes research on the development of learning environments and technologies

Please contact Merredith Portsmore (meredith.portsmore@tufts.edu) for more information.

Engineering and Innovation Management/Gordon Institute

The Gordon Institute offers programs focused on engineering leadership, innovation, and entrepreneurship that provide graduate and undergraduate students with the tools they need to advance their careers, inspire teams, and bring innovative products to market. Please note that information on the Entrepreneurial Leadership Program can be found in the Entrepreneurial Leadership section of this bulletin.

PROGRAM DIRECTOR, Engineering Management Programs

Professor of the Practice Mary Adams Viola, Leadership

PROGRAM DIRECTOR, M.S. in Innovation and Management Program

Professor of the Practice Kevin Oye, Business strategy, new product innovation

CORE FACULTY:

Lecturer Alicia Amaral, *Finance and accounting*

Professor of the Practice Frank Apesecche, *Finance and accounting, accounting for high tech ventures*

Lecturer Mark Bamford, *Conflict resolution*

Lecturer Jennifer Bragg, *Engineering management*

Lecturer Jerome Brightman, *Leadership*

Lecturer Gerald Brown, *Operations and supply chain management, business strategy*

Lecturer Steve Caplow, *Business Communications*

Professor of the Practice Gavin Finn, *Engineering management, new product development*

Lecturer Steve Geary, *Supply chain management*

Professor of the Practice Partha Ghosh, *Multinational strategies, fundamental of economics, business analytics*

Lecturer Victoria Godfrey, *Marketing*

Senior Lecturer Amy Hirschfeld, *Business communication*

Senior Lecturer Sergei Ikonenko, *Systematic innovation*

Lecturer Stacy Lennon, *Conflict resolution, leadership for impact*

Professor of the Practice Samuel Liggero, *New product development, technology and innovation strategy*

Lecturer Tom Mooney, *Sustainability*

Lecturer James Nash, *Design of experiments, project management, and software methodologies*

Lecturer Monica Pheifer, *Engineering management*

Lecturer Kishore Pochampally, *Process capability, systems engineering and optimization, lean six sigma, and operations management*

Lecturer Debra Reich, *Experience design management*

Lecturer Marci Sapers, *Marketing and branding*

Lecturer Joan Seamster, *Digital marketing*

Lecturer Annette Sawyer, *Leadership*

Lecturer Jane Seminara, *Humanistic perspectives on leadership, ethics*

Lecturer Sarah Stockwell, *Career impact and personal development*

Lecturer Louise Strayhorn, *Leadership*

Lecturer Abbott Weiss, *Supply chain and operations management*

Lecturer Ewa Winston, *Humanistic perspectives on leadership, ethics*

UNDERGRADUATE PROGRAM

The Gordon Institute offers a minor in engineering management that is available to all engineering undergraduate students at Tufts. The program emphasizes real-life experience and engineering practice, not just theory. A Tufts engineering degree combined with an engineering management minor provides students with a competitive edge and equips them to make significant contributions as soon as they enter the workplace.

Five courses are required for the minor. All five courses in the minor must be taken for a grade.

Four are designated:

EM 051 Engineering Management

EM 052 Technical and Managerial Communications

EM 153 Management of Innovation (**ELS101** may be substituted for **EM153**.)

EM 054 Engineering Leadership (or **ELS 107** with permission)

One course must be selected from the School of Engineering elective options or the general course elective options listed below. EM 52 and EM 54 are courses that can be used by engineering students to fulfill their Social Science distribution requirements.

School of Engineering elective options:

EC5 – Principles of Economics

EM155 – Financial Management in High Technology Firms

Comp171 – Human Computer Interaction

Comp180 – Software Engineering

ME102 – Inventive Design

ENP161 – Human Factor Product Design

ME108 – Modern Quality Control

ES152 – Engineering Systems: Stochastic Models

ES56 – Probability and Statistics

CEE53 – Engineering Economics

CE185 – Legal Issues in Engineering

CBE110 – Introduction to Optimization

General course elective options:

EC3 Principles of Accounting (free elective)

EC5 Principles of Economics

PS 104 Public Administration (free elective)

PSY 17 Industrial and Organizational Psychology (social science elective)

SOC 122 Organizational Behavior (free elective)

ELS 103, ELS 105, ELS 107 (social science elective) (note: **ELS 107** only as alternate to **EM 054**, Engineering Leadership, with permission)

DR 0027 Public Speaking (humanities elective)

PSY 0006 Psychology of Leadership (free elective) (note: **PSY 0006** only as alternate to **EM 054**, Engineering Leadership, with permission)

PSY 53 Engineering Psychology (free elective)

SOC 114 Sociology of Leadership (social science elective)

GRADUATE PROGRAMS

The Gordon Institute specializes in transforming individuals with STEM backgrounds (science, technology, engineering, and math) into impactful leaders, innovators, and entrepreneurs. The Institute's close ties with organizations in industry and government provide unique opportunities for experience-based learning and networking. Dedicated faculty with extensive real-world experience center their teaching approach on tangible career progress for students. The Gordon Institute offers two accredited graduate degree programs: a two-year or three-year M.S. in Engineering Management (M.S.E.M.) and a one-year M.S. in Innovation Management (M.S.I.M.).

The M.S.E.M. is a two-year or three-year, part-time program for working professionals that maps directly to students professional challenges and allows them to apply their learning on the job. The curriculum includes interactive classes and immersive consulting projects with start-up and established companies. Technical topics such as project management, product development, and quantitative methods are studied along with the broader areas of business management, leadership, and the humanities. This multidisciplinary approach fully prepares individuals in the global science and technology sector to advance their industries – and their careers. The program is offered in Evening and Weekend formats to accommodate the needs of working professionals.

The M.S.I.M. is a one-year, full-time program that prepares recent college graduates to have early-career impact and long-term success in the innovation economy. Program coursework and projects build on students' technical foundation with an emphasis on innovation and entrepreneurship. Students develop fluency in the language of business; hone their ability to creatively synthesize novel new solu-

tions to complex problems; and develop the leadership skills needed to influence, negotiate and build effective teams. Elective course options allow students to customize the program to fit their unique goals, and a summer internship and substantive career workshops prepare students to successfully launch their careers.

For more detailed information, please visit the website <http://gordon.tufts.edu>.

Engineering Physics

(FOR DEGREE REQUIREMENTS, SEE PHYSICS AND ASTRONOMY.)

Engineering Psychology

UNDERGRADUATE ADVISOR FOR LIBERAL ARTS:

Assistant Professor Nathan Ward, *Psychology*

DIRECTOR OF THE UNDERGRADUATE PROGRAM IN HUMAN FACTORS ENGINEERING:

Professor of the Practice James Intriligator, *Mechanical Engineering*

AFFILIATED FACULTY:

Professor of the Practice Daniel J. Hannon, *Mechanical Engineering*

Professor of the Practice James Intriligator, *Mechanical Engineering*

Professor Robert Jacob, *Computer Science*

Professor Holly A. Taylor, *Psychology*

Assistant Professor Nathan Ward, *Psychology*

Professor of the Practice Michael Wiklund, *Mechanical Engineering*

The Engineering Psychology/Human Factors Engineering program is an interdisciplinary program offered jointly by the departments of Mechanical Engineering and Psychology. Engineering Psychology (and Human Factors Engineering within the School of Engineering) 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 medical devices and systems design, transportation safety, consumer product design, and computer interface design. Students in the College of Liberal Arts will receive the bachelor of science degree 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 careers in technology design and development, or management.

The below requirements apply only to students in the College of Liberal Arts; students in the School of Engineering should see the Human Factors Engineering section of this bulletin.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The program features 15 courses of at least 3 semester-hour credits each, divided into introductory and core course requirements. Listed below are the requirements for students in the Class of 2022 or later (students in the Class of 2021 or earlier may opt into these current requirements or use the old requirements detailed on the Psychology Department's website). Note that no course may count toward more than one requirement. See listing for Psychology major for details regarding AP, IB, and GCE A-level test equivalencies as well as potential substitutions for Psychology 31.

Introductory course requirements:

- 1) One of: Engineering Science 2, Computer Science 11, Computer Science 15, Mechanical Engineering 1, or an approved Computer Science elective;
- 2) Psychology 1;
- 3) Engineering Science 18 or Mechanical Engineering 1;
- 4) Computer Science 11 or Physics 11;
- 5) One of: Computer Science 11, Computer Science 15, Math 32, or Math 61.

Core course requirements:

- 6) Psychology 31;
- 7) Psychology 32;
- 8) Psychology 53;
- 9) Psychology 130;
- 10) Engineering Management 52;
- 11) Engineering Psychology 64;
- 12) Engineering Psychology 120;
- 13) Engineering Psychology 161;
- 14) Engineering Psychology 166 or Computer Science 171;

15) Psychology or Engineering Psychology core elective.

English

Professor John M. Fyler, *Chair; Chaucer, medieval literature*
Professor Elizabeth Ammons, *Harriet H. Fay Professor of Literature; American literature, literature and environmental justice*
Professor Jay Cantor, *History of consciousness, modernism, creative writing*
Professor Lee Edelman, *Fletcher Professor of English Literature; Literary theory, film studies, modern poetry*
Professor Judith Haber, *Renaissance literature*
Professor Joseph Litvak, *Nineteenth-century British literature, literary theory, Jewish cultural studies*
Professor Jonathan Wilson, *Fletcher Professor of Rhetoric and Debate; American literature, creative writing*
Associate Professor Kevin Dunn, *Renaissance literature*
Associate Professor Sonia Hofkosh, *British Romantic literature*
Associate Professor John Lurz, *Twentieth-century British literature*
Associate Professor Modhumita Roy, *World literature in English*
Associate Professor Greg Thomas, *African American literature*
Associate Professor Ichiro Takayoshi, *Twentieth-century American literature, Asian American literature*
Associate Professor Nathan Wolff, *Nineteenth-century American literature*
Assistant Professor Jess Keiser, *Eighteenth-century British literature*
Senior Lecturer Michael Ullman, *Non-Fiction Writing, British and Irish literature*
Professor of the Practice Natalie Shapero, *Poetry and Creative 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 advisors. A list of approved courses for each category is available online through the English department website: <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

English 21 Heroes, Lovers, and Demons: British Literature from Beowulf to 18th Century

English 22 Crisis and Critique: British Literature from 1780 to 1950

English 23 Dissent and Democracy: American Literature to 1900

- 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/undergraduate/majorsApprovedCourses.htm>.

- 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/undergraduate/majorsApprovedCourses.htm>.

- 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 advisors 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 advisors, English majors should seek to create programs of study that expand their knowledge and challenge their preconceptions.

No more than four 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, and 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.

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. Students may count a maximum of three creative writing courses toward fulfillment of the minor in English. No more than two 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 topics 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. Admission is in the Fall semester only.

More information can be found at this link: <http://ase.tufts.edu/english/graduate>.

Master of Arts

Master's candidates are required to take two years of coursework. At the end of the first academic year, the graduate faculty will consider the Master's candidates individually, focusing on their grades and the recommendations of the faculty who have taught them. On the basis of this appraisal, the faculty may in rare cases recommend that the student not continue in the program. At the end of the second academic year, the faculty again evaluates each student individually, focusing on their grades and their overall performance. At this time the faculty will 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.

Doctor of Philosophy

Admission to the doctoral degree program is open to students who have completed with distinction the Master's degree in English, either at Tufts or another university. Students who enter with a Master's degree from another institution will be reviewed by the faculty at the end of their first year at Tufts to determine whether each candidate should continue in the program. Upon receiving a positive recommendation, candidates who came to Tufts with a Master's degree in hand will proceed in the program.

During their Ph.D. coursework, students will increase their comprehensive knowledge while beginning to concentrate on one particular area or subject. Normally, the courses they take will be chosen from among the graduate seminars in the department. Also, graduate courses in other departments at Tufts, courses at area universities in the graduate

consortium with Tufts, and independent studies may be counted with the approval of the Director of Graduate Study. As they are completing their coursework, students will begin teaching one course per semester in the First-Year Writing Program; they will normally teach for a total of six semesters.

When coursework has been completed, each doctoral 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. In many cases, the graduate student will already have spoken with this faculty member about serving as director of her or his dissertation, but the faculty member chairing the oral exam does not have to be the same person who directs the dissertation.

No standardized list of texts is issued for the Ph.D. oral 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. Each of the student's lists of specific titles must be arrived at in consultation with two or more faculty members. 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- and Twenty-first Century British Literature, Twentieth- and Twenty-first Century American Literature, Contemporary World Literature, and Literary Critical Theory. Each candidate also has the option of constructing, in consultation with a faculty member, one special topic focused on his or her particular area of interest, which is usually but not always in preparation for the dissertation. Candidates 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 one time.

After the student has passed the oral comprehensive, he or she will produce a prospectus for the dissertation. This must be submitted to the department not later than six months after the oral examination.

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.

Tufts in London and Oxford

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 website <http://ase.tufts.edu/english>.

Entrepreneurial Leadership Studies-Entrepreneurship Minor/Gordon Institute

DIRECTOR:

Director of Tufts Entrepreneurship Center and Cummings Family Professor of Entrepreneurship Jack Derby, *Entrepreneurial Marketing; Art & Science of Sales in Entrepreneurship; Inside the Classroom; Entrepreneurial Fieldstudy*

FACULTY:

Professor of the Practice Frank Apeseche, *Entrepreneurial Finance*

Lecturer Karen Bressler, *Nutrition and Entrepreneurship*

Lecturer Lana Caron, *Entrepreneurship and Business Planning*

Lecturer Jessica Deckinger, *Nutrition and Entrepreneurship*

Professor of the Practice Gavin Finn, *Entrepreneurial Marketing; Entrepreneurship for Computer Science*

Professor of the Practice Partha Ghosh, *Strategic Management in the 21st Century*

Lecturer Nancy Lippe, *Philanthropy, Social Enterprise & Community*

Lecturer Elizabeth McCarthy, *Entrepreneurial Leadership*

Lecturer Jay Mixter, *Entrepreneurship and Business Planning, Entrepreneurship in Action*

Lecturer Pamela Stepp, *Entrepreneurial Leadership*

Lecturer Josef Volman, *Entrepreneurial Business Law*

Lecturer Tina Weber, *Entrepreneurship and Business Planning*

Professor of the Practice Joshua Wiesman, *High Technology Entrepreneurship; Creative Design Process of Products*

Lecturer Julianne Zimmerman, *Innovative Social Enterprises*

The Tufts Entrepreneurship empowers the Tufts' community to positively impact businesses, social enterprises, and society at large by teaching and applying entrepreneurial principles of innovation, collaboration and strategic problem solving. We seek to foster, encourage, and celebrate a culture of entrepreneurship at Tufts, while inspiring and empowering our students, faculty, and alums to become active citizens who continuously change the world for the better.

A minor in entrepreneurial leadership studies (Entrepreneurship) is available for all arts & sciences and engineering students. Students are required to take four core courses plus one elective course from the lists below. 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.

Required courses:

ELS101 Entrepreneurship and Business Planning (may substitute ELS 101.03, BME 194, EC74, ELS193.02, or EM 153)

ELS103 Entrepreneurial Finance

ELS105 Entrepreneurial Marketing

ELS107 Entrepreneurial Leadership (may substitute EM 54)

Elective courses:

ELS 141 Innovative Social Enterprises (cross-listed as **American Studies 141** and taught in partnership with Tisch College)

ELS 162 Creative Design Process of Products

ELS 193 Special Topics: Entrepreneurial Business Law; Entrepreneurship in Action

ELS 194 Special Topics: Entrepreneurship for Computer Science; Art & Science of Sales in Entrepreneurship; Product Design in Entrepreneurship; Creativity, Innovation, and Entrepreneurship; Inside the Classroom; Philanthropy, Social Enterprise, and Community; Internship/Research; Talent Management in Entrepreneurship; Strategic Management in the 21st Century

ELS 199 Entrepreneurial Field Studies: Launching the Venture

ELS 109 Societal Aspects of Design

EC 3 Principles of Accounting

E52 – Technical and Managerial Communications

EM153 –Management of Innovation

UEP 23 Negotiation, Mediation and Conflict Resolution

DR 27 Public Speaking

NUTR280 Nutrition and Entrepreneurship

Annual Events

The Tufts Entrepreneurship Center organizes the annual Shapiro Entrepreneurial Lecture featuring distinguished entrepreneurs and prominent alumni. The center also hosts two entrepreneurship roadshows, one in New York City and one in Boston, where Tufts entrepreneurs pitch to investors and connect with prominent alumni. Two Founder's Workshops are offered annually. These intensive "how-to" workshops teach the fundamentals and specifics of writing business plans, creating sales & marketing plans, setting financial plans, and fundraising. The Tufts Entrepreneurship Center also hosts weekly Jumbo Cafes, where students receive expert advice from successful entrepreneurs.

\$100k New Ventures Competition

The Tufts Entrepreneurship Center manages the annual \$100k New Ventures Competition. This university-wide event attracts entries from undergraduate and graduate students, researchers, faculty, staff and alumni from across the entire University including Arts and Sciences, School of Engineering, Sackler School of Graduate Biomedical Sciences, the Fletcher School of Law and Diplomacy, the Cummings School of Veterinary Medicine, Jonathan M. Tisch College of Citizenship and Public Service, the School of Dental Medicine, the School of Medicine, and School of the Museum of Fine Arts. The Tufts \$100k New Ventures Competition uniquely positions itself with three competition tracks: Social Impact, Med Devices & Life Science, and General Technology.

Ideas Competition

The Tufts Ideas Competition provides early-stage startups with mentorship, funding and the support needed to catalyze their ideas and serve as a feeder for the \$100k New Ventures Competition.

Paul and Elizabeth Montle Prize for Entrepreneurial Achievement

This annual competition commends outstanding Tufts Students who demonstrate entrepreneurial skills in for profit or non-profit sectors.

Stephen and Geraldine Ricci Interdisciplinary Prize

This prize is awarded annually to student teams that best demonstrate interdisciplinary engineering design and entrepreneurial spirit.

For information on additional entrepreneurial competitions as well as information on the Entrepreneurship Minor, please visit the website <https://gordon.tufts.edu/entrepreneurship-center/>

Environmental Management

FACULTY ADVISOR:

Lecturer Anne Marie C. Desmarais, *Civil and Environmental Engineering* annemarie.desmarais@tufts.edu

Environmental managers in industry, government, and consulting know that changes in environmental compliance requirements can lead to challenges and opportunities. Complex regulations, emerging environmental technologies, international environmental treaties, and multinational corporate environmental programs will determine the direction that environmental managers must take in the future. The Certificate in Environmental Management provides students with the tools and techniques to understand the future of environmental management.

Students in this program take graduate-level courses offered by the Departments of Civil and Environmental Engineering and Urban and Environmental Policy to develop a five-course program that includes environmental technology, environmental health, and environmental policy. Students can take courses to enhance their knowledge for professional advancement, including life-cycle analysis, GIS, groundwater hydrology, hazardous waste treatment technology, epidemiology, toxicology, corporate environmental management, and environmental law. Courses in global health, primary prevention of infectious disease and sanitation in developing nations are also open to certificate students as are courses in data analytics and wind energy.

The program is open to students with a bachelor's degree. Students should have undergraduate course work in engineering or the natural and physical sciences, including mathematics.

This five-course, graduate-level certificate, offered through the Department of Civil and Environmental Engineering, is designed to be pursued on a part-time basis by professionals seeking advanced training or by students preparing to enter a master's degree program. The program can also be completed full-time in one academic year. In most cases, courses taken as a certificate student can be transferred into a master's degree program in the Department of Civil and Environmental Engineering.

For more information, visit the website <https://engineering.tufts.edu/cee/current/certificate-programs/em>

Environmental Health

DIRECTOR:

Professor David M. Gute, Environmental and occupational epidemiology

CORE FACULTY:

Professor Helen Suh, *Air pollution health effects, Multi-pollutant Impacts, GIS-based spatio-temporal modeling tools*
Associate Professor Daniele S. Lantagne, *Public health engineering, Global health, Water-borne pathogen, Emergencies*
Assistant Professor Amy Pickering, *Sustainability and child health impacts of water, hygiene, and sanitation (WASH) interventions, Climate change and waterborne disease transmission*
Senior Lecturer Mark Woodin, *Epidemiology and biostatistics*
Lecturer Anne Marie Desmarais, *Risk assessment and toxicology*

ASSOCIATED ENVIRONMENTAL HEALTH FACULTY:

Professor Steven C. Chapra, *Water quality modeling and transport of pathogens*
Associate Professor Wayne Chudyk, *Drinking water quality and treatment*
Associate Professor John L. Durant, *Contaminant fate and transport*
Adjunct Professor Jeffrey Griffiths, *Professor of Public Health and Community Medicine, Infectious disease epidemiology, characterization of waterborne pathogens and global health*
Adjunct Professor Elena N. Naumova, *Biostatistics and infectious disease modeling*

The Environmental Health program is an inter-disciplinary program based in the Department of Civil and Environmental Engineering in 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, the focal points of Environmental Health at Tufts has broadened to such challenging issues as environmental pollution, epidemiological aspects of chronic illnesses, occupational health, community based participatory research (CBPR), primary prevention of water-borne disease, toxicology, and risk assessment and management.

While the program retains its traditional strength in environmental engineering, it also provides a sound background in epidemiology, biostatistics, occupational health, and toxicology. The problems and issues in environmental health can be viewed in three broad categories:

- 1) Biological: living organisms, 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 interrelationships within society, which include cultural values, customs, attitudes, economic status, and social-political organization.

The Environmental Health (EH) Graduate Program at Tufts University places emphasis on an interdisciplinary approach to understanding and solving current and classical environmental health problems as they manifest themselves in society. Students study environmental contaminants in air, water and land, the effects of occupational exposures to hazardous materials, risk and exposure assessment, toxicology, the epidemiological aspects of infectious and chronic diseases, the use of biostatistics in the description of the distribution of disease, and the applications of these context areas in the practice of environmental risk management in solving local and global environmental health problems.

Environmental Health at Tufts operates at the interface of the natural and built environments and has introduced the concept of Public Health Engineering, which is integrated in coursework and research. A course in Public Health Engineering is now offered through the EH faculty and is required for undergraduate students in the B.S. program in Environmental Engineering. Through this course, Tufts undergraduates understand the relationships between environmental engineering and public health. Research interests of the Tufts Environmental Health faculty and graduate students range from evaluating and understanding needs of immigrant workers in the neighborhoods surrounding Tufts to assessment and mitigation of water contamination in resource-challenged environments in Ghana, Haiti, and India.

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 in Environmental Health

Requirements:

Core Courses (four courses)

CEE 154 Principles of Epidemiology

CEE 156 Biostatistics

CEE 157 Environmental Toxicology

CEE 158 Occupational and Environmental Health

All M.S. and Ph.D. students are expected to attend the Civil and Environmental Engineering Department Seminar. This is a non-credit seminar that meets on Friday afternoons.

Masters students are normally admitted for a non-thesis program but can elect to complete a thesis with the consent of a faculty member who is willing to supervise the research. The thesis replaces two of the six electives. If a student is interested in the thesis option he or she should meet with faculty to discuss a project in that faculty member's area of research. If accepted, the faculty member will become the student's research advisor. The M.S. thesis contributes two course credits toward the M.S. degree (**CEE 295** and **CEE 296**).

Electives In addition to the Core Courses, M.S. student take an additional six electives (non-thesis) or four electives (thesis option). Electives should be selected after consulting with the student's academic advisor. The electives should balance a student's course work after completion of the Core to provide adequate depth of knowledge in one area of Environmental Health. The following lists are not inclusive and students may take other courses after consulting with their advisors. Some courses are offered every other year.

CEE 113 Groundwater Hydrology

CEE 136 Air Pollution Control

CEE 139 Bioremediation, Natural and Enhanced

CEE 143 Site Remediation

CEE 150 Field Methods for Global Health

CEE 151 Global Climate Change and Human Health

CEE 152 Environmental Health Data Lab

CEE 153 Health Effects and Risk Assessment

CEE 154 Epidemiological Methods

CEE 159 Water, Sanitation, and Hygiene (WASH) Design

CEE 187 Geographic Information Systems

CEE 189 Introduction to Remote Sensing

CEE 194C Environmental Informatics

MPH 224 Infectious Disease Epidemiology

MPH 226 Cancer Epidemiology

MPH 240 Environmental Epidemiology

MPH 206 Intermediate Biostatistics: Regression Methods

MPH 220 Cardiovascular Epidemiology

MPH 222 Survey Research Methods & Data Management

CEE 251 Biology of Water and Health

Supplemental Electives List—Other courses of interest to EH M.S. students include the following. Students may substitute one of these courses for any track elective with his or her advisor's approval. This list is not all-inclusive, and

students may take other courses with their advisor's approval.

CEE 138 Hazardous Waste Treatment Technology

CEE 212 Chemical Principles for Environmental and Water Resources Engineering

CEE 213 Transport Principles for Environmental and Water Resources Engineering

CEE 214 Environmental and Water Resources Systems Engineering

CEE/UEP 207 Environmental Law

CEE/UEP 265 Corporate Management of Environmental Issues

CEE/UEP 267 Methods in Environmental Impact Assessment

CEE/UEP 230 Negotiation, Mediation, and Conflict Resolution

UEP 203 Political Economy, Ethics, and Environment

In addition, on a space-available basis, students may enroll in courses offered in the Master in Public Health (MPH) degree program. These courses are generally held on the Health Sciences campus in Boston.

Masters Project Students in the non-thesis M.S. program may elect to complete a Masters Project (CEE 290) which replaces one of the six electives. Students who elect this option will take a total of nine courses including the four core courses and five electives. Although any student may choose to complete a project, this option may best serve working professionals who can evaluate and assess a practice-oriented problem from their professional experience. Students who elect to complete a project should discuss their topic with their advisor. Students electing to complete a project do not need a formal committee, but are encouraged to ask members of the faculty to read and comment on their final report. Completed projects are submitted to the student's advisor; there is no formal presentation.

Ph.D. in Environmental Health

The requirements for the Ph.D. degree are highly individualized depending on each student's background when he or she matriculates as a Ph.D. student. Students normally take at least five courses beyond the Master's degree or 12 courses beyond the Bachelor's degree. However, students matriculating with a Master's degree in a field unrelated to Environmental Health, or whose academic background lacks specific areas within the Tufts EH Master's curriculum, may be required to take additional courses depending on his or her advisor's recommendations. Students entering with a Bachelor's Degree must complete the four M.S. Core courses as part of their program. The Ph.D. student's advisor is the final arbiter in determining his or her course requirements. Courses can be selected from the M.S. electives list or from other departments at Tufts. Up to two courses can be taken at other area universities.

All Ph.D. students are expected to attend the Civil and Environmental Engineering Department Seminar. This is a non-credit seminar that meets on Friday afternoons.

The Ph.D. Dissertation is the equivalent of three courses in addition to the required courses.

Environmental Studies

PROGRAM DIRECTOR:

Professor Colin M. Orians, Biology and Environmental Studies

PROGRAM ASSISTANT DIRECTOR:

Dr. Sara Gomez, Environmental Studies

EXECUTIVE COMMITTEE:

Professor Ujjayant Chakravorty, Economics and Environmental Studies

Professor Jonathan E. Kenny, Chemistry

Professor J. Michael Reed, Biology

Professor James Rice, History

Professor Jack Ridge, Earth and Ocean Sciences

Professor Modhumita Roy, English

Associate Professor John Durant, Civil and Environmental Engineering

Assistant Professor Alexander Blanchette, Anthropology and Environmental Studies

Assistant Professor Andrew Kemp, Earth and Ocean Sciences and Environmental Studies

Assistant Professor Benjamin Wolfe, Biology

Senior Lecturer Cathy Stanton, Anthropology

Senior Lecturer George Scarlett, Child Study and Human Development

Senior Lecturer Ann Rappaport, Urban and Environmental Policy and Planning

Lecturer Karen Kosinski, Community Health Program

Lecturer Ninian Stein, Environmental Studies

ACADEMIC ADVISORS:

Professor Elizabeth Ammons, English

Professor Ujjayant Chakravorty, Economics and Environmental Studies

Professor David Gute, Civil and Environmental Engineering

Professor Jonathan E. Kenny, Chemistry

Professor Colin M. Orians, Biology and Environmental Studies

Professor J. Michael Reed, Biology

Professor Jack Ridge, Earth and Ocean Sciences

Professor Modhumita Roy, English

Associate Professor John Durant, Civil and Environmental Engineering

Associate Professor George S. Ellmore, Draupner Ring Scholar; Biology

Associate Professor Patrick Forber, Philosophy

Associate Professor Albert Robbat, Chemistry

Associate Professor Markus Wilczek, German

Assistant Professor Alexander Blanchette, Anthropology and Environmental Studies

Assistant Professor Kyle Emerick, Economics

Assistant Professor Andrew Kemp, Earth and Ocean Sciences and Environmental Studies

Assistant Professor Nimah Mazaheri, Political Science

Assistant Professor Alisha Rankin, History

Assistant Professor Benjamin Wolfe, Biology

Senior Lecturer Julie Dobrow, Child Study and Human Development and Interdisciplinary Studies

Senior Lecturer Ann Rappaport, Urban and Environmental Policy and Planning

Senior Lecturer Cathy Stanton, Anthropology

Lecturer Silvia Bottinelli, Visual and Critical Studies

Lecturer Ninian Stein, Environmental Studies

Environmental Studies is a multidisciplinary undergraduate program created to promote the study of our natural surroundings, designs that help minimize degradation of those surroundings, and the social and political tools needed to preserve and improve the environment. The program provides training in social sciences, natural

sciences, engineering, and humanities. It offers both Majors and Minors. For detailed information on the program please visit the Environmental Studies website: go.tufts.edu/ENVS.

UNDERGRADUATE MAJOR PROGRAMS

Major in Applied Environmental Studies

The Applied Environmental Studies major is a stand-alone major that provides theoretical grounding of environmental principles while also providing robust training in quantitative methods, spatial analysis and communication skills required for success in the field. Students are required to complete 15 courses (five core courses, five skill-based courses, four elective courses in a thematic track, and a project-based capstone or equivalent course) and a pre-approved internship (min. 100hrs; ENV 99). We recommend students begin the major with the gateway interdisciplinary course ENV 1 Introduction to Environmental Studies in the fall semester.

Students majoring in Applied Environmental Studies may:

- double-count up to five courses with another major
- double-count up to two courses with a minor
- count up to four (approved) classes taken abroad
- use one (approved) Experimental College class toward this major
- petition classes not listed in the major's website in order to fulfill degree requirements

Major in Environmental Studies

This is a dual major, which must be completed in conjunction with any stand-alone major in the School of Arts and Sciences and the School of Engineering. This dual-major program combines the depth of a disciplinary major, interdisciplinary training in environmental studies, and breadth of offerings in any one of the tracks within environmental studies. Students are required to complete 10 courses (five core courses and five courses in a specialized track) and a pre-approved internship (min. 100hrs; ENV 99). We recommend that students begin the major by taking ENV 1 Introduction to Environmental Studies in the fall semester.

Students majoring in Environmental Studies may:

- double-count up to three courses with another stand-alone major
- double-count up to two courses with a minor
- count up to two (approved) classes taken abroad
- use one (approved) Experimental College class toward this major
- petition classes not listed in the major's website in order to fulfill degree requirements

Thematic Tracks for both Majors

The program offers the following tracks: Track I, **Environmental Science** focuses on science and the tools necessary to detect, evaluate, and solve environmental problems (basic principles, theories, and methods in biology, chemistry, geology, and physics). Track II, **Sustainability, Policy, and Equity** focuses on human development policies and practices that can have both positive and negative effects on the natural ecosystem and human well-being, both now and in the future. Track III, **Environmental Communication** will require students to have knowledge of natural sciences, social sciences, and the arts and humanities to effectively communicate complex environmental issues to diverse audiences. Track IV, **Food Systems, Nutrition and the Environment** focuses on cultural, policy and scientific aspects of food production and consumption. Track V, **Environmental Humanities** focuses on cultural expressions and artistic representations of environmental issues, concentrating particularly on justice, ethics, activism, and social change.

UNDERGRADUATE MINOR PROGRAMS

The program offers two minors, one in Food Systems and Nutrition (for all students) and one in Environmental Science and Policy (for Engineers only).

Minor in Food Systems and Nutrition

The Food Systems and Nutrition minor encompasses a wide array of topics addressing sustainable food production, policy, access and nutrition. The aim is to provide a solid foundation to understand food systems from a holistic interdisciplinary point of view while providing students flexibility to specialize in an area that is most relevant to their interests and career goals. The faculty advisor for the minor is Senior Lecturer Cathy Stanton.

The minor requires taking a total of six courses and is cohesively structured to maximize student learning. Students are advised to start with the required interdisciplinary gateway course ENV 009 Food Systems. Additionally, students must take an introductory course and three electives in the areas of Food Production, Food Access and/or Policy and Science and Nutrition. The minor ends with a required capstone course, ENV 190 Practicing in Food Systems, or equivalent pre-approved experience. The capstone class is a project-based course designed to integrate academic learning with application in a range of food systems settings and working with community partners.

Minor in Environmental Science and Policy (for Engineers)

The Environmental Science and Policy minor is only available to students in the School of Engineering. The minor is designed to give engineering majors greater exposure to natural and social sciences, and thereby deepen their understanding of the causes and solutions to problems related to environmental sustainability. The minor focuses on the integration of knowledge and approaches from different fields for the preservation and improvement of the environment. The goal of the minor is to empower student navigation across disciplines and to prepare engineering students for interdisciplinary collaboration in the area of environmental sustainability. The faculty advisor for this minor is Associate Professor John Durant.

The minor has three required core courses and three electives. Electives must be selected from key areas within the Environmental Studies curriculum, including one each of a select group of methods courses; an approved social science elective drawn from Anthropology, Economics, Political Science, or Urban and Environmental Policy and Planning; and an approved environmental studies seminar course. Only two of these courses may be double counted as foundation or concentration courses taken for School of Engineering majors.

LUNCH & LEARN LECTURE SERIES

Every week during the academic year, Environmental Studies brings speakers from government, industry, academia and non-profit organizations to give presentations on environmental topics. This is a great opportunity to broaden your knowledge, meet other faculty and students and network with the speakers. Students, faculty, staff, and visitors are welcome to attend. Students may receive credit (2 SHUs) if they enroll in ENV 5 Environmental Studies Lecture Series. Food is generously sponsored by the Tufts Institute of the Environment. For more information visit <http://as.tufts.edu/environmentalStudies/lunch/>

Film and Media Studies

DIRECTOR:

Malcolm Turvey, *Sol Gittleman Professor of Film and Media Studies, Art and Art History*

CORE FACULTY:

Professor Nancy Bauer, *Dean of Academic Affairs for Arts and Sciences; Philosophy*

Professor Jay Cantor, *English*

Professor Lee Edelman, *English*

Professor Nina Gerassi-Navarro, *Romance Languages*

Professor Charles Inouye, *Department of International Literary and Cultural Studies*

Professor Vida Johnson, *Department of International Literary and Cultural Studies*

Professor Susan Napier, *Department of International Literary and Cultural Studies*

Professor Kamran Rastegar, *Department of International Literary and Cultural Studies*

Professor Stephen White, *Philosophy*

Professor Xueping Zhong, *Department of International Literary and Cultural Studies*

Associate Professor Amahl Bishara, *Anthropology*

Associate Professor Alessandra Campana, *Music*

Associate Professor Noe Montez, *Drama and Dance*

Associate Professor Tasha Oren, *Drama and Dance, Film and Media Studies*

Associate Professor Joel Rosenberg, *Department of International Literary and Cultural Studies*

Associate Professor Sarah Sobieraj, *Sociology*

Assistant Professor Alexandra Chreiteh (Shraytekh), *Department of International Literary and Cultural Studies*

Assistant Professor Jeremy Melius, *Art and Art History*

Assistant Professor Jacob Stewart-Halevy, *Art and Art History*

Senior Lecturer Julie Dobrow, *Child Study and Human Development*

Senior Lecturer Elizabeth Lemons, *Religion*

Lecturer Gail Bambrick, *Film and Media Studies*

Lecturer Natalie Minik, *Film and Media Studies*

Lecturer Claire Schub, *Romance Languages*

Professor of the Practice Jennifer Burton, *Drama and Dance*

Professor of the Practice Khary Jones, *Drama and Dance*

Professor of the Practice Don Schechter, *Film and Media Studies*

Director Howard Woolf, *Experimental College*

Mass media saturate our lives, making media literacy an indispensable civic skill for the 21st century. Film and Media Studies (FMS) is an interdisciplinary program that educates students about the artistic potential and social effects of film, television and other modern media. Theoretical and practical knowledge are equally essential for media literacy, and all students take critical studies and production courses. The program combines film with television and media studies due to their increasing convergence, and is international in its outlook, thereby furthering Tufts' commitment to globalism and diversity. The curriculum encompasses narrative, documentary, and avant-garde modes in live action and animated images as well as sound and text-based platforms. In keeping with Tufts' rich liberal arts tradition, an interdisciplinary approach is fostered by core courses in film, television and media analysis, history, theory, and production, and supplemented by electives in a variety of departments. By learning about the theory and practice of filmmaking, television and other modern media on a global scale, students become more discerning and active users of media, able to understand and employ them as powerful art forms that can change society for the better.

The program offers a major and a minor, both of which prepare students well for graduate studies/professional programs, and for career opportunities in film, television, advertising, public relations, journalism and digital media.

UNDERGRADUATE MAJOR IN FILM AND MEDIA STUDIES (FMS)

The Film and Media Studies major requires the completion of TEN courses:

- TWO required core courses
- EIGHT elective courses, OR SIX elective courses and a TWO course Senior Honors Thesis

Required Core Courses (TWO courses)

The two required core courses impart analytical skills, historical background, and theoretical underpinnings, providing a coherent knowledge base and consistent language among FMS students. The two required core courses are:

- FMS20 Art of the Moving Image
- FMS21 Global History of Cinema or FMS24 20th Century U.S. Television History

We strongly encourage students to take the two required core courses early in their program of study.

Elective Courses (EIGHT courses)

Students must take eight elective courses (or six if undertaking a Senior Honors Thesis) from the list of FMS-approved courses. Of these:

- One must be a theory course
- One must be a social science course
- One must be an introductory film or media practice course
- One must be a non-U.S. film or media course
- One must be an upper level course or seminar

Senior Honors Thesis (TWO courses)

In the senior year, FMS students may undertake a two course Senior Honors Thesis under the guidance of a committee consisting of at least two faculty members, which allows students to do in-depth, self-directed work as scholars and/or artists. Students undertaking a two course Senior Honors Thesis need only take six elective courses along with the two required core courses.

UNDERGRADUATE MINOR IN FILM AND MEDIA STUDIES (FMS)

The Film and Media Studies minor requires the completion of six courses:

- ONE required core course, FMS20 Art of the Moving Image
- ONE introductory level film or practice course
- FOUR elective courses from the list of FMS-approved courses

FILM AND MEDIA STUDIES INTERNSHIP PROGRAM

The internship program grants academic credit for internships in film, media and communications (FMS 99). 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 written requirements, and meet regularly with the faculty advisor. Consult the FMS website for eligibility and course requirements: <http://as.tufts.edu/fms/internships>

French

(FOR DEGREE REQUIREMENTS, SEE ROMANCE STUDIES)

German

(FOR DEGREE REQUIREMENTS, SEE INTERNATIONAL LITERARY AND CULTURAL STUDIES.)

Greek

(FOR DEGREE REQUIREMENTS, SEE CLASSICS.)

History

Professor James Rice, *Chair, Walter S. Dickson Professor of English and American History; Early America, Native American, and Environmental History*

Professor Ina Baghidianz McCabe, *Darakjian and Jafarian Chair in Armenian History; Armenia and cross-cultural world history*

Professor Virginia G. Drachman, *Arthur Stern, Jr. 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 Ayesha Jalal, *Mary Richardson Professor of History; South Asia, the Muslim world*

Professor Gary P. Leupp, *Japan*

Professor Beatrice F. Manz, *Middle East and Inner Asia*

Professor Steven P. Marrone, *Medieval, early modern Europe*

Professor Hugh Roberts, *Edward Keller Chair in North African and Middle Eastern History; Modern Algeria and Egypt, Berber politics, Islamism and political reform in North Africa*

Professor Reed Ueda, *Industrial and urban U.S. history, immigration, American social history, comparative and world history* **Professor Peter Winn**, *Latin America*

Associate Professor David Ekbladh, *Modern U.S., U.S. in the world*

Associate Professor Kendra Field, *Nineteenth-century U.S., African American, Native American*

Associate Professor Elizabeth Foster, *Modern France in the world, colonial West Africa*

Associate Professor Kris Manjapra, *Modern South Asia, modern Germany, intellectual history*

Associate Professor Alisha Rankin, *Early modern Europe; history of science and medicine*

Associate Professor Man Xu, *Chinese history*

Assistant Professor Rachel Applebaum, *Modern Russia, Modern Eastern Europe*

Senior Lecturer David J. Proctor, *Late antique and medieval Western Europe, Byzantium, Southeastern Europe, Papal-Imperial relations*

SECONDARY APPOINTMENTS:

Professor Gregory R. Crane, *Classics; Winnick Family Chair in Technology and Entrepreneurship; Greek literature, computers and classics*

Professor Sol Gittleman, *ILCS; Alice and Nathan Gantcher University Professor of Judaic Studies; Earlier twentieth century, Yiddish literature, national socialism*

Professor R. Bruce Hitchner, *Classics; Roman history, archaeology and international relations*

Associate Professor Heather D. Curtis, *Religion; History of Christianity, American religious history* **Associate Professor Steven W. Hirsch**, *Classics; Greek, Roman, and Near Eastern history*

Assistant Professor Chris Miller, *International History*

Senior Lecturer Steven Cohen, *Education; History, political science and philosophy, curricula instruction, practice of teaching history and political science*

Adjunct Senior Lecturer John C. Schneider, *Tisch College; U.S. urban and social history*

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.

Trained to examine evidence carefully and evaluate received interpretations of the past, students construct their own understanding of historical processes and occurrences, building arguments from primary sources, historians' writings and appropriate theoretical literatures. In history you also write gripping narratives, empathize with the experiences of people who have gone before, and re-imagine past worlds.

The Tufts History faculty promotes a diversity of approaches and ways of understanding the past. From the history of medicine, to labor and migrant histories, to transnational and material culture, courses challenge students to analyze historical material. The department 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 189)

provide more specific, comparative, or regional perspectives. Foundation Seminars (numbered 90–97) introduce undergraduate majors to the historian’s craft; announced each semester. Research Seminars (numbered 190 to 197) provide them 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 10 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. Courses taken outside of Tufts, however, do not count as graded courses. No more than four of the history major concentration requirements may be transferred from other institutions.

In consultation with their advisor (normally prior to taking such courses), majors may 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. A minimum grade of C- is required in all courses counted towards the completion of the major. 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: global/transregional, Africa, Latin America, the Middle East or Central Asia, East Asia, and South Asia; (4) four or more courses to serve as a concentration core (this may be defined geographically or topically); and (5) one Research Seminar (a high-demand course) to be taken within the History Department at Tufts.

In consultation with their advisor, 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 concentration core. 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. In exceptional cases, thesis writers may petition to be exempt from the Research Seminar requirement.

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, Latin America, Middle East/Central Asia, East Asia, or South Asia); (3) three courses developed as a coherent core in consultation with the student’s History advisor.

Both majors and minors: Please note that a single course may fulfill several of the concentration requirements.

DEPARTMENTAL HONORS

When nominating seniors for honors, especially magna and summa, the department looks carefully at qualitative issues—performance in Foundation and Research Seminars, evidence of sophistication in work beyond the introductory level (e.g., work in advanced courses, Senior Thesis and independent study)—and not simply the quantitative criteria of GPA and A’s earned.

The Senior Honors Thesis in History

The Senior Honors Thesis program in History is intended for those students who have a record of high performance in upper-level history courses and who have developed an interest and some background in a well-focused research topic. Students interested in writing a Senior Honors Thesis should consult their advisors, the guidelines described under Thesis Honors Program in this bulletin and the History Department Web pages. For an Honors Thesis in History the thesis committee must have three members: two from History and one from an outside department. All thesis writers must enroll in the thesis seminar, HIST 198, for the fall semester of their thesis year.

GRADUATE PROGRAM

The Tufts History Department encourages students to study subjects and problems that transcend traditional academic constraints and consider national and regional histories in the broadest possible contexts. Our collaborative approach places an emphasis on global or interregional connections and comparisons, as well as on the use of interdisciplinary methods.

The Tufts History Graduate Program cultivates academic excellence and prepares students for leading roles in education and research, as well as in the fields of business, administration and world affairs.

The Tufts Graduate Program offers the M.A. degree in History or in History and Museum Studies. It also offers individual courses to students earning a certificate in Museum Studies. The Ph.D. is offered in Modern South Asia and Global History. Members of the History Department offer preparation at the M.A. level in regional fields that include South Asia, East Asia, Africa, Latin America, Europe and the United States. In addition to the regional fields, the department supports thematic fields, which combine interdisciplinary and comparative approaches. Students who choose not to specialize in a regional field may select a thematic field of study such as the following:

- Civil Society, the Public Sphere, and the State
- Film, Media, and History
- Gender and Sexuality
- International and Intercultural Relations
- Colonialism and Postcolonialism
- Labor and Social Movements
- Nationalism and Collective Identity

Master of Arts in History

The Master's Program is a small, selective program of graduate study that emphasizes comparative understanding of historical processes. It is organized around colloquia in comparative and regional topics, the preparation of specified fields, and individual research in consultation with a faculty member.

The 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. GRE scores (verbal, quantitative, analytical) and, if appropriate, TOEFL are required for admission to the graduate history program. Since the curriculum depends greatly upon individualized interaction between faculty and students, admission is 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 who plans to meet the requirement after enrollment at Tufts 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 (History 200), one Graduate Colloquium, at least one Research Seminar, and either an additional Research Seminar or one semester of directed graduate research.

Up to two of the ten courses required for the master's degree may, by prior agreement with the principal advisor, 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 advisor and the relevant instructor. Graduate students may not take undergraduate colloquia. Appropriate courses offered by the Fletcher School will be accepted by petition for graduate credit in History.

A student may devote two out of ten courses to the writing of a thesis. In that case, only one additional course needs to be allocated for a Research Seminar or directed graduate research. In the second 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. Students will choose two fields of study to be prepared for examination. These fields may be regional or comparative in focus. Each student will consult with his or her principal advisor and a field committee to design a sequence of courses that will provide preparation for examinations in each field. Examinations must be taken at least six weeks prior to graduation. If the student chooses to write a thesis, only one field, different from the field of the thesis, need be prepared for examination.

Master of Arts in Museum Studies and History

The Tufts Museum Studies Program provides qualified post-baccalaureate students with professional training in the administration, preservation, and interpretation skills required for a career in the museum field. The Certificate in Museum Studies requires four graduate-level courses and an on-site internship. History M.A. candidates may take individual Museum Studies courses that fit into their program. 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 Master's Program in History and Museum Studies are the same as those for the Master's Degree in History alone. 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 (History 200), 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) proven reading proficiency in at least one foreign language; (4) the presentation of one research project drawn from coursework to the Graduate History Roundtable.

Doctor of Philosophy

The Tufts History Department offers the Ph.D. in History in two fields: Modern South Asia and Global 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.

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. Students interested in applying for the program in Modern South Asia should be in contact with Professors Ayesha Jalal and Kris Manjapra; those interested in the program in Global History should be in contact with Professor Elizabeth Foster. Students admitted with a master's degree from another university will be allowed to transfer up to eight course credits.

Requirements for completion are as follows: proficiency in two foreign languages; completion of sixteen courses at the graduate level, including the historiography proseminal and two graduate colloquia; at least three semesters of independent readings or research; oral and written examinations in three fields, based on coursework and readings, administered by the appropriate members of the department; and a dissertation directed by the supervising faculty, to be read and defended before a committee including the advisor, 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. See additional requirements for the South Asia Ph.D. below.

Modern South Asia

The Tufts History Department has a distinguished tradition of offering doctoral training in Modern South Asian history.

Successful Ph.D. candidates have gone on to obtain positions in some of the most prestigious institutions of American academe. The program provides doctoral students with an ambience geared to intense and focused research into the most pressing questions of South Asian scholarship today, while also connecting students to the larger international expertise of the Tufts History Faculty, as well as the resources of the Tufts Fletcher School of Law and Diplomacy. Students in this major field also partake of the active intellectual life surrounding South Asian studies in the Boston area, including the Center for South Asian and Indian Ocean Studies at Tufts University (<http://ase.tufts.edu/southasian>).

The Modern South Asia Ph.D. immerses students in both the breadth and the detail of a complex arena of historical inquiry. Students study local and regional specificities, and also the large-scale political, economic, social, cultural and intellectual interactions that have made South Asia a nexus for globalizing forces in the modern period.

Focus is placed on building expert skills in historical reasoning and analysis, in good writing and exposition, and in historiographic theory and debates.

Students who enter the Ph.D. program in Modern South Asian history at Tufts secure themselves a place in a scholarly tradition that has significantly influenced academic discussions in the United States and abroad by the formulation of new themes and heuristic categories, and by the impressive caliber of its work.

Additional requirements for the Ph.D. in Modern South Asian History are as follows:

- a. Language requirements: English, at least one major South Asian language, and one other appropriate language.
- b. Primary field of concentration: Nineteenth- and twentieth-century South Asia.
- c. Secondary geographic field: An appropriate field in the history of the Middle East, East Africa, Central Asia, Southeast Asia, or East Asia.
- d. Thematic field: An appropriate interdisciplinary and comparative field in topics such as nationalism, agrarian or labor history, or world history.

Applicants should contact Professors Ayesha Jalal and Kris Manjapra.

Global History

Global History begins with the premise that the world is an everchanging, interconnected system. This program pursues a comparative and connected approach to the study of history. It also explores formations and processes such as colonialism, empire, globalization, and diaspora, that situate places, social groups, and events beyond the limiting conceptual framework of the nation-state, or the world region. At the same time, a global perspective also enhances understanding of a particular region's history, and can illuminate the significance of well-defined historical place and time by situating it within a larger comparative horizon. Our commitment to cross-cultural studies, perspectives from the Global South, and comparative history provides a context within which students can conduct research across and beyond national or imperial histories.

Students will be able to work in comparative and connected frameworks with scholars who specialize in Atlantic, Indian Ocean, transnational, postcolonial, and global approaches, and whose areas of study include Europe, Africa, Latin America, North Africa, the Middle East, Asia, and the United States.

Additional requirements for the Ph.D. in Global History

- Three graduate fields:
 - a major field in a specific regional/national area directly related to the thesis topic.
 - a second regional/national field that complements the major field.
 - a thematic field that emphasizes global history approaches.
- At least one of the fields should be in non-European/U.S. history.
- Demonstrated competence in two languages besides English.
- At least one graduate course in another discipline.

To determine whether the Global History program is a good fit for your interests and academic background, applicants should contact the program coordinator, Associate Professor Elizabeth Foster, or the director of graduate studies, Professor Steven Marrone

Human Factors Engineering

DIRECTOR OF THE UNDERGRADUATE PROGRAM IN HUMAN FACTORS ENGINEERING:
Professor of the Practice James Intriligator, Mechanical Engineering

UNDERGRADUATE ADVISOR FOR LIBERAL ARTS (ENGINEERING PSYCHOLOGY):
Assistant Professor Nathan Ward, Psychology

AFFILIATED FACULTY:

Professor of the Practice Daniel J. Hannon, Mechanical Engineering
Professor of the Practice James Intriligator, Mechanical Engineering
Professor Robert Jacob, Computer Science
Professor Holly A. Taylor, Psychology
Assistant Professor Nathan Ward, Psychology
Professor of the Practice Michael Wiklund, Mechanical Engineering

UNDERGRADUATE PROGRAM

Bachelor of Science—Human Factors Engineering

The Human Factors Engineering/Engineering Psychology program is an interdisciplinary program offered jointly by the departments of mechanical engineering and psychology. Human Factors Engineering (and Engineering Psychology within the College of Liberal Arts) applies knowledge of human attributes, behaviors, skills and attitudes to the design of products, equipment, machines, and large-scale systems for human use. Areas of application include medical devices and systems design, transportation safety, consumer product design, and computer interface design. Students in the School of Engineering (or the College of Liberal Arts – via the Engineering Psychology degree) will receive the bachelor of science 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 premedical and pre-dental students; and for those interested in careers in technology design and development, or management.

The below requirements apply only to students in the School of Engineering, students in the College of Liberal Arts should see the Engineering Psychology section of this bulletin.

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. In addition to the below requirements, students must complete a minimum of 120 semester hour units (SHUs).

An example course of study:

CORE PROGRAM:

Freshman Year

FALL TERM

Introductory Engineering 1 Intro Engineering Elective

Mathematics 32 Calculus I

Physics 11 General Physics I

English 1 or 3 Expository Writing or Reading, Writing & Research

SPRING TERM

Engineering Science 2 Introduction to Computing in Engineering

Mathematics 34 Calculus II

Psychology 1 Introduction to Psychology

Natural Science Elective

Sophomore Year

FALL TERM

Computer Science 11 Introduction to Computer Science

Engineering Psychology 53 Engineering Psychology

Engineering Science 3 or Engineering Science 5 or Mechanical Engineering 20 or Mechanical Engineering 30 Introduction to Electrical Systems or Introduction to Mechanics—Statics and Dynamics or Mechanics I or Electromechanical Systems & Robotics I

Mathematics Elective

Natural Science Elective

SPRING TERM

Computer Science 15 or Computer Science 20 Data Structures or Web Programming

Engineering Psychology 64 Methods for Human Factors Engineering

Engineering Psychology 130 Advanced Engineering Psychology

Engineering Science 56 or Psychology 31 Probability & Statistics or Statistics for Behavioral Science

Humanities/Arts or Social Science Elective

Junior Year

FALL TERM

Computer Science or Engineering Psychology Core Elective

Domain Focus Elective

Engineering Management 52 Technical & Managerial Communications

Engineering Elective

Psychology Elective

SPRING TERM

Domain Focus Elective

Engineering Science 18 or Mechanical Engineering 40 Computer Aided Design or Engineering Design I

Engineering Psychology 161 Human Factors Product Design

Engineering Psychology 166 or Computer Science 171 Computer Interface Design or Human Computer Interaction

Humanities/Arts or Social Science Elective

Senior Year

FALL TERM

Domain Focus Elective

Engineering Psychology 120 Project Study in Human Systems A

Engineering Psychology Core Elective

Psychology Elective

Humanities/Arts or Social Science Elective

Free elective

SPRING TERM

Domain Focus Elective

Domain Focus Elective

Engineering Psychology 120 Project Study in Human Systems B

Engineering Psychology Open Elective

Free elective

The above thirty eight courses satisfy the following distribution requirements:

INTRODUCTORY NATURAL SCIENCES, MATHEMATICS & ENGINEERING (9 COURSES)

- **Mathematics 32** Calculus I
- **Mathematics 34** Calculus II
- Two Mathematics Electives (listed with attribute SoE-Mathematics in SIS)
- **Physics 11** General Physics I
- Two Natural Science Electives (listed with attribute SoE-Natural Sciences in SIS)
- **Engineering Science 56 or Psychology 31** Probability & Statistics or Statistics for Behavioral Science

- **Introductory Engineering 1** Intro Engineering Elective
- **Engineering Science 2** Introduction to Computing in Engineering

HUMANITY/ART/SOCIAL SCIENCES (6 COURSES, MINIMUM 18 CREDIT HOURS)

In addition to the below requirements, at least two courses in the Humanity/Art/Social Sciences requirement must be taken in the same department.

- **English 1 or 3** Expository Writing or Reading, Writing & Research
- **Psychology 1** Introduction to Psychology
- **Engineering Management 52** Technical & Managerial Communications
- One Humanities Electives (listed with attribute SoE-HASS-Humanities in SIS)
- Two HASS Electives (listed with attribute SoE-HASS-Humanities, SoE-HASS-Social Sciences, SoE-HASS-Arts in SIS)

DOMAIN FOCUS (5 COURSES, MINIMUM 15 CREDIT HOURS)

In keeping with the interdisciplinary and multidisciplinary nature of the field, students are encouraged to choose electives from among a wide array of fields. Your domain focus electives should be chosen to compliment your career objectives and prepare you to do human factors engineering within a specific domain. For example, if you are interested in doing HFE work in biomedical devices, then these electives might be in Biomedical Engineering, or in biology, medicine, and related areas.

- Courses may only be taken from the departments listed below.
- All courses must be at least 3 SHUs each.
- At least 2 courses must be 100 level.
- At least 2 courses must be from the same department.
- At least two courses must be outside of Engineering Psychology or Human Factors Engineering.

Art (including SMFA)

Art History

Anthropology

Biology

Biomedical Engineering

Chemical & Biological Engineering

Child Study & Human Development

Civil & Environmental Engineering

Community Health

Computer Science

Economics

Education

Electrical & Computer Engineering

Engineering Management

Engineering Science

Entrepreneurial Leadership Studies

Linguistics

Mathematics

Mechanical Engineering

Music

Occupational Therapy

Peace & Justice Studies

Political Science

Psychology

Sociology

Science, Technology & Society

Urban & Environmental Planning

FOUNDATION (4 COURSES)

- **Engineering Science 3 or Engineering Science 5 or Mechanical Engineering 20 or Mechanical Engineering 30**
Introduction to Electrical Systems or Introduction to Mechanics—Statics and Dynamics or Mechanics I or Electromechanical Systems & Robotics I
- **Engineering Science 18 or Mechanical Engineering 40** Computer Aided Design or Engineering Design I
- **Computer Science 11** Introduction to Computer Science
- **Computer Science 15 or Computer Science 20** Data Structures or Web Programming

FOUNDATION (12 COURSES)

- **Engineering Psychology 53** Engineering Psychology
- **Engineering Psychology 130** Advanced Engineering Psychology
- **Engineering Psychology 64** Methods for Human Factors Engineering
- **Engineering Psychology 166 or Computer Science 171** Computer Interface Design or Human Computer Interaction
- **Engineering Psychology 161** Human Factors Product Design
- **Engineering Psychology 120** Project Study in Human Systems A & B (two terms of enrollment required)
- One Computer Science or Engineering Psychology Core Elective (any course in computer science beyond **Computer Science 11** or one of the following: **Engineering Psychology 109, Engineering Psychology 110, Engineering Psychology 112, Engineering Psychology 114, Engineering Psychology 162, Engineering Psychology 163 or Engineering Psychology 164**)
- One Engineering Psychology Core Elective (one of the following: **Engineering Psychology 109, Engineering Psychology 110, Engineering Psychology 112, Engineering Psychology 114, Engineering Psychology 162, Engineering Psychology 163 or Engineering Psychology 164**)
- One Engineering Psychology Open Elective (any course in Engineering Psychology)
- One Engineering Elective (listed with attribute SoE-Engineering in SIS)
- Two Psychology Electives (any course in Psychology)

FREE ELECTIVES (2 COURSES)

- Two free elective courses without restriction

Minor in Human Factors Engineering

A minor in Human Factors Engineering for non-Human Factors Engineering majors is intended for students interested in the field but already too far along to switch, or for those who are simply interested in gaining a basic understanding of human factors engineering. Note: The minor is only available to students in the School of Engineering.

The focus of the minor is on the inter-relationship between human and technology, from a human-centered perspective. A total of five courses are required in order to complete the minor program:

- **Engineering Psychology 64** Methods for Human Factors Engineering
- **Psychology 53** Engineering Psychology
- One Statistics Elective chosen from: **Psychology 31** Statistics for the Behavioral Sciences, **Biology 132** Biostatistics, **Economics 13** Statistics, or **Engineering Science 56** Probability & Statistics
- **Engineering Psychology 161** Human Factors in Product Design
- One Independent Research or Internship chosen from: **Engineering Psychology 99** Undergraduate Internship, **Psychology 91** Research in Psychology, **Psychology 99** Undergraduate Internship, **Mechanical Engineering 94** Undergraduate Research, **Mechanical Engineering 99** Undergraduate Internship

Human-Computer Interaction

FACULTY ADVISOR:

Professor of the Practice Daniel J. Hannon, Mechanical Engineering

Professor James Intriligator, Mechanical Engineering

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 Mechanical Engineering, 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, visit the website

<https://engineering.tufts.edu/me/current/certificate-programs/human-computer-interaction>.

Interdisciplinary Studies

(See also Center for Interdisciplinary Studies.)

The Center for Interdisciplinary Studies (CIS) administers the Interdisciplinary Studies major and the CIS Senior Thesis Option.

Interdisciplinary Studies Major

The Interdisciplinary Studies major offers students the opportunity to create a self-designed, individual concentration that draws on courses from at least two of the following six areas of study: humanities, arts, social sciences, natural sciences, mathematics (quantitative), and engineering.

Students proposing an Interdisciplinary Studies major must have a high degree of initiative and self-discipline. The Interdisciplinary Studies major consists of an integrated program of at least 30-36 SHUs plus a two-semester thesis or honors thesis (for eligible students) or a substantial project comparable in scope to a thesis, including a written component. A student who wishes to pursue an Interdisciplinary Studies major must submit a detailed application describing the planned program of study. The student selects an advisory committee of three faculty members who support the application, including representatives from three departments or programs 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 tenured or tenure-track member of the Arts and Sciences faculty. In consultation with this advisory committee, the student develops a rationale for the major, selects courses, and outlines the thesis plan. The proposal is reviewed for approval by the CIS Board or its designated subcommittee.

Note: Six SHUs used to fulfill another major may also be used toward the Interdisciplinary Studies major; students may not triple major if one major is in Interdisciplinary Studies. **Students are not permitted to do an honors thesis in more than one major.**

For specific information and application guidelines, visit the Center for Interdisciplinary Studies website:
<http://cis.tufts.edu>.

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 or its designated subcommittee 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 will serve as the chair of the committee and be responsible for submitting the final grade. One member of the committee must be from a department or program in which the student is majoring. The proposed thesis topic must be approved by the CIS Board or its designated subcommittee. Application instructions and relevant timeline can be found on the CIS website.

Students who would like to be recommended for degrees with honors by a department or program that requires a thesis should be aware that a CIS thesis will not usually count as a substitute for an honors thesis within the department or program. However, once the thesis proposal is approved by the CIS Board or its designated subcommittee, eligible students can apply to the Thesis Honors Program by filing the appropriate paperwork at Dowling Hall. If the CIS thesis is to qualify as an honors thesis, the chair of the thesis committee must be a member of the department or program in which the student is majoring.

In addition to administering the Interdisciplinary Studies major and the CIS Senior Thesis, the Center for Interdisciplinary Studies provides a dynamic hub for a range of interdisciplinary academic programs at Tufts. For information about majors and/or minors offered by interdisciplinary programs, please see the relevant program website.

For more information on these programs, students should consult the individual program website and/or program director.

International Literary and Cultural Studies

Professor (Russian) Gregory Carleton, *Department Chair; Russian literature and culture*

Professor (Japanese) Hosea Hirata, *Director of Japanese Program; Director of International Literary and Visual Studies; Japanese literature*

Professor (Japanese) Charles Inouye, *Japanese literature*

Professor (Russian) Vida Johnson, *Director of Russian Program; Twentieth century, film, women writers*

Professor (Japanese) Susan Napier, *Goldthwaite Professor of Rhetoric; Japanese literature, popular culture, anime*

Professor (Arabic) Kamran Rastegar, *Director of Arabic Program; Modern Arabic literature, comparative literature, cinema studies, postcolonial studies*

Professor (Chinese) Xueping Zhong, *Director of Chinese Program; Modern Chinese literature, film*

Associate Professor (Judaic Studies) Joel Rosenberg, Lee S. McCollester *Associate Professor of Biblical Literature; Director of Judaic Studies; Central European writers, South African writers, film studies*

Associate Professor (German) Markus Wilczek, *Director of German Program; 18th Century to Modern, Environment*

Assistant Professor (Arabic) Alexandra Chreiteh (Shrayteh), *Mellon Bridge Assistant Professor of Arabic Studies*

Senior Lecturer (Arabic) Rana Abdul-Aziz, *Coordinator of Arabic language courses*

Senior Lecturer (Hebrew) Hedda Harari-Spencer, *Coordinator of Hebrew language courses*

Senior Lecturer (Arabic) Fadi Jajji, *Arabic language*

Senior Lecturer (Japanese) Kiyomi Kagawa, *Coordinator of Japanese language courses*

Senior Lecturer (Chinese) Jinyu Li, *Chinese language*

Senior Lecturer (German) Doris Pfaffinger, *German language*

Senior Lecturer (German) Saskia Stoessel, *Coordinator of German language courses*

Senior Lecturer (Chinese) Mingquan Wang, *Coordinator of Chinese language courses*

Lecturer (Russian) Marina Aptekman, *Coordinator of Russian language courses*

Lecturer (Chinese) Jianping Feng, *Chinese language*

Lecturer (Japanese) Shiori Koizumi, *Japanese language*

Lecturer (Chinese) Min Wan, *Chinese language*

Lecturer (Chinese) Shaomei Wang, *Chinese language*

Lecturer (Japanese) Miki Yagi, *Japanese language*

Lecturer (Arabic) Souhad Zendah, *Arabic literature*

The Department of International Literary and Cultural Studies (formerly the Department of German, Russian and Asian Languages and Literatures) is the administrative home to the following foreign language and culture programs: Arabic, Chinese, German, Hebrew, Japanese and Russian. It is also the administrative home to three interdisciplinary programs, International Literary and Visual Studies (ILVS), Judaic Studies and Middle Eastern Studies. The department is also closely connected to other interdepartmental programs such as Film and Media Studies (FMS) and International Relations (IR).

The Department offers nine majors and two graduate degrees. The undergraduate majors are Arabic, Chinese, German Language and Cultural Studies, German Studies, Japanese, Judaic Studies, ILVS, Russian Language and Cultural Studies, 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, Hebrew, Japanese, Judaic Studies, and Russian. (For majors in IR, as well as minors in FMS, please consult their websites.)

SPECIAL MINOR FOR ENGINEERING STUDENTS

Students earning a bachelor's 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 second-semester level: 3, 4, 21, 22.
- b. One course in the social sciences concentrating on the area in which the target language is spoken (e.g., for Arabic: History 70, 71, 72, 87, 97; for Chinese: History 40, 41, Political Science 126; for German: History 54, 59, 63, 68, Political Science 125, 147; for Hebrew: History 71; for Japanese: History 42, 43, 133, 134, 135, Political Science 131; for Russian: History 61, 62).
- 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.

Minor checklist forms are available at <http://ase.tufts.edu/ilcs/programs/>.

Arabic

Arabic is among the top five most widely spoken languages in the world, is one of the six official languages of the United Nations, and is the official language of twenty-six nations. The Tufts Arabic Program, with its language, literature and cultural studies courses, offers training in the study of the Arabic language at all levels, as well as offering studies in topics relating to Arabic literature, and film and visual cultures of the Arab world. Students of Arabic at Tufts gain a strong foundation in Modern Standard Arabic, as well as studying in courses taught in English on modern and classical Arabic literatures, cinema, and other areas of cultural studies.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The Arabic Language and Cultural Studies major is designed to offer students a strong foundation in both the Arabic language and in Arabic literary and cultural studies. The major in Arabic requires ten courses in all: nine courses beyond Arabic 4, plus one approved course in a different department. Of the nine departmental courses, four must be Arabic language-based courses, while five must be selected from available departmental Arabic literary and cultural studies courses.

- a. Language requirement: Four Arabic language-based courses above Arabic 4: Arabic 21, Arabic 22, Arabic 121, Arabic 122, or further advanced Arabic language-based courses (subject to approval of the director of Arabic). Students who place higher than Arabic 21 upon entry into the program are expected to complete ten courses in all, in consultation with the Director of Arabic.
- b. Culture requirement: Five departmental Arabic literature or culture courses. Two of these five required courses may be filled by approved courses taken outside of the Medford campus.
- c. Related course: One course in a topic related to Arabic or the Middle East offered outside of Tufts' Arabic Program. Courses in this category are subject to the approval of the Director of Arabic.

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. Minor checklist forms are available at <http://ase.tufts.edu/ilcs/requirements/arabic.htm>.

Chinese

Chinese civilization is one of the longest and most continuous in the world. Home to one-fifth of the world population and undergoing rapid changes, China is playing an increasingly important role in today's world. The Chinese program offers courses that aim at helping students achieve proficiency in modern Chinese language and acquire a comprehensive understanding of Chinese literature and culture in conjunction with their social and historical contexts.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The major in Chinese Language and Cultural Studies requires 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 category B must be a seminar offered by the Chinese program. If qualified, a student may opt to do an honors thesis.

- a. Language requirement: 4 courses beyond Chinese 4: 21, 22, 121, 122. Students placed above 21 or higher, upon completion of 122 or its equivalent, can take more advanced language courses (123, 124, 125, 126, 127, 128), or additional culture courses, or a combination of both.
- b. Chinese 61 and four additional literature and cultural courses (taught in English) from Chinese Program offerings in the department. The four additional courses must include at least one seminar course. If approved, a student may opt to do an honors thesis, which can be counted as one seminar course. One culture course from Tufts-in-China will be counted in this category.
- c. CHNS 52 or one China-related course offered by another program or department (PS 120, 126, 188-44; HIST 40, 41;

- FAH 13/CR13; REL 53). One culture course from Tufts-in-China will be counted in this category. Courses not listed above require approval by the Chinese program director.
- d. One seminar, or honors thesis, double counted as one course in category B. Please see category B above for more information.

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. Minor checklist forms are available at <http://ase.tufts.edu/ilcs/requirements/chinese.htm>.

CHINESE LANGUAGE COURSES

Regular classes for the first four years (1 through 122) meet three times a week; regular classes at the higher levels (123 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-Beijing

The Tufts-in-Beijing program offers a fall semester in Beijing, China, at Beijing Normal University, one of the top universities in China. The combination of the city of Beijing and the rich academic resources at BNU makes Tufts-in-Beijing a unique program for students of Chinese language and culture.

Well-prepared undergraduates who have successfully completed Chinese 4 (or the equivalent) by the time of departure are eligible to apply. Tufts-in-Beijing 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 contemporary 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 culture of the German-speaking countries. The program also provides a significant number of courses in English for students not conversant in German.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The German program offers two undergraduate major degrees:

German Language and Cultural Studies

To major in this area, a student should take ten courses above the intermediate (German 4) level. At least five of these should be courses taught in German and, depending on the student's preparation, include German 21, 22, 34, 44, 61, 62, and 100-level courses. A minimum of two 100-level courses taught entirely in German (121 and one literature/culture course), and one course in a related field, such as German art, politics, or history, are required.

The Tufts-in-Tübingen program (see below for description) is highly recommended for 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 in German Language and Cultural Studies.

German Studies

To major in this area, a student should take ten courses above the intermediate (German 4) level. Five of these should be

courses taught in German and, depending on the student's preparation, include German 21, 22, 34, 44, 61, 62, and 100-level courses. A minimum of two 100-level courses taught entirely in German (121 and one literature/culture course) are required. The remainder is a combination of courses dealing with German subject matter taught through at least three departments, for example International Literary and Cultural Studies, History, Music, Philosophy, Political Science, or International Relations. Courses taken in other departments must be approved by the German program for concentration credit.

The Tufts-in-Tübingen program (see below for description) is highly recommended for majors. Courses taken in German at the University of Tübingen count toward the major in German Studies. Please check with your advisor regarding approval.

TUFTS-IN-TÜBINGEN PROGRAM

The Tufts-in-Tübingen program is a unique opportunity for students from various disciplines to spend their junior or senior year (or one semester thereof) abroad experiencing the culture of German-speaking countries within the larger European context, and combining their knowledge of German with their specific areas of interest (for example International Relations). Courses taken in German at the University of Tübingen in such areas as Politikwissenschaft, Volkswirtschaft, Geschichte, Kunstgeschichte, Volkskunde, Sozial- und Kulturwissenschaft, Germanistik, and Vergleichende Literaturwissenschaft will count toward the concentration requirement of the two German majors we offer. After returning to the Tufts Medford/Somerville campus, German 121 and one 100-level literature/culture course in German will be required. These two courses cannot be substituted for by courses taken abroad. A minimum of two years of college-level German (German 4) is required to qualify for Tufts in Tübingen.

UNDERGRADUATE MINOR PROGRAMS

German Minor

The department offers a minor in German requiring six courses above the intermediate level (German 4). These must include German 121 and one 100-level literature/culture course in German.

Language Minor for Engineers:

This minor requires six courses above the beginner level (German 2): four courses should be language courses (for example GER 21, 22, 34, 44), one social science course concentrating on the area in which the target language is spoken, and GER 121.

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.

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. Both master's programs provide a wide range of courses in language, literature, and culture.

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 of German.

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.

TUFTS-IN-TÜBINGEN PROGRAM

Graduate 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 assistants.

Japanese

The Japanese program offers five levels of Japanese language instruction and introduces students to many facets of Japanese culture—especially literature, film, and visual culture. The major prepares students for careers in academics, business, law, diplomacy, or technology where an in-depth knowledge of Japanese language and culture is an invaluable asset.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The major in Japanese Language and Cultural Studies 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 061 and four additional literature/culture courses from the 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 intermediate level (JPN 003–004). These must include two language courses (121, 122, or 123, 124) and two literature/culture courses. Those who place out of language courses still need to complete six JPN courses. Details are available from the departmental office. Minor checklist forms are available at <http://ase.tufts.edu/ilcs/requirements/japanese.htm>.

JAPANESE CULTURE HOUSE

The department administers the Japanese Culture House, a coeducational undergraduate dormitory that serves as an informal center for Japanese studies on 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 002 or equivalent. The selection 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

DIRECTOR:

Associate Professor Joel Rosenberg, Lee S. McCollester Associate Professor of Biblical Literature; Judaic Studies; Film and Media Studies; International Literary and Visual Studies

CORE FACULTY

Professor Barbara Wallace Grossman, Drama

Professor Joseph Litvak, English

Professor Heather Nathans, Professor of Drama, Alice and Nathan Gantcher Professor of Judaic Studies, Theatre History, Dramatic Literature and Criticism, [and] Directing

Professor Jonathan M. Wilson, English

Associate Professor Tasha Oren, Film and Media Studies

Research Professor Rabbi Jeffrey Summit, Judaic Studies and Ethnomusicology; music in the Jewish Tradition; advocacy and social justice

Assistant Professor Alexandra Shreytekh, Mellon Bridge Assistant Professor of Arabic Studies

Senior Lecturer Hedda Harari-Spencer, Hebrew and Judaic Studies

Lecturer Janis Freedman-Bellow, English

Lecturer Stephanie Levine, English

The program in Judaic Studies encompasses study of some 4,000 years of ancient Israelite and ancient, medieval, and modern Jewish civilization, with attention to the influence of Israelite and Jewish culture on the many cultural and religious traditions that grew from it. The major in Judaic Studies comprises the courses listed below under Hebrew and Judaic Studies and a number of primary or related courses in other departments.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The major in Judaic Studies consists of ten courses—eight primary courses and two related courses. Courses in Hebrew language at the level of Hebrew 21, 22, and 121, 122 may be counted as primary courses. Courses not listed below, offered at Tufts and elsewhere, are acceptable upon approval of the program director (Professor Joel Rosenberg, Olin 322), or any future director or co-director. 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. Majoring students are strongly urged to complete four years of Hebrew. At least one primary course must involve a substantial integrative project, details of which can be explained by the Program's director. Students who place out of third or fourth-year Hebrew by language placement exam must still take a total of eight primary courses, chosen from the list below or future additions to it. Qualified students majoring in Judaic Studies are encouraged to consider pursuing the Senior Honors Thesis. Senior capstone projects and certain Directed Study courses are also applicable to the major or minor's requirement of a substantial integrative project. Certain Judaic Studies primary or related courses may possibly no longer be offered, but can be counted toward the major or minor if already taken.

At least two of the eight primary courses must have a significant amount of pre-modern content. These presently are: Judaic Studies 52, 65, 73, 84, 87, 96, 126, 132, 136, 150, English 49, Religion 21, or equivalent courses from other accredited institutions, or equivalent Directed Study.

Primary Courses

Drama 172 Imagining the Holocaust on Stage and Screen

Drama 272 Confronting Genocide on Stage and Screen

English 49 The English Bible

English 159 Contemporary Jewish Fiction

English 162 Philip Roth and Company

English 164 Representing the Jew

Judaic Studies 48 Israeli Film

Judaic Studies 55 Technology and Jewish Oral Tradition

Judaic Studies 65 Introduction to Yiddish Culture
Judaic Studies 73 Aspects of the Sephardic Tradition
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 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 The Story of King David
Judaic Studies 142 Jewish Experience on Film
Judaic Studies 150 Music and Prayer in the Jewish Tradition
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

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; and the legacy of biblical and Jewish tradition in world cultures. A student may, with the approval of the program director, substitute an appropriate course not on this list.

American Studies 16 American Identities
Anthropology 119 Peoples of the Middle East
Anthropology 132 Myth, Ritual, and Symbol
Arabic 62 Modern Arabic Literature
Arabic 64 The Literary Qur'an
Art History 22 Iconoclasm and Iconophobia: The Threat of the Image (cross-listed as **Religion 24**)
Art History 28/128 Medieval Art in the Mediterranean: Pagans, Jews, Christians, Muslims (cross-listed as **Religion 28/128**)
Classics 26 Ancient Egypt
Classics 75 Classical Mythology
Classics 148 Time and Festivals in the Ancient World
Classics 151 Ancient Philosophy
English 49 The English Bible
English 69 Contemporary Multi-Ethnic Literature
English 77 The Modern Mind
English 175 Post-Structural Literary Theory
English 177 Feminism, Literature, Theory
English 180 Psychoanalysis and Cultural Criticism
English 181 The Politics of Reading
History 70 Middle East to World War I
History 71 Middle East and North Africa since World War I
History 167 Medieval Islam
International Literary and Visual Studies 114 Politics and Literature in Russia and Eastern Europe (cross-listed as

Russian 114)

Peace and Justice Studies 120 Sociology of War and Peace (cross-listed as **Sociology 120**)

Philosophy 16 Philosophy of Religion

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 41, 42 Western Political Thought

Political Science 134 Comparative Politics of the Middle East

Religion 6 Philosophy of Religion

Religion 48 Introduction to Islam

Religion 195 Mystics

Russian 73 The Bible in Russian Literature

Sociology 110 Racial and Ethnic Minorities

Sociology 143 Sociology of Religion

Spanish 130 Civilization of Muslim Spain

World Civilizations 5 Time and Festivals

World Civilizations 6 Time and Modernity

World Civilizations 9 Memory and Identity in World Cultures I

World Civilizations 10 Memory and Identity in World Cultures II

World Civilizations 85 Film and Nation: Russia and Central Asia

World Literature 120 Central European Writers

World Literature 122 South African Writers

UNDERGRADUATE MINOR PROGRAMS

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 director. Minor checklist forms are available at
<http://ase.tufts.edu/ilcs/requirements/judaicMinor.htm>.

The Minor in Hebrew consists of Hebrew 21, 22, 121, and 122 (third- and fourth-year Hebrew language, with an introduction to modern Hebrew literature), or equivalent, and two additional courses in Hebrew-based Judaic Studies, from the following list:

English 49 The English Bible

Judaic Studies 48 Israeli Film

Judaic Studies 73 Aspects of the Sephardic Tradition

Judaic Studies 84 The Sources of Jewish Tradition

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 150 Music and Prayer in the Jewish Tradition (cross-listed as Music 54)

Religion 21 Introduction to the Hebrew Bible

Students who place out of third or fourth-year Hebrew by language placement exam must still take a total of six courses, chosen from the above list or other approved courses. Minor checklist forms are available at

<http://ase.tufts.edu/ilcs/requirements/judaicMinor.htm#hebrew>.

Russian

The Russian Program offers two majors: one in Russian Language and Cultural Studies, and the other in Russian and East European Studies that also incorporates courses taught in the departments of History and Political Science or in any department where the course covers at least 50% material on Russia and/or the former Soviet Union. We offer five years of Russian language courses and an array of courses in English, as well as some in Russian, that provide a survey and an in-depth study of Russian literature, culture, and film, not only for our majors but for all students who want to broaden their knowledge and understanding of the humanities, world languages, and cultures. For both majors a semester of study in Russia is strongly recommended (see below).

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Russian Language and Cultural Studies

The Russian Language and Cultural Studies major provides students with a firm grounding in the Russian language and in-depth knowledge, through comparative and historical approaches, in Russian culture, film, and literature. The major broadly prepares students for professional pursuits with a global outreach as well as for graduate study in a variety of Russia-related fields. It also gives heritage speakers an opportunity to engage in their language and culture more deeply. Graduates have found employment in many fields, including government, international business and law, journalism, teaching, translation, and consulting.

The major requires ten courses as follows:

1. Russian 21 and 22.
2. Two advanced (100-level) courses conducted in Russian, normally Rus 121 and 122. An advanced course in some advanced special topic (e.g., Russian 123, 125, 191, 192) may be substituted for Russian 121 or 122 with program approval. Students who place out of any language courses above Russian 4 still must complete 10 courses for the major.
3. Five culture/film/literature courses offered by the Russian Program. One cross-cultural or comparative course is highly recommended. One course in culture/film/literature must be at the advanced level: special topics, a seminar, or directed study, each option at the 100 level with a substantial research paper or project. With the Program Director's approval, any existing course may count if it has an additional research component and project.
4. One additional related course (with Russian program approval) or an advanced Russian language course above Russian 122 (RUS 123, 124, 125 or special topics in Russian language: 191, 192) with a research component. These language courses above RUS 122 do not count in category 3.

Transfer courses requiring program approval:

- a. Language courses taken abroad can be counted in the language category upon placement by the Russian Program. Students coming back from a semester in Russia are required to take one 100-level course conducted in Russian.
- b. Up to two culture/film/literature courses taken outside of Tufts can be substituted in the culture/film/literature category. They must be equivalent to Tufts courses as determined by the Russian Program.

Russian and East European Studies

The Russian and East European Studies (REES) major offers the student training and regional expertise in a variety of disciplines that shape Russia and Eastern Europe such as history, literature, politics, and culture, as well as a solid grounding in oral and written Russian. Broadly speaking, for the purposes of this major "Russia" entails the geographic area of the former Soviet Union including Central Asia. The major is designed for students interested in Russia and related areas who might pursue a career in this field, particularly with an orientation to graduate work in Russia/Eastern Europe, but also for students planning to enter law, business, international relations or diplomacy in which this degree would be an useful asset.

The major requires ten courses as follows:

1. Four core language courses: Russian 21, 22, 121, 122, or the equivalent. For Russian 121 and 122 the student may substitute Russian 123, 125, 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.)
2. Six courses with a primary focus in the Russian and East European area chosen from the following two categories: (1)

literature and culture; (2) history, politics and society. At least two courses must be taken at Tufts in each of the designated categories. One of the six courses must be an advanced special topics course, a seminar, an advanced directed study, or similarly oriented course approved by the program.

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 and may include up to two culture courses in English. Minor checklist forms are available at <http://ase.tufts.edu/ilcs/requirements/russian.htm#minor>.

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, but with preference given in this order: (1) active study of Russian in courses related to the Russian and East European culture area (languages, history, literature, art, political science; (2) Slavic or East European background with some knowledge of Russian or other Slavic language; or (3) a strong interest in the area. Applications for residence in the house are available from the department early in the spring semester. (Dr. Marina Aptekman, faculty advisor.)

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 website <http://ase.tufts.edu/ilcs/studyAbroad/#russian>.

International Literary and Visual Studies

Director:

Professor Hosea Hirata, International Literary and Cultural Studies

Executive Committee:

Professor Nina Gerassi-Navarro, Romance Studies

Associate Professor Tasha Oren, Drama and Dance

Lecturer Silvia Bottinelli, Visual and Critical Studies (SMFA)

The program in International Literary and Visual Studies makes possible the study of literature, film/media, and visual arts in an international context. ILVS students share an interest in literature, film/media, and the visual arts, which they approach in an interdisciplinary and multicultural way.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Language Preparation for the Major

Except those on the World Literature track, students are to have or to attain competency in one foreign language (to the eighth-semester level or equivalent). Students on the World Literature track need to pass only the Tufts foreign language requirement.

Disciplinary focus

ILVS offers four tracks—literature, world literature, film/media, and the visual arts, which would include painting, photography, performance, etc.

Cultural areas

ILVS majors, except those on the World Literature track, select a primary and a secondary area of study. The cultural areas are usually geographical ones (Russia, Germany, Latin America, the Middle East). But the second cultural area could be a conceptual one (the modern novel, feminism, etc.). Normally, these areas reflect one's language preparation—Japanese and Japan, Chinese and China—but this is not always the case. For example, one might choose French and Spanish as her languages, and Spain and Japan as areas of cultural study. In all cases, ILVS requires the study of more than one culture. Students on the World Literature track do not need to select two cultures but need to take six literature courses from at least three different regions.

A main focus

ILVS is both interdisciplinary and multicultural; therefore, the number of courses available to a student doing the major is large. For this flexibility to work to one's advantage, each student should have a conceptual focus, developed in consultation with his or her major advisor. This might be a question about a certain cultural phenomenon or an aesthetic school, style, or problem. Alternatively, one might also focus on an interaction or common development in two or more cultures, or on a particular genre or form. A student's conceptual focus should guide course selection and eventually lead to a senior thesis or project.

The senior year

A senior project is required. It can be a one-semester project (usually an independent study or a slightly enlarged seminar paper), or a two-semester senior honors thesis. The thesis could be a scholarly study, a translation, a film, or some other creative project.

Courses

The major consists of twelve courses, not counting those taken for language preparation.

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 the Executive Committee. Here is the distribution of required courses for each of the four possible tracks.

LITERATURE EMPHASIS

- A. At least one foreign language up to the eighth semester.
- B. National and ethnic literatures (six courses—four in the primary cultural area and two in the secondary area).
- C. Visual arts and/or film (two courses, normally one in each cultural area) chosen from the course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#cultural>.
- D. Cross-cultural and/or gender-oriented literature courses (two courses in literature) chosen from the course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#gender>.
- E. Literary and cultural theory (two courses—one literary theory and one cultural theory course) chosen from the course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#theory>.
- F. Honors thesis (two semesters) or senior project (one semester)

FILM/Media EMPHASIS

- A. At least one foreign language up to the eighth semester.
- B. National and ethnic literatures (three courses— two in the primary culture area and one in the secondary area).
- C. Film/media (five courses— normally 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.)
- D. Cross-cultural and/or gender-oriented literary, film/media, or visual studies courses (two courses) chosen from the course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#gender>.
- E. Film/media theory and cultural theory (two courses—one course in film/media theory plus one course in cultural theory) chosen from the course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#theory>.
- F. Honors thesis (two semesters) or senior project (one semester)

VISUAL STUDIES EMPHASIS

- A. At least one foreign language up to the eighth semester.
- B. National and ethnic literatures (three courses— two in the primary cultural area and one in the secondary area).
- C. Visual arts (five courses—normally one in the primary cultural area and one in the secondary area). The student may substitute, for one of the five courses, a course in film/media or two studio courses in a visual art (drawing, painting, sculpture, filmmaking, etc.).
- D. Cross-cultural and/or gender-oriented literary or visual studies (two courses in literary, or visual art courses) chosen from the course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#gender>.
- E. Visual and cultural theory (two courses— one course in visual theory and one course in cultural theory chosen from course lists on <http://ase.tufts.edu/ilvs/courses/electives.htm#theory>).
- F. Honors thesis (two semesters) or senior project (one semester)

WORLD LITERATURE EMPHASIS

- A. National and ethnic literatures (six courses from at least three different regions—e.g. 2 Japanese literature, 2 Anglophone

literature, 1 French literature, 1 Russian literature).

B. Visual arts or film/media (two courses) chosen from the course lists on
<http://ase.tufts.edu/ilvs/courses/electives.htm#cultural>.

C. Cross-cultural and/or gender-oriented literary, film/media, or visual studies (two courses). The student must take two cross-cultural or gender-oriented courses in literature, film/media, or visual arts chosen from course lists on
<http://ase.tufts.edu/ilvs/courses/electives.htm#gender>.

D. Literary and Cultural theory (one course in literary theory and one in cultural theory). Chosen from the course lists on
<http://ase.tufts.edu/ilvs/courses/electives.htm#theory>.

E. Honors thesis (two semesters) or senior project (one semester)

For more detailed information, please visit the website [**http://ase.tufts.edu/ILVS**](http://ase.tufts.edu/ILVS).

Interdisciplinary Studies

(See also Center for Interdisciplinary Studies.)

The Center for Interdisciplinary Studies (CIS) administers the Interdisciplinary Studies major and the CIS Senior Thesis Option.

Interdisciplinary Studies Major

The Interdisciplinary Studies major offers students the opportunity to create a self-designed, individual concentration that draws on courses from at least two of the following six areas of study: humanities, arts, social sciences, natural sciences, mathematics (quantitative), and engineering.

Students proposing an Interdisciplinary Studies major must have a high degree of initiative and self-discipline. The Interdisciplinary Studies major consists of an integrated program of at least 30-36 SHUs plus a two-semester thesis or honors thesis (for eligible students) or a substantial project comparable in scope to a thesis, including a written component. A student who wishes to pursue an Interdisciplinary Studies major must submit a detailed application describing the planned program of study. The student 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 tenured or tenure-track member of the Arts and Sciences faculty. In consultation with this advisory committee, the student develops a rationale for the major, selects courses, and outlines the thesis plan. The proposal is reviewed for approval by the CIS Board or its designated subcommittee.

Note: Six SHUs used to fulfill another major may be used toward the Interdisciplinary Studies major; students may not triple major if one major is in Interdisciplinary Studies.

For specific information and application guidelines, visit the Center for Interdisciplinary Studies website:
<http://cis.tufts.edu>.

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 or its designated subcommittee 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 will serve as the chair of the committee and be responsible for submitting the final grade. One member of the committee must be from a department or program in which the student is majoring. The proposed thesis topic must be approved by the CIS Board or its designated subcommittee. Application instructions and relevant timeline can be found on the CIS website.

Students who would like to be recommended for degrees with honors by a department or program that requires a thesis should be aware that a CIS thesis will not usually count as a substitute for an honors thesis within the department or program. However, once the thesis proposal is approved by the CIS Board or its designated subcommittee, eligible students can apply to the Thesis Honors Program by filing the appropriate paperwork at Dowling Hall. If the CIS thesis is to qualify as an honors thesis, the chair of the thesis committee must be a member of the department or program in which the student is majoring.

In addition to administering the Interdisciplinary Studies major and the CIS Senior Thesis, the Center for Interdisciplinary Studies provides a dynamic hub for a range of interdisciplinary academic programs at Tufts. For information about majors and/or minors offered by interdisciplinary programs, please see the relevant program website.

For more information on these programs, students should consult the individual program website and/or program director.

International Relations

DIRECTOR:

Associate Professor Kelly M. Greenhill, *Political Science*

CORE FACULTY:

Professor David Art, *Political Science*

Professor Ina Baghdiantz-McCabe, *History*

Professor Nancy Bauer, *Philosophy, Dean of Academic Affairs, and Dean of SMFA*

Professor Marcelo Bianconi, *Economics*

Professor Gregory Carleton, *International Literary and Cultural Studies*

Professor Ujjayant Chakravorty, *Economics*

Professor Gregory Crane, *Classics*

Professor Robert Devigne, *Political Science*

Professor Ioannis Evrigenis, *Political Science/Classics*

Professor Leila T. Fawaz, *History*

Professor Gerard Gasarian, *Romance Studies*

Professor David Gute, *Civil and Environmental Engineering*

Professor Brian Hatcher, *Religion*

Professor Hosea Hirata, *International Literary and Cultural Studies*

Professor Bruce Hitchner, *Classics/Peace and Justice Studies*

Professor Charles Shiro Inouye, *International Literary and Cultural Studies*

Professor Yannis Ioannides, *Economics*

Professor Ayesha Jalal, *History*

Professor Vida Johnson, *International Literary and Cultural Studies*

Professor Paul Joseph, *Peace and Justice Studies/Sociology*

Professor Erin Kelly, *Philosophy*

Professor David Locke, *Music*

Professor Beatrice Manz, *History*

Professor Christina Maranci, *Art and Art History*

Professor Jose Antonio Mazzotti, *Romance Studies*

Professor Margaret McMillan, *Economics*

Professor Jayanthi J. Mistry, *Child Study and Human Development*

Professor Malik Mufti, *Political Science*

Professor H. Adlai Murdoch, *Romance Studies*

Professor Isabelle Naginski, *Romance Studies*

Professor Susan Napier, *International Literary and Cultural Studies*

Professor Nina Gerassi-Navarro, *Romance Studies*

Professor Pedro Angel Palou, *Romance Studies*

Professor Sarah Pinto, *Anthropology*

Professor Peter Probst, *Art and Art History*

Professor Kamran Rastegar, *International Literary and Cultural Studies*

Professor Daniel J. Richards, *Economics*

Professor Hugh Roberts, *History*

Professor Enrico Spolaore, *Economics*

Professor Vickie Sullivan, *Political Science*

Professor Reed Ueda, *History*

Professor Peter Winn, *History*

Professor Jonathan Wilson, *English*

Professor Xueping Zhong, *International Literary and Cultural Studies*

Associate Professor Cristelle Baskins, *Art and Art History*

Associate Professor Michael Beckley, *Political Science*

Associate Professor Amahl Bishara, *Anthropology*

Associate Professor Alex Blanchette, *Anthropology*

Associate Professor Drusilla Brown, Economics
Associate Professor Consuelo Cruz, Political Science
Associate Professor Heather Curtis, Religion
Associate Professor Richard C. Eichenberg, Political Science
Associate Professor David Ekbladh, History
Associate Professor Elizabeth Foster, History
Associate Professor Kenneth Garden, Religion
Associate Professor Kelly M. Greenhill, Political Science
Associate Professor Zeina Hakim, Romance Studies
Associate Professor Steven Hirsch, Classics
Associate Professor Richard Jankowsky, Music
Associate Professor Ikumi Kaminishi, Art and Art History
Associate Professor Kris Manjapra, History
Associate Professor Nimah Mazaheri, Political Science
Associate Professor Lionel McPherson, Philosophy
Associate Professor Vincent Pollina, Romance Studies
Associate Professor Alisha Rankin, History
Associate Professor Elizabeth Remick, Political Science
Associate Professor Pearl T. Robinson, Political Science
Associate Professor Modhumita Roy, English
Associate Professor Pablo Martin Ruiz, Romance Studies
Associate Professor Rosalind H. Shaw, Anthropology
Associate Professor Oxana Shevel, Political Science
Associate Professor Adam Storeygard, Economics
Associate Professor Ichiro Takayoshi, English
Associate Professor Jeffrey Taliaferro, Political Science
Associate Professor Rosemary Taylor, Community Health/Sociology
Associate Professor Joseph Walser, Religion
Associate Professor Markus Wilczek, International Literary and Cultural Studies
Associate Professor Man Xu, History
Assistant Professor Rachel Applebaum, History
Assistant Professor Tatiana Chudakova, Anthropology
Assistant Professor Kyle J. Emerick, Economics
Assistant Professor Mona El Khoury, Romance Studies
Assistant Professor Laura Gee, Economics
Assistant Professor Eva Hoffman, Art and Art History
Assistant Professor Daniele Susan Lantagne, Civil and Environmental Engineering
Assistant Professor Sahar Parsa, Economics
Assistant Professor Jacob Stewart-Halevy, Art and Art History
Assistant Professor Riccardo Strobino, Classics
Senior Lecturer Rana Abdul-Aziz, International Literary and Cultural Studies
Senior Lecturer Ming Chow, Computer Science
Senior Lecturer Eulogio Guzman, SMFA
Senior Lecturer Anna Hardman, Economics
Senior Lecturer Matthew Harrington, Classics
Senior Lecturer David J. Proctor, History
Senior Lecturer Mark A. Woodin, Civil and Environmental Engineering
Lecturer Christiane Soares, Romance Studies
Lecturer Ninian Stein, Biology

The IR Program offers a rigorous plan of study for undergraduate 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 shape the international relations of particular states or regions.

The IR Program is governed by the IR Faculty Board which represents the departments and programs that serve the major. All majors select an academic advisor 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 introductory courses 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.

Majors in International Relations may wish to take advantage of study abroad opportunities to complement their Medford campus education. Prior to studying abroad in either Tufts or non-Tufts programs students should carefully review all relevant program policies and consult with their advisor and IR Program staff to ensure their coursework abroad will keep them on track towards major completion. To apply courses from Tufts and/or non-Tufts programs abroad toward the major, students must complete the transfer credit process by submitting appropriate documentation to and obtaining approval from the IR Program. No more than three courses taken abroad may be applied toward the IR major, and only one may be applied toward the IR major Core requirements. There is no limit on the number of language courses taken abroad that can count toward the IR language requirement.

The IR Program grants two academic awards to graduating seniors: the John S. Gibson Prize and the Distinguished Achievement Award in International Relations. The John S. Gibson Award, named after the first director of the International Relations Program at Tufts University, is presented annually to majors in International Relations who have produced particularly noteworthy examples of academic scholarship. The award is bestowed in two categories: Outstanding Seminar Paper and Outstanding Senior Honors Thesis. The Distinguished Achievement Award in International Relations is given annually to one or more outstanding International Relations majors of high academic standing. The recipients have participated widely in the program and have displayed a deep understanding of and sensitivity to the richness of the international community.

The IR Program offers two awards to support student research each year: the International Relations Research Scholars Award and the Anne E. Borghesani Memorial Prize. The International Relations Research Scholars Award enables 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 Prize, open to sophomores and juniors from any major, helps defray the costs of study, research, or community service abroad that adds an international dimension to the student's program of study.

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 comprised of five core courses and seven courses from one of thirteen Thematic Concentrations. A grade of C- or better is required for a course to count for the IR major. Students are not permitted to petition courses to count toward the IR major. The IR capstone requirement (upper-level seminar, directed research or senior thesis) must be completed on the Tufts Medford campus. Additionally, the IR Program requires proficiency in a language other than English beyond that of the Tufts University requirement. Details regarding these requirements are as follows.

Language Requirement

The IR major requires oral and written proficiency in a language other than English. Proficiency is defined as successful completion of eight semesters (or the equivalent) of university-level language instruction. All students wishing to major in International Relations must comply with this requirement. Courses used to fulfill this requirement may not also be used to fulfill Core or Thematic Concentration requirements.

Core Requirements (Five Courses)

The Core Requirements constitute the foundation of knowledge expected of all International Relations majors, regardless of the 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. Core courses constitute a major element in establishing a coherent sense of IR identity and community. Consequently, the IR Program strongly encourages students to take all core courses at Tufts. The required core courses are:

Political Science 61: Introduction to International Relations

Economics 5: Principles of Economics

One course in international economics*

One course in the historical dimension*

One course in theories of society and culture*

*See the IR website for specific course offerings.

Thematic Concentration Requirement (Seven Courses)

Thematic Concentrations are designed to provide students with substantial, in-depth and focused study of an aspect of international affairs. All majors must choose one of the following thirteen Thematic Concentrations and complete the course requirements within that concentration with no less than seven total courses. No more than three of the seven courses in each concentration may be an introductory-level course and one must be a capstone research course (seminar, honors thesis, or directed research).

1. REGIONAL AND COMPARATIVE ANALYSIS

Choose one of the following:

- a. Africa
- b. East and Southeast Asia
- c. Europe and the former Soviet Union
- d. Latin America
- e. Middle East and South Asia

2. INTERNATIONAL ECONOMICS

Choose one of the following:

- a. International economics and trade
- b. International economics and finance
- c. International economics and environment
- d. International economics and development

3. GLOBAL HEALTH, NUTRITION, AND THE ENVIRONMENT**4. INTERNATIONAL SECURITY****5. GLOBALIZATION****6. IDENTITY**

Descriptions of each of the Thematic Concentrations, detailed program requirements and policies, and a complete list of courses that satisfy the IR major are available on the IR website at: <http://ase.tufts.edu/ir>.

Italian Studies

(FOR DEGREE REQUIREMENTS, SEE ROMANCE STUDIES)

Japanese

(FOR DEGREE REQUIREMENTS, SEE INTERNATIONAL LITERARY AND CULTURAL STUDIES.)

Judaic Studies

(FOR DEGREE REQUIREMENTS, SEE INTERNATIONAL LITERARY AND CULTURAL STUDIES.)

Latin American Studies

DIRECTOR:

Professor Nina Gerassi-Navarro, *Romance Studies*

Latin American Studies is increasingly important in the world and for the United States in particular. Latin American Studies is an Interdisciplinary minor, which encourages students to integrate the varying disciplinary perspectives of the arts, literature, social sciences, and history, along with the study of 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 independent interdisciplinary capstone project on a Latin American subject or in a senior thesis or senior seminar.

Requirements for completing the Latin American Studies major are 10 courses and a five-semester language study. Required courses include courses in history, social sciences, literature and the arts, plus foundational courses, as well as a research seminar or thesis or independent project. At least one of the courses should focus on indigenous peoples, and at least one course must focus on pre-20th-century Latin America. A Latino Studies course may count as one of the elective courses. A grade of C- or better is required for a course to count for the major.

Minor in Latin American Studies

The Latin American Studies Minor (LAS) allows students to explore the region from a multidisciplinary perspective. It encourages students to integrate their study of the arts and literature, history, and social sciences into a unified view of Latin America.

In pursuing the minor, students can draw on resources throughout the university, including courses on Latin America in Anthropology, History, Music, Political Science, and Romance Studies. In their senior project, students also have the opportunity to explore a theme of particular interest with the coordinated support of the faculty advisors from different fields.

In addition to providing insight into the culture, economy, history, and politics of our hemispheric neighbors, Latin American Studies offers students planning to pursue careers in diplomacy, international business, and law or graduate study in the humanities and social sciences a solid grounding in the region that will help link theory with Latin American reality and culture with history and politics.

There are three requirements for completing a minor in Latin American Studies:

1. 1. Study of one of the region's languages for three years or the equivalent.
2. 2. Five courses in Latin American Studies, including at least one course from each of two disciplinary areas: Arts, Literature, and Culture, and Social Science.
3. 3. A senior project (normally done in the second semester of the senior year) that integrates at least two of the three disciplinary areas of the minor. This project may be written work, a photography exhibit, a performance or some other creative work. Student will work with at least two core LAS faculty advisors from two different disciplines, as project director and second reader. Students will participate in a monthly senior project seminar taught by the entire Latin American Studies faculty and receive a full course credit for their project. The project will conclude with an oral defense.

APPROVED COURSES

Each semester an updated list of current Latin American studies courses is available from the director.

Seminars and other courses on the region maybe offered from time to time and credited toward the minor or major. Students may also petition the director to credit courses not included in the list.

For more detailed information, please visit the website <http://ase.tufts.edu/latinamericanstudies>.

Latino Studies

(FOR DEGREE REQUIREMENTS, SEE DEPARTMENT OF STUDIES IN RACE, COLONIALISM, AND DIASPORA.)

Management of Community Organizations

FACULTY ADVISOR:

Justin Hollander, Urban and Environmental Policy and Planning

Are you one of those who, because of your deep commitment to an important public issue, started in community organizing or perhaps as a direct service provider—and who find yourself today as an “accidental manager” of a community organization? Without the benefit of formal training or theoretical grounding, you may find yourself in uncharted territory running a growing, increasingly complex organization.

The certificate in Management of Community Organizations (MCO) may be for you. It's a graduate-level 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 in effective management who are committed to social policy and wish to work at the community level. The certificate is offered by the graduate Department of Urban and Environmental Policy and Planning.

The certificate requires the completion of four courses (12 credits)—one core course and three electives—that address such issues 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 seek additional management training, midcareer professionals interested in pursuing community work, and individuals who wish to start a new agency or program.

For more information, contact the program administrator, Angela Foss, at 617-627-2320 or visit the website <http://as.tufts.edu/uep/programs/certificate>.

Manufacturing Engineering Certificate Program

FACULTY ADVISOR:

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, 3-D printing, CNC machining, and robotics, is essential as industries strive to reduce labor costs, increase productivity and profitability, tighten performance standards, and improve quality.

The Department of Mechanical Engineering offers a four-course graduate-level certificate in manufacturing engineering. The program is offered on a part-time, non-degree 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, visit the website at

<http://engineering.tufts.edu/me/current/certificate-programs/manufacturing-engineering>

Mathematics

Professor Misha Kilmer, Chair; William Walker Professor of Mathematics, Numerical linear algebra
Professor Christoph Börgers, Associate Chair, Mathematical biology
Professor Bruce Boghosian, Fluid dynamics
Professor Fulton Gonzalez, Harmonic analysis
Professor Boris Hasselblatt, Dynamical systems
Professor George McNinch, Algebraic groups
Professor Zbigniew H. Nitecki, Dynamical systems
Professor Eric Todd Quinto, Robinson Professor of Mathematics; Tomography and functional analysis
Professor Kim Ruane, Geometric group theory
Professor Montserrat Teixidor i Bigas, Algebraic geometry
Professor Loring Tu, Algebraic geometry and algebraic topology
Professor Genevieve Walsh, Geometry and topology
Associate Professor James Adler, Computational partial differential equations, scientific computing
Associate Professor Moon Duchin, Geometry, topology, groups, dynamics
Assistant Professor Alexandru Hening, Mathematical ecology
Assistant Professor Xiaozhe Hu, Scientific computing
Assistant Professor Robert Lemke Oliver, Number theory
Assistant Professor James Murphy, Machine learning and harmonic analysis
Assistant Professor David Smyth, Algebraic geometry
Norbert Wiener Assistant Professor Michael Chou, Number theory
Norbert Wiener Assistant Professor Eunice Kim, Dynamical systems
Norbert Wiener Assistant Professor Robert Kropholler, Geometric group theory
Norbert Wiener Assistant Professor Caleb Magruder, Scientific computing
Norbert Wiener Assistant Professor Ky Tran, Stochastic systems
Senior Lecturer Mary Glaser, Combinatorics
Lecturer Zachary Faubion
Lecturer Gail Kaufmann

SECONDARY APPOINTMENTS:

Adjunct Professor Lenore J. Cowen, Computer Science; Computational biology, theory of computation, algorithm design and analysis
Adjunct Professor Elena Naumova, Department of Civil and Environmental Engineering; Methodology development for modeling of transient processes
Adjunct Professor Diane Souvaine, Computer Science; 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

Option I: Major in Mathematics

To major in Mathematics, a student must take ten courses beyond Calculus II (Mathematics 32, or 39). These courses must include Mathematics 42 or 44, Mathematics 70 or 72, Mathematics 135, Mathematics 145, Mathematics 136 or 146, two more 100-level mathematics courses, and three electives. The electives may include mathematics courses numbered 50 or above and up to two approved courses in related fields. Majors are advised to complete Mathematics 42 or 44 and Mathematics 70 or 72 by the end of their second year.

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.

Option II: Major in Applied Mathematics

To major in Applied Mathematics, a student must take 13 courses beyond Calculus II (Mathematics 34, or 39). These courses must include Mathematics 42 or 44; Mathematics 51 or 153; Mathematics 70 or 72; Mathematics 87, 133, 135, and 136; one of Mathematics 145, Comp/Math 61, Comp 15, or Comp/Math 181; one of the following three sequences: Mathematics 125/126, 155/156, or 165/166; one of Mathematics 125, 126, 155, 156, 165, or 166 (excluding the sequence referred to in the last requirement); and two electives. Mathematics courses numbered 61 or above are acceptable electives. With the approval of the Mathematics Department, students may also choose as electives courses with strong mathematical content that are not listed as Mathematics courses. Majors are advised to complete Mathematics 42 or 44, Mathematics 70 or 72, and Mathematics 87 by the end of their sophomore year.

Summa Cum Laude Honors

Mathematics majors will not normally be recommended for summa cum laude honors without having completed at least two of the five one-year sequences 125/126, 135/136, 145/146, 155/156, 165/166, and having taken at least six mathematics courses numbered above 100.

UNDERGRADUATE MINOR PROGRAM

To minor in mathematics, a student must take six courses in the department beyond the level of Calculus II (Mathematics 34, or 39). These must include Mathematics 42 (or 44) and 72 (or 70), as well as Mathematics 135 or 145 (or both).

UNDERGRADUATE COURSES

Please note: Students who wish to begin calculus should register for Mathematics 32 or 39. Those interested in computer science, engineering, mathematics, or the physical sciences should begin the three-course sequence Mathematics 32, 34, 42 or the two-course accelerated honors sequence Mathematics 39, 44. Other combinations of these courses may not be granted full credit (see the separate course descriptions). Mathematics 10, 14, 15, 16, and 19 do not count toward a degree in the School of Engineering.

Students will receive 2 SHUs (with grade) for passing Mathematics 32 after receiving credit for Mathematics 30. Mathematics 32 must be taken at Tufts and for a grade in order to obtain these extra 2 SHUs. The extra 2 SHUs will not count toward the mathematical sciences distribution requirement. Mathematics 30 may not be taken for credit after receiving credit for Mathematics 32.

Course recommendations

Students who take Mathematics 70 instead of 72 are advised to also take another course above 51 to prepare for the proofs required in Mathematics 135 and 145.

Mathematics majors interested in graduate school in applied mathematics are advised to major in applied mathematics. The requirements of that major reflect the appropriate preparation for graduate study in this field.

Mathematics for majors interested in graduate school in pure mathematics: For mathematical depth, we recommend Mathematics 136, 146, and 133. We recommend students take as many 100-level and higher courses as possible.

We also recommend that students interested in graduate school in pure or applied mathematics do research in mathematics, such as through an NSF Research Experience for Undergraduates (REU) Program or with a professor at Tufts.

Mathematics for majors interested in actuarial science: We recommend Mathematics 51, 165, 166, and 136; economics courses such as EC 105, 107, 108, 150, and 152; and ES 152 and programming.

Mathematics for majors interested in computer science: We strongly recommend Mathematics 61, 63, 125, and 126, and we recommend 146, 165, 166, as well as Computer Science 160 and 170 plus programming.

Mathematics for majors interested in economics: We recommend Mathematics 51, 165, 166, and 136, as well as EC 107–8. We also recommend students take Comp 11.

Mathematics for majors interested in careers in industry: We recommend Mathematics 51, 87, 155, 165–166, 135–136,

125–126, and Comp 11 or above.

Mathematics for majors interested in careers in science: We recommend that students consult professors in the specific science department as well as our department.

Mathematics for majors interested in teaching high school: We recommend Mathematics 61, 63, 112, 146, and 165, and education courses. We encourage students to take Mathematics 136 or 133, or computer science, if possible.

GRADUATE PROGRAM

The Department of Mathematics offers programs leading to the degrees of a Master's of Science, Doctor of Philosophy, and a Post-Baccalaureate Certificate. Many students fulfill the Master's degree requirements and obtain a Master's degree in the course of their doctoral studies.

Post-Baccalaureate Certificate

The Post-Baccalaureate certificate program is intended for students with a bachelor's degree (in any field) who would like to expand or deepen their mathematical skills for use in the workplace or in preparation for graduate programs in mathematics. The program is flexible and can accommodate students with a wide range of backgrounds and goals. Students are expected to have strong skills in (high-school level) algebra and to have taken a full year of calculus before entering the program. Post-Baccalaureate courses numbered above 100 are transferable into the Tufts MS program upon acceptance to that program. Completion of the certificate program requires grades of B- or better in all courses. Please see our department webpage for a complete list of requirements for the certificate: <http://math.tufts.edu/graduate/postBacc.htm>

Master's Degree

The Master of Science in Mathematics provides the student with basic graduate training in mathematics. Master of Sciences students may choose widely ranging programs of study that may focus on pure or applied mathematics. The coursework in each case prepares the student for employment in the mathematics profession either in academia, in government, in business and industry or to pursue further graduate education. Completion of the program requires grades of B- or better in all courses. Please see our department webpage for a complete list of requirements for the degree: <http://math.tufts.edu/graduate/ms.htm>

Doctor of Philosophy

Students may have either a Bachelor's degree or a Master's degree in mathematics or a related field to be admitted to the Ph.D. program. Doctoral study consists of preliminary coursework and study, qualifying exams, a candidacy exam with an adviser, and creative research culminating in a written dissertation and defense. All doctoral students must also do some teaching on the way to the Ph.D. Detailed requirements and procedures for the Ph.D. program are outlined on the department web pages in a graduate handbook found at <http://math.tufts.edu/documents/handbookPhD.pdf>.

Mechanical Engineering

Professor Chris Rogers, Department Chair; *Robotics, musical instrument design, fluid mechanics, and engineering education*

Professor Marc Hodes, *Transport phenomena*

Professor Mark Kachanov, *Solid mechanics, fracture mechanics, micro-mechanics of materials*

Professor William Messner, *controls, robotics, mechatronics, data storage systems, biomedical instrumentation*

Professor Jianmin Qu, Dean, School of Engineering, Karol Family Professor; *Micromechanics of composites, interfacial fracture and adhesion, fatigue and creep damage in solder alloys, thermomechanical reliability of microelectronic packaging, defects and transport in solids with applications to solid oxide fuel cells and batteries, ultrasonic nondestructive evaluation of advanced engineering materials, material science*

Professor Anil Saigal, *Materials engineering, material science, manufacturing processes, quality control*

Professor Igor Sokolov, *Mechanics at the micro- and nano-scale, mechanics of cells, molecules, and polymers, self-assembly of advanced materials, fluorescent sensors, soft condensed matter, physics of cancer, friction in oils, atomic force microscopy, Raman spectroscopy*

Associate Professor Behrouz Abedian, *Fluid mechanics, electrokinetics and thermal-fluid systems*

Associate Professor Luisa Chiesa, *Sustainable energy, superconducting materials, material science*

Associate Professor Douglas M. Matson, *Solidification processes, thermal manufacturing, machine design, material science*

Associate Professor Jason Rife, *Navigation, robotics, controls*

Associate Professor Robert White, *Micro- and Nano-electromechanical systems (MEMS/NEMS), sensors, dynamic system modeling, acoustics, and vibrations*

Associate Professor Kristen Bethke Wendell, *Engineering education, design practices, learning sciences*

Assistant Professor Jeffrey S. Guasto, *Biophysics and soft matter, microscale fluid mechanics and transport phenomena, microfluidic devices*

Assistant Professor Erica Cherry Kemmerling, *Medical engineering, fluid mechanics*

Assistant Professor Deborah Sunter, *Computational modeling, energy policy, design*

Assistant Professor Matthew Woodward, *Biologically inspired robotics, miniature robotics, multi-modal locomotion, morphological intelligence*

Senior Lecturer and Research Assistant Professor Gary G. Leisk, *Machine design, non-destructive testing*

Professor of the Practice Daniel Hannon, *Human factors, airspace systems*

Professor of the Practice James Intriligator, *Human factors, design thinking, marketing, perception, entrepreneurial education*

Professor of the Practice Pratap Misra, *GPS, emerging satellite navigation systems*

Professor of the Practice Michael Wiklund, *Human factors, medical devices*

Professor of the Practice Michael A. Zimmerman, *Novel polymer electrolytes for batteries, liquid crystal polymers, composite materials, material science*

SECONDARY APPOINTMENTS:

Secondary Appointment, Professor Karen Panetta, Professor of Electrical and Computer Engineering and Dean of Graduate Education, Tufts University; *Image and signal processing for security and medical applications, modeling and simulation, multimedia, machine learning, recognition systems*

Secondary Appointment, Assistant Professor Jivko Sinapov, *Assistant Professor of Computer Science, Tufts University; Developmental robotics, computational perception, artificial intelligence, machine learning*

Secondary Appointment, Associate Professor Thomas Vandervelde, *Associate Professor of Electrical and Computer Engineering, Tufts University; Interaction of light with matter, physics of nanostructures (semiconductor photonics and electronics) and interfaces, energy materials*

ADJUNCT FACULTY:

Adjunct Professor Vincent Manno, *Provost and Dean of the Faculty, Professor of Engineering, Franklin W. Olin College of Engineering; Thermal-fluid phenomena, power generation systems*

Adjunct Professor Holly Taylor, *Professor of Psychology, Tufts University; Human Factors, situation models, spatial cognition and comprehension*

Adjunct Assistant Professor Iryna V. Zenyuk, Assistant Professor of Chemical Engineering, Associate Director of the National Fuel Cell Research Center, University of California, Irvine; Electrochemistry, thermodynamics, fluid mechanics, renewable energy

Mechanical engineering is a rich and versatile profession that encompasses invention, design, analysis, and manufacturing 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 as well as new and emerging technologies such as robotics, medical devices, and micro and nano devices. Mechanical engineering is also a highly collaborative discipline with many opportunities to work with colleagues in other disciplines.

The faculty in the Department of Mechanical Engineering offer courses in the core disciplines of Thermal Fluid Systems, Material Mechanics and Processing, Robotic, Aeronautic and Automated Systems, and Product Design and Human Factors. Their research is in four areas of specialization:

1. *The world of the very small*, where we control materials all the way down to the atomic level, and also build functional devices at the micro- and nano-scale, allowing new avenues of innovation in materials, sensors and actuators. We build micro and nano electro-mechanical systems (MEMS/NEMS) such as microphones, ultrasound sensors, and aerodynamic measurement systems. We develop hydrophobic coatings and nano-pattered surfaces for heat transfer, develop bio-sensing systems for detecting cancer, and nano polished surfaces to prevent bacterial growth. We also develop models of how things fracture.
2. *The world of biological systems*, where we look at how cells move in micro-fluidic systems or how blood flows in our veins and arteries. Our human factors group helps improve the design of future medical equipment while the soft robotics group develops biologically inspired robots using highly compliant materials.
3. *The world of sustainable energy*, where we focus on systems that generate, store, convert and consume power efficiently and consciously. This includes power generation, pyro-thermal materials processing, electronics thermal management, hydrogen cell energy storage, next generation battery design, energy system design/optimization, and superconducting materials for energy transmission.
4. *The world of the human brain*, where we examine how humans learn to engineer and interact with technology. We use that information to develop the next generation of educational technologies as well as technologies appropriate for aging and other special populations. Our students in mechanical engineering and human factors engineering collaborate with the departments of education, child development, occupational therapy, and psychology to better understand how we learn and age. This knowledge is leveraged into working prototypes and products through our partnerships with education and industry.

The mission of the Department of Mechanical Engineering is to graduate students with a sound basis for professional practice and a career built around lifelong learning. We do this through classroom experiences, individual advising, undergraduate research opportunities, internships and open-ended, hands-on experiences. Students master methods of solving challenging problems through learning: the fundamental principles of mechanical engineering and human factors, how to discover new knowledge, how to communicate these solutions to technical and non-technical communities, and how to think like scientists and engineers, developing opinions / designs and finding evidence to support them.

UNDERGRADUATE PROGRAM

The undergraduate curriculum 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, engineering education, materials and materials processing, manufacturing, applied mechanics, robotics, human factors, 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 two undergraduate degree programs leading to the undergraduate degrees of Bachelor of Science in Mechanical Engineering (B.S.M.E.) and Bachelor of Science (B.S.). The B.S.M.E. program is accredited by the Engineering Accreditation Commission of ABET (www.abet.org). Of the minimum 120 semester hour units (SHUs) required for graduation, the professional degrees accredited by the Engineering Accreditation Commission of ABET require a minimum of 30 SHUs must be completed in college level math and basic science subjects appropriate to the discipline and a minimum of 45 SHUs must be completed in Engineering topics, consistent with ABET general and program criteria. The B.S.M.E. program 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 B.S.M.E. program are presented here. We expect that graduates of the B.S.M.E. 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.

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.

CORE PROGRAM:

First Year

FALL TERM

Introductory Engineering 1 Intro Engineering Elective

Mathematics 32 Calculus I

Physics 11 General Physics I

English 1 Expository Writing

SPRING TERM

Engineering Science 2 or Computer Science 11 Introduction to Computing in Engineering or Introduction to Computer Science

Mathematics 34 Calculus II

Chemistry 1 Chemical Fundamentals

Humanities, Arts or Social Science Elective

Sophomore Year

FALL TERM

Natural Science or Mathematics Elective

Physics 12 or Chemistry 2 or Engineering Science 11 or Biology 13 General Physics II or Chemical Principles or Fundamentals of Biological Systems or Cells & Organisms

Mathematics 51 Differential Equations

Mechanical Engineering 10 Materials & Manufacturing I

Mechanical Engineering 20 Mechanics I

SPRING TERM

Humanities, Arts or Social Science Elective

Mathematics 42 Calculus III
Mechanical Engineering 21 Mechanics II
Mechanical Engineering 40 Engineering Design I
Mechanical Engineering 50 Thermal Fluid Systems I

Junior Year

FALL TERM

Probability, Statistics, or Numerical Methods
Foundation Elective
Mechanical Engineering 11 Materials & Manufacturing II
Mechanical Engineering 30 Electromechanical Systems & Robotics I
Mechanical Engineering 51 Thermal Fluid Systems II

SPRING TERM

Humanities/Arts or Social Science Elective
Mechanical Engineering 18 Instruments and Experiments
Mechanical Engineering 31 Electromechanical Systems & Robotics II
Mechanical Engineering 41 Engineering Design II
Mechanical Engineering Concentration Elective

Senior Year

FALL TERM
Mechanical Engineering 43 Senior Design Projects
Humanities/Arts or Social Science Elective
Mechanical Engineering Concentration Elective
Mechanical Engineering Concentration Elective
Free elective

SPRING TERM

Humanities/Arts or Social Science Elective
Foundation Elective
Mechanical Engineering Concentration Elective
Mechanical Engineering Concentration Elective
Free Elective

The BSME degree program requires students to complete at least 38 courses prior to graduation. The above example is one way to satisfy the requirements for the BSME degree program. The specific requirements for the BSME degree are the following:

1. A total of ten courses in introductory natural sciences, mathematics, and engineering: three courses in the natural sciences (labeled in SIS with the attribute SoE-Natural Sciences), including Physics 11, Chemistry 1, and one of the following: Physics 12, Chemistry 2, Engineering Science 11 or Biology 13; four courses in mathematics (labeled in SIS with the attribute SoE-Mathematics), comprising Mathematics 32, 34, 42, and 51; one additional elective course in either mathematics or natural sciences (labeled in SIS with the attribute SoE-Natural Sciences or SoE-Mathematics); and two courses in introductory engineering, to include Introductory Engineering 1 and Engineering Science 2.
2. A total of six courses in humanities, arts and social sciences (HASS), including English 1 or 3. Acceptable HASS electives are listed in SIS as SoE-HASS-Humanities, SoE-HASS-Arts, or SoE-HASS-Social Sciences. Courses selected must include a minimum of one course in each area of Humanities (H) and Social Sciences (SS). In addition, at least two HASS courses must be taken in the same department.
3. Eight department foundation courses: five required courses in mechanical engineering: Mechanical Engineering 10, Mechanical Engineering 20, Mechanical Engineering 30, Mechanical Engineering 40 and Mechanical Engineering 50; one elective course in probability, statistics, or numerical methods, refer to the ME degree sheet for details on fulfilling this requirement; and two foundation electives that are either natural sciences, mathematics, engineering, or Engineering Management. The following courses may not be used to fulfill the foundation elective requirement:

- Engineering Science 3, Engineering Science 5, Engineering Science 7, Engineering Science 8, Engineering Science 9, and Engineering Science 10.
4. Twelve department concentration courses: six required mechanical engineering core courses (Mechanical Engineering 11, 18, 21, 31, 41, and 51), a senior design project elective (Mechanical Engineering 43), and five mechanical engineering concentration electives. Refer to the ME degree sheet for details on department concentration courses.
 5. Of the 38 required courses for the BSME program, two are unrestricted courses, also known as *free electives*.

Bachelor of Science—Human Factors Engineering

This program is available for students planning a career or further graduate study in the field of human factors, human factors engineering, product design, system design, UI/UX, medical-device design, ergonomics, or other related fields. Students generally should plan to elect the program at the end of the first year and will graduate with a B.S. degree in Human Factors Engineering. Program requirements are detailed in this bulletin under Human Factors Engineering. More details can also be found here: <https://sites.tufts.edu/humanfactors/>

Students may also pursue an M.S. in Human Factors Engineering.

HUMAN FACTORS ENGINEERING MINOR

Program requirements are detailed in this bulletin under Human Factors Engineering.

ENGINEERING EDUCATION MINOR

The Engineering Education minor provides students with hands-on teaching experience through the Student Teacher Outreach Mentorship Program (STOMP). Engineering students participating in STOMP visit local K–12 classrooms once a week to facilitate hands-on engineering lessons and to gain a first-hand perspective on the challenges faced by educators today.

The Engineering Education minor not only provides students with STOMP field experience, but also provides an educational foundation that will help them in their classroom visits and influence their work.

Engineering students are encouraged to obtain an Engineering Education minor if they have:

- a passion for K–12 education, but don't necessarily want to pursue a career in the field;
- a potential desire to go into the education field post-graduation, but want to explore the possibility first;
- a determination to become an educator post-graduation, and the minor experience will adequately prepare them in pursuing an M.A.T.;
- a need to be active in citizenship and public service pre- and post-graduation.

This minor is currently only open to Tufts engineering undergraduates. Students are eligible for the minor if they take five courses and participate in one field experience activity in the form of STOMP (<http://www.stomppnetwork.org>) or an equivalent Education field course. The five required courses are divided among the three categories of Build, Apply, and Integrate, outlined below.

If you are a Tufts Engineering student interested in the minor, please visit the Mechanical Engineering website: <https://engineering.tufts.edu/me/current/undergraduate/minor-engineering-education>

REQUIREMENTS:

BUILD

Human Development & Learning Foundation (2 Courses)

- ED-0001 - School & Society (SS) ***Required**
- Select **one** of the following:
 - CSHD-0051 - Intellectual Development (SS)

- CSHD-0173 - Curricula for Young Children: Math, Science & Technology (SS)
- CSHD-0145 - Technological Tools for Learning (SS)
- CSHD-0151 - Advanced Intellectual Development
- ED-0130 - Human Development & Learning (SS)

Social & Cultural Foundation (1 Course)

Select **one** of the following:

- ED 0161 - Anthropology and Sociology of Schooling
- ED-0162 - Critical Histories of U.S. Education (SS)
- ED-0164 - Education for Peace & Justice (SS)
- ED-0165 - Feminist & Gender Theories in Education (SS)
- ED 0166 - Masculinities & U.S. Schooling (SS)
- ED 0167 - Critical Race Theory (SS)

APPLY

Education through Engineering (2 Courses)

Select **two** of the following:

- COMP-0171 - Human-Computer Interaction (E)
- ENP-0161 - Human Factors in Product Design (E)
- ENP-0162 - Human-Machine Systems Design (E)
- ME-0145 - Engineering Education Design (E)
- ME-0134 - Robotics (E)
- ME-0140 - Inventive Design (E)

INTEGRATE

STOMP or Field Studies

Select **one** of the following:

- ED 0011 - Observing Theory In Action (SS)
- ED 0099 - Field Experience In Education
- STOMP - Participation in 2 semesters

CERTIFICATE PROGRAM IN MANUFACTURING ENGINEERING

FACULTY ADVISOR: Professor Anil Saigal, Mechanical 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 advisor of this program. The certificate requires four courses.

Two core courses are required:

Mechanical Engineering 110 Manufacturing Processes and Materials Technology

Mechanical Engineering 130 or Mechanical Engineering 134 Digital Control of Dynamic Systems or Robotics

Two elective courses are required from the following:

Mechanical Engineering 146 Micro-fabrication and Design

Mechanical Engineering 102 Statistical Quality Control

Mechanical Engineering 116 Mechanics of Composite and Heterogeneous Materials

Mechanical Engineering 113 Computer-Integrated Engineering

Mechanical Engineering 129 Finite Elements

Mechanical Engineering 130 Digital Control of Dynamic Systems

Mechanical Engineering 134 Robotics

Further information can be found under Manufacturing Engineering Certificate Program in this bulletin.

CERTIFICATE PROGRAM IN HUMAN-COMPUTER INTERACTION

FACULTY ADVISOR:

Professor of the Practice James Intriligator, Mechanical Engineering

This certificate is offered on a part-time, non-degree basis for post baccalaureate students and is especially useful for computer programmers, Web designers, software engineers, human factors professionals, user interface designers, and others who wish to develop or enhance their user interface design and implementation skills. Courses taken in the certificate program may be transferred to the degree program. Professor Daniel Hannon is the faculty advisor of this program. The certificate requires four courses.

Two foundation courses are required:

Computer Science 171 Human-Computer Interaction

Psychology 53 Engineering Psychology

One additional course from the following:

Computer Science 86 Object Oriented Programming for GUIs

Engineering Psychology 161 Human Factors in Product Design

Engineering Psychology 162 Human-Machine System Design

Engineering Psychology 166 Computer Interface Design

Psychology 130 Advanced Engineering Psychology

Electives:

Computer Science 20 Web Programming

Computer Science 175 Computer Graphics

Electrical Engineering 120 Computer Animation for Technical Communications

Occupational Therapy 105 Assistive Technology

Engineering Psychology 215 Interface Design in Complex Systems

For more detailed information, please visit the Mechanical Engineering website:

<http://engineering.tufts.edu/me/current/certificate-programs/human-computer-interaction>

CERTIFICATE PROGRAM IN HUMAN FACTORS IN MEDICAL DEVICES AND SYSTEMS

FACULTY ADVISOR:

Professor of the Practice James Intriligator, Mechanical Engineering

The rate of preventable deaths due to medical error is huge. A widely cited report published in 2016 suggests at least 250,000 patients die each year due to medical error, making it the third leading cause of death in the USA. A large percentage of these deaths are related to poor user interface design.

Recognizing the medical error "epidemic," the U.S. Food and Drug Administration (FDA) now requires the manufacturers to Class II and III devices to apply HFE through the device development process and validate that representative users can operate them safely. This requirement has increased the demand for professionals in the field of human factors engineering who have special knowledge about the design and evaluation of medical technology.

The Graduate Certificate consists of four courses, many available as evening classes – and some may be available via telepresence from distant locations. Students interested in earning a master's degree can often apply these certificate courses toward a master's degree in human factors engineering.

PROGRAM OF STUDY:

The certificate requires **four** courses:

- Two foundation courses:
 - ENP 109 Medical Technology Development
 - ENP 110 Human Factors in Medical Technology
- Two more courses from approved list, including:
 - ENP-0105 Assistive Technology
 - ENP-0161 Human Factors in Product Design
 - ENP-0165 Industrial Design
 - ENP-0166 Computer Interface Design
 - ENP-0163 Analytical Methods
 - COMP-0171 Human-Computer Interaction
 - ME-0140 Inventive Design
 - BME-0100 Design of Medical Instrumentation

For more detailed information, please visit the Mechanical Engineering website:

<http://engineering.tufts.edu/me/current/certificate-programs/hf-medical-devices-and-systems>

GRADUATE PROGRAM

Master of Science in Mechanical Engineering

The goal of the Master of Science (M.S.) degree program is to provide students with an opportunity to strengthen their technical backgrounds for pursuing successful professional careers in engineering research, development, and management. Applicants are admitted to this program on the basis of their educational qualifications. A key admission requirement is a strong academic background in mechanical engineering or a related technical discipline. The department also requires all applicants to submit their recent Graduate Record Examination (GRE) scores. More detailed descriptions of all application requirements are provided on the Mechanical Engineering Department website and the Office of Graduate Admissions website.

Two M.S. degrees are offered by the department: a thesis-based M.S. and a non-thesis based M.S. The thesis-based degree typically requires 3 or 4 semesters (1.5-2 years) to complete. The non-thesis based degree may be completed in 2 semesters (1 academic year) of full time study. Both programs require successful completion of 30 semester hour units (SHUs) and a minimum of ten (10) graduate-level (100-level or above) courses.

Students in both degree programs are required to choose two core areas from the four available in the department. Students must take a two-course sequence in the two selected core areas in the first two semesters of their M.S. program. The two-course sequence is referred to as core A and core B. The four core area course sequences are Thermal Fluid Systems (ME 150 and ME 151), Material Processing and Mechanics (ME 110 and 120), Dynamics and Controls (ME 121 and 130), and Design (ME 140 and ME 193).

Students are also required to take an advanced mathematics course (ME 100, ME 101, or ME 102) in semester 2 or 3. Full time M.S. students must also attend and enroll in the graduate seminar (ME 291/292) every semester. At least 80% attendance is required.

Students in the non-thesis M.S. program will select the remaining five courses (15 SHUs) as follows. One (3 SHU) class in technical communications (either EM 252 or ME 171), two or three courses totaling six (6) SHUs selected from the professional education courses offered by the Tufts Gordon Institute (<https://gordon.tufts.edu/programs/professional-education-courses/>), and two elective courses (6 SHUs) selected in consultation with the academic advisor at the graduate level (100-level or above) in any of the engineering disciplines, physical sciences, mathematics, or computer science. One (3 SHUs) of the two professional development courses can be replaced with an advanced engineering project (ME 294), if agreed upon by the student and their academic advisor.

Students in the thesis-based M.S. program must complete a thesis. Ordinarily, the thesis is 9 SHUs of the 15 remaining required SHUs. The exact number of SHUs to be considered for the thesis research (6 or 9) is determined by the thesis committee at the time of the thesis prospectus submission. After selecting a thesis topic and advisor, a student must register for thesis credit (ME 296) and submit a thesis prospectus signed by the student and advisor describing the proposed research. The thesis prospectus must be submitted by the end of the first semester of thesis course registration. The thesis defense is the final step in obtaining approval for the thesis. The remaining two or three required courses (6 or 9 SHUs) will be elective credits selected in consultation with the academic advisor at the graduate level (100-level or above) in any of the engineering disciplines, physical sciences, mathematics, or computer science.

Master of Science in Human Factors Engineering

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, training and research opportunities 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.

Although this program has its own entrance and course requirements separate from Mechanical Engineering, it is expected that applicants to the Human Factors program will have an acceptable B.S. 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 contact the program director and/or (if interested in the thesis-based path) identify and contact a potential thesis advisor before applying to the program.

Two M.S. (HFE) degrees are offered by the department: a thesis-based M.S. and a non-thesis based M.S. The thesis-based degree typically requires 3 or 4 semesters (1.5-2 years) to complete. The non-thesis based degree may be completed in 2 semesters (1 academic year) of full time study. Both programs require successful completion often (10) graduate-level (100-level or above) courses and a minimum of 30 SHUs.

Students in both degree programs are required to complete one course in each of the following five core areas: Human Factors (ENP 162), Design (ME 140 or ENP 149-DPS), Probability and Statistics (ENP 164), Analytical Methods (ENP 163), and Human Computer Interaction (ENP 166, COMP 171, COMP 175 or COMP 177).

Full time M.S. students must also attend and enroll in the graduate seminar (ME 291/292) every semester. At least 80% attendance is required.

Students in the non-thesis M.S. (HFE) program will select the remaining five courses (15 SHUs) as follows. One (3 SHU) course in professional development (ENP 220) and 12 SHUs of general electives. The general electives must be at the 100 level and at least two courses must be taken within Engineering Psychology (ENP).

Students in the thesis-based M.S. (HFE) program must complete a thesis. Ordinarily, the thesis is 9 SHUs of the 15 remaining required SHUs. The exact number of SHUs to be considered for the thesis research (6 or 9) is determined by the thesis committee at the time of the thesis prospectus submission. After selecting a thesis topic and advisor, a student must register for thesis credit (ENP 295 and/or ENP 296) and submit a thesis prospectus signed by the student and advisor describing the proposed research. The thesis prospectus must be submitted by the end of the first semester of thesis course registration. The thesis defense is the final step in obtaining approval for the thesis. The remaining two or three required courses (6 or 9 SHUs) will be elective credits selected in consultation with the academic advisor at the graduate level (100-level or above). Finally, M.S. (HFE) candidates are also expected to present their research at scientific conferences (e.g., ASME, HFES, IEA, IEEE SMC) and submit at least one paper to a peer-reviewed scientific journal.

Doctor of Philosophy

Applicants to the Ph.D. program are expected to have an outstanding academic record 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 fourth academic semester if entering the program with an M.S., or by the end of their sixth academic semester if entering the program with a B.S. The student must select four out of the nine areas (Physical Ergonomics, Cognitive Human Factors, Dynamics, Controls, Fluid Dynamics, Heat Transfer, Solid Mechanics, Materials Processing, and Mechanical Design) for the written qualifying examination, and pass an oral examination.

A Ph.D. candidate is required to complete at least five courses (15 SHUs) beyond the M.S. 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 200 level or higher, either within or outside of the department.

After the successful qualifying exam, Ph.D. 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.

For more detailed information, please visit the Mechanical Engineering website:
<http://engineering.tufts.edu/me/current/phd>

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 courses (15 semester hour units) with at least one course from each of the three categories (consult: ase.tufts.edu/pandp/medievalstudies) are required for the minor. 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. (See the description of CIS 0120 [worth 2 semester hour units] in the Catalog.)

Middle Eastern Studies

DIRECTOR:

Kenneth Garden, Associate Professor, Religion

FACULTY:

Professor Ina Baghdiantz-McCabe, History

Professor Leila Fawaz, History

Professor Bruce Hitchner, Classics

Professor Ayesha Jalal, History

Professor Beatrice Manz, History

Professor Christina Maranci, Art and Art History

Professor Malik Mufti, Political Science

Professor Kamran Rastegar, Arabic Literature

Professor Hugh Roberts, History

Professor Enrico Spolaore, Economics

Associate Professor Amahl Bishara, Anthropology

Associate Professor Kenneth Garden, Religion

Associate Professor Steven Hirsch, Classics

Associate Professor Richard Jankowsky, Music

Associate Professor Nimah Mazaheri, Political Science

Associate Professor Joel Rosenberg, Judaic Studies

Assistant Professor Jennifer EYL, Religion

Assistant Professor Riccardo Strobino, Classics

Assistant Professor Eva Hoffman, Art and Art History

Senior Lecturer Rana E. Abdul-Aziz, Arabic Language

Senior Lecturer Thomas Abowd, Race, Colonialism & Diaspora

Senior Lecturer Hedda Harari-Spenser, Hebrew Language

Senior Lecturer Fadi Jajji, Arabic Language

Senior Lecturer David Proctor, History

Lecturer Souhad Zendah, Arabic Language

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 pre-modern and modern times. Study abroad is highly recommended.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Middle Eastern Studies

The Middle Eastern Studies major comprises twelve courses:

- i. Four courses of a Middle Eastern language (level 3–4 or equivalent). Students who have demonstrated language competence through level 3–4 by a placement test must take two advanced language courses and either two semesters of a second Middle Eastern language or two other courses from the list referred to in section ii.
- ii. Six courses in Middle Eastern studies—chosen in consultation with an advisor—from an approved list updated by the Middle Eastern Studies program annually. Three courses must be chosen from each of the following two groups:
 - A. art history, religion, literature, Judaic studies, music, and
 - B. anthropology, history, political science.

These courses must include at least one course in pre-modern and one course in modern Middle Eastern studies. They must also include one course in each of two Middle Eastern cultures. Two of these courses may

be more advanced language courses (21–22 and beyond).

iii. One course that relates the Middle East to other regions of the world.

iv. One advanced research course, such as thesis honors, a seminar, or advanced directed study in which the student writes a 20+ page paper.

For more detailed information, please contact Professor Garden at ken.garden@tufts.edu.

Microwave and Wireless Engineering

FACULTY ADVISOR:

Professor Mohammed Nurul 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, cellular phone, cruise control and collision avoidance radar are just a few areas that utilize microwave technology.

In addition, computer hardware researchers and designers are finding that microwave engineering concepts are necessary to develop gigahertz and faster computer circuits. As engineers explore low microwave frequencies and even lower radio frequencies, this technology is now applied to cable, broadband, television, medical, and other commercial uses.

In collaboration, the Department of Electrical and Computer Engineering offers a 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, non-degree 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.

The department offers a graduate-level certificate in microwave and wireless engineering. The certificate is offered on a part-time, non-degree 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, visit

<https://engineering.tufts.edu/ece/current/certificate-programs/microwave-wireless-engineering>

Museum Studies

Senior Lecturer Cynthia Robinson, Program Director and Faculty Advisor; Museum Education

Professor Andrew McClellan, Faculty Advisor; Art History and Museum Studies

Professor James Rice, Faculty Advisor; History and Museum Studies

As the stature and number of museums 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, Education, and History, and the Office of the Dean of the Graduate School of Arts and Sciences, the program equips students with the theories and practices needed for the 21st-century museum.

Students may pursue the certificate program, consisting of four courses and a practicum, or a master's degree program in art history, history, or education. Together, certificate and masters students take museum studies courses that cover museum history, administration, education, collections management, preservation, material culture, fund-raising, evaluation, digital media, and exhibition planning. The field-based practicum enables students to apply what they have learned in the classroom and to expand their networks.

The program is open to individuals with a bachelor's degree interested in pursuing a museum-based career, museum professionals who wish to improve their credentials for career advancement, and professionals in other fields who wish to shift career direction.

For more information, contact the program administrator, Angela Foss, at 617-627-2320 or visit the website <http://museumstudies.tufts.edu>.

Music

Joseph Auner, *Austin Fletcher Professor of Music, Dean of University College*
David Locke, *Professor*
John McDonald, *Professor, Director of Graduate Studies*
Alessandra Campana, *Associate Professor*
Richard Jankowsky, *Associate Professor, Department Chair*
Stephan Pennington, *Associate Professor*
Melinda Latour, *Rumsey Family Assistant Professor in the Humanities and Arts; Assistant Professor*
Frank Lehman, *Associate Professor, Director of Undergraduate Studies*
Paul D. Lehrman, *Senior Lecturer, Director of Music Engineering & Technology*
Joel LaRue Smith, *Senior Lecturer, Director of Jazz Activities*
Jamie Kirsch, *Senior Lecturer, Director of Choral Activities*
John Page, *Senior Lecturer, Director of Orchestral Activities*
Michael Ullman, *Senior Lecturer in Music and English*
Kareem Roustom, *Professor of the Practice*
Jeffrey A. Summit, *Research Professor*
Edith Auner, *Coordinator of Private Lessons, Director of Tufts Community Music*
Paul Ahlstrand, *Lecturer, Small Jazz Ensemble*
Nina Barwell, *Lecturer, Flute Ensemble*
Donald Berman, *Lecturer, New Music Ensemble*
David Coleman, *Lecturer, Gospel Choir*
Douglas McRay “Ray” Daniels, *Lecturer, Pep Band*
Barry Drummond, *Lecturer, Javanese Gamelan*
Jessica Fulkerson, *Lecturer in Musicology*
Ian Goldstein, *Lecturer, Ethnomusicology*
Jane Hershey, *Lecturer, Early Music Ensemble*
Stéphanie Khoury, *Lecturer, Ethnomusicology*
David Lefkowitz, *Lecturer, Music Technology*
Carol Mastrodomenico, *Lecturer, Opera Ensemble*
John McCann, *Lecturer, Wind Ensemble & Music Theory*
Michael McLaughlin, *Lecturer, Klezmer Ensemble & Music Theory*
Fernando Michelin, *Lecturer, Small Jazz Ensemble*
Emmanuel Attah Poku, *Lecturer, African Music & Dance Ensemble (Kiniwe)*
Layth Sidiq (Al-Rubaye), *Lecturer, Arab Music Ensemble*
Thomas Stumpf, *Lecturer, Opera Ensemble*

The Tufts University Department of Music welcomes all members of the Tufts community to participate in our inclusive, diverse, and comprehensive curriculum. Housed within The Perry and Marty Granoff Music Center, our flexible program serves those students who wish to pursue undergraduate or graduate studies in music and all students seeking to develop their musical knowledge and/or performance skills. We offer courses in composition, ethnomusicology, musicology, sound studies, technology, theory, and performance. Our research and teaching explore a variety of traditions within Western art music, American music (especially African-American music and jazz), and world music (especially African and Middle Eastern music). We encourage individual study of instrumental and vocal performance and encourage participation in performing ensembles; students may earn academic credit for these musical activities.

Music studies at Tufts are interdisciplinary, drawing on research in the arts, humanities, social sciences, mathematics, sciences, and engineering. Our courses fulfill many requirements: arts distribution, world

civilizations, international relations, American studies, and several interdisciplinary minors. The study of music is preparation for a lifelong appreciation of the arts and provides transferable skills for professional careers.

All Tufts University students are invited to enroll in the courses offered by the Music Department, to take private lessons in voice or a musical instrument, and to participate in our performing ensembles. Students need not have music as their major or minor to participate in the programs of the Music Department. Everyone is welcome!

For students who would like to study music in a focused and comprehensive way, the department offers the major in "Music, Sound, and Culture." Students may also choose the music minor program, as detailed below.

PERFORMANCE OPPORTUNITIES

Faculty in the Music Department teach a wide array of courses in ensemble performance, including African Music and Dance (Kiniwe), Arab Music, Chamber and Concert Choirs, Chamber and Symphony Orchestras, Early Music, Electronic Music Ensemble, Flute Ensemble, Gospel Choir, Javanese Gamelan, Jazz Orchestra, Jazz Improvisation Ensemble, Klezmer Ensemble, New Music Ensemble, Opera Ensemble, Pep Band, and Wind Ensemble. All ensembles are open to the Tufts community and can be taken either for credit or no credit. Many of our ensembles require auditions to determine placement: musical excellence is highly valued, but competition for membership is far less intense than in music conservatories.

The Music Department provides students the opportunity for private study of instrumental and/or vocal performance in a broad range of musical styles from many traditions. Private lessons are open to all Tufts students, regardless of major or program of study, and can be taken either for credit or no credit. In order to enroll, all students must consult the Coordinator of Private Lessons. Private lessons are not included in the cost of tuition and require an additional fee per semester, payable directly to the instructor.

Scholarship funding is available to students enrolled in private lessons who apply by the tenth day of each term; a new application is required for each term. Those eligible to apply are: 1) music majors and minors; 2) those on financial aid; 3) those in Music Department ensembles.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

For students who wish to study music in a focused and comprehensive way, the Music Department offers the major in "Music, Sound, and Culture." The Music, Sound, and Culture major empowers students to chart their own musical path, and to provide them with the creative, scholarly, social, and professional tools they might need to confidently embark on this journey. The major is open to undergraduates with any and all prior backgrounds in music; it is designed around the interests and needs of individual students. Everyone is welcome!

Note: As of the Fall Term 2018 the undergraduate major in music detailed below will take effect. Students who declared a music major prior to Fall 2018 are welcome to switch to the Music, Sound, and Culture major, and should consult with their major advisor and the Music Department's Director of Undergraduate Studies to determine their course of study.

Music, Sound, and Culture: Undergraduate Major Requirements

The Music, Sound, and Culture major enables a rigorous, balanced study in many disciplines of music including composition, cultural studies, ethnomusicology, musicology, performance, sound studies,

technology, and theory. Fields of musical study taught in the Music Department include Western classical music, American music, world-ethnic-folk-traditional musics, popular music, film music, and music for multi-media.

The Music, Sound, and Culture major consists of 10 or more courses falling within three categories: Foundation (3 courses), Concentration (5 or more courses), and Free Choice (2 courses). The faculty recommends that Foundation courses be taken early in a student's sequence of major courses. Otherwise, courses may, in principle, be taken in any order, but prerequisites will have impact upon a student's eligibility for certain courses (see course descriptions). Students pursuing the major are strongly encouraged to take advantage of the department's many seminars and upper-level offerings, which provide smaller classroom environments and specialized instruction. A student's major advisor and the department's Director of Undergraduate Studies will review their program of study for its coherence, depth, and breadth.

Foundation

These three courses introduce students to essential modes of musical inquiry, and emphasize an integrated, community-oriented approach to music studies:

Sound and Structure (MUS 11 course plus lab; offered every Fall)

Music Scholarship at Tufts (MUS 12 course plus lab; offered every Spring)

Performance: Private Lessons or Ensemble (MUS 67 or one from MUS 69–94; offered every semester)

Concentration

In consultation with their major advisor and with approval of the department's Director of Undergraduate Studies, students will take at least five (5) courses to make a concentration. Students have the opportunity to select the particular combination of courses that will comprise their own personal concentration. Concentration clusters may be formed on the basis of a sub-discipline, a specialization, a genre or style, a field, or a career goal.

Free Choice

To count towards their major, a student may choose any two courses numbered MUS 14 or above that give breadth to their program of study.

Choosing an Advisor & Declaring a Major

Students should request as their major advisor a member of the full-time faculty based on shared interests or positive relationships in the classroom. Students may contact the Director of Undergraduate Studies, who can help connect prospective majors to an advisor. Once a student has selected an advisor, they may declare their major(s)/minor(s) electronically, using the appropriate form through Student Services. In consultation with their advisor, students should also complete the Music, Sound, and Culture Major Checklist to track their progress through the major and ensure they have fulfilled requirements in all three areas.

UNDERGRADUATE MINOR PROGRAMS

Minor in Music

Students who intend to make music studies a significant part of their course work at Tufts may choose the disciplinary minor in music. To fulfill the music minor requirements, students may take a broad range of courses or may choose a cluster of courses in a focused area of musical study. The undergraduate minor in music requires a minimum of six courses. After consultation with a member of the full-time music faculty for advice on a suggested program of study, students should submit the minor declaration form to the main office of the Music Department.

Minor in Music Engineering

This interdisciplinary minor is open to all undergraduates. It is a joint effort of the Music, Computer Science, Mechanical Engineering, and Electrical Engineering departments. For specific information about fulfilling the minor requirements, visit the Music Engineering website:

www.tufts.tufts.edu/musicengineering

COURSES AT NEW ENGLAND CONSERVATORY OF MUSIC

A reciprocal arrangement between Tufts University and the 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.

GRADUATE PROGRAM

Master of Arts

Master of Arts

The Music Department offers the degree of Master of Arts in the disciplines of composition, conducting, ethnomusicology, music theory, and musicology. Applicants for the master's degree must demonstrate a distinctive background in music studies, and must submit writing samples, composition portfolios (scores and recordings), or conducting performances (video and audio) as part of their application. The Graduate Record Examination (GRE) is not required but scores may be included at the applicant's discretion. The two-year program of study consists of ten semester courses numbered 100 and above, including a capstone project that includes a substantial written component. The capstone project may take the form of a master's thesis, composition, exhibit, lecture-recital, or other rigorous academic undertaking determined in consultation with the student's advisor. Students are expected to take music courses both inside and outside their discipline of concentration. Course selection is made in consultation with the Director of Graduate Studies in the first year, and with a chosen advisor in the second year. The department encourages students to gain practical experience in performance courses and students have the option of replacing one of the ten semester courses with two performance courses (private lessons or ensemble).

For more detailed information, please visit: as.tufts.edu/music.

Music Engineering

Administrator:

Senior Lecturer Paul D. Lehrman, Music

Advisor:

Professor Chris Rogers, Mechanical engineering

UNDERGRADUATE MINOR

The minor in Music Engineering provides students with experiences at the intersection of music and technology. Students learn the technologies behind music-making, both traditional and modern, and how new technologies can be applied to musical goals. The minor is available to students both in the School of Engineering and the School of Arts and Sciences.

The minor consists of five courses and a final project (six units in total). The minor has three possible emphases: (1) acoustic instrument design, (2) electronic instrument design, and (3) recording and production. Students can follow any one of these emphases, which will influence the choice of final project. Course requirements for the minor vary according to whether the student is in the School of Engineering or the School of Arts and Sciences, and according to which emphasis they are pursuing.

Students taking the acoustic instrument design emphasis will take one course each in music, acoustics, electronic music, and acoustic instrument design. Students taking the electronic instrument design emphasis will take one course each in music, electronics, electronic music, and electronic instrument design. Students taking the recording and production emphasis will take one course each in music, electronics, electronic music, and recording and production. In addition, each student will take one elective from any of the approved courses for the minor or an internship in the appropriate field, and a three-credit final project (EE 95 or 96, or both EE 97 and 98; ME 43 or 94; or Music 98) on an approved topic, supervised by a participating minor advisor.

Courses for the students in the School of Arts and Sciences include the following (one course in each category):

1) Acoustic instrument design emphasis

Music MUS 5, 11, 14, 15, 17, 70, 71, 74, 81, 82, 84, 85, 86, 90, 101, 102, 103, 116, 118

Acoustics ME 37, 181, 149 (new course: Science & Engineering of Music), Architectural Acoustics (new course, #TBD)

Electronic music MUS 61, SCP 110, SND 70, DR 93-06

Acoustic instruments ES 73, SCPC 36

Elective any other course in the minor, internship

Final project MUS or ME

2) Electronic instrument design emphasis

Music MUS 5, 11, 14, 15, 17, 70, 71, 74, 81, 82, 84, 85, 86, 90, 101, 102, 103, 116, 118

Electronics ES 3, EE21, ME93-01, EN 1-02

Electronic music MUS 61, SCP 110, MUS 90

Electronic instruments MUS 141/ES 95

Elective any other course in the minor, internship, ES 2, ES 4, COMP 10, COMP 11

Final project MUS or ECE

3) Recording and production emphasis

Music MUS 5, 11, 14, 15, 17, 70, 71, 74, 81, 82, 84, 85, 86, 90, 101, 102, 103, 116, 118

Electronics ES 3, EE21, ME 93-01, EN 1-02

Electronic Music MUS 61

Recording and Production MUS 142

Elective any other course in the minor, internship, MUS 17, ES 2, ES 4, COMP 10, COMP 11

Final project MUS or ECE

Courses for the students in the School of Engineering include the following (one course in each category):

1) Acoustic instrument design emphasis

Music MUS 5, 11, 14, 15, 17, 70, 71, 74, 81, 82, 84, 85, 86, 90, 101, 102, 103, 116, 118

Acoustics ME 37, 181, 149 (new course: Science & Engineering of Music), Architectural Acoustics (new course, # TBD)

Electronic music MUS 61, SCP 110, SND 70

Acoustic instruments ES 73, SCPC 36

Elective any other course in the minor, internship

Final project ME

2) Electronic instrument design emphasis

Music MUS 5, 11, 14, 15, 17, 70, 71, 74, 81, 82, 84, 85, 86, 90, 101, 102, 103, 116, 118

Electronics ES 3, ES 4, EE21, ME93-01

Electronic music MUS 61, SCP 110

Electronic instruments MUS 141/ES 95

Elective any other course in the minor, internship

Final project ME or ECE

3) Recording and production emphasis

Music MUS 5, 11, 14, 15, 17, 70, 71, 74, 81, 82, 84, 85, 86, 90, 101, 102, 103, 116, 118

Electronics ES 3, EE21, ME 93-01

Electronic Music MUS 61

Recording and Production MUS 142

Elective any other course in the minor, internship, MUS 17, ES 4

Final project ECE

Each student taking the minor must have a minor faculty advisor who approves course selections and mentors the final project. For more information, visit <http://go.tufts.edu/musicengineering>.

Occupational Therapy

Professor Gary Bedell, Chair, Outcomes measurement, research methods, social participation of children, youth and adults

Professor Sharan L. Schwartzberg, Faculty Emeritus, Group theory and practice, psychosocial rehabilitation, interprofessional healthcare teams

Professor Linda Tickle-Degnen, Healthy and active aging, nonverbal and verbal behavior in health quality of life, clinical reasoning, evidence-based practice, research methods

Associate Professor Nancy Baker, Musculoskeletal disorders, public and community health, ergonomics and industrial rehabilitation, work disability, measurement development, research methods, evidence-based practice, knowledge translation and implementation science

Assistant Professor Keren Ladin, Health policy, research methods, public health ethics, health disparities, medical ethics.

Assistant Professor Elizabeth (Beth) Marfeo, Work disability, productive-aging, heath services research, measurement development

Entry Level Program Director/Senior Lecturer Jessica Harney, Clinical reasoning, kinesiology, health and community systems; health conditions, management

Senior Lecturer Janet Curran Brooks, Occupational therapy practice in physical medicine, hand and upper extremity rehabilitation, ergonomics and clinical reasoning

Senior Lecturer Margaret Morris, Pediatrics, clinical practice, school-based service, teaching and learning, online teaching and learning

Lecturer/Academic Fieldwork Coordinator Susan M. Higgins, Group and psychosocial practice; cognitive disabilities model, occupational therapy fieldwork, animal-assisted therapy

Lecturer Meredith Grinnell, Adult neurology, clinical practice, vision rehabilitation, clinical reasoning

Lecturer/Doctoral Capstone Coordinator, Mary Barnes, Group leadership and community-based practice, occupational therapy fieldwork

Part-time and affiliated faculty:

Lecturer Jennifer Buxton, Assistive technology

Lecturer Paul C. Leavis, Physiology

Lecturer Jean Lyons Martens, Adult and pediatrics

Lecturer Monica Pessina, Anatomy and neuroanatomy

Lecturer Sarah Everhart Skeels, Health promotion/disease prevention and disability

Lecturer Elizabeth Ratcliff Whitney, Anatomy and neuroanatomy

Lecturer Ryan Whitney, Clinical Reasoning, Pediatrics, physical rehabilitation

Affiliated Faculty Scott Trudeau, Occupational therapy practice in psychiatry, gerontology

The Department of Occupational Therapy, originally the Boston School of Occupational Therapy ("BSOT" for short), was founded in 1918 at the request of the surgeon general of the United States Army. In 1945, BSOT became affiliated with Tufts University. The Department is part of Tufts Graduate School of Arts and Sciences and is situated on the Medford/Somerville campus in the Collaborative Learning and Innovation Complex at 574 Boston Avenue.

The Department of Occupational Therapy has an impressive array of resources for learning, practice, and research. We ensure the broadest and most relevant education, fostering clinical reasoning skills needed for collaborating with diverse client, community, and professional groups to address complex, rapidly changing healthcare and societal needs. As part of the Tufts Graduate School of Arts and Sciences, the department is ideally positioned to educate future professionals, researchers and leaders who can actively participate in and advance an interdisciplinary and inter-professional approach to health and healthcare. Through our education, research, and practice, we promote participation in meaningful activity ("occupation") of individuals, communities and populations with diverse needs and experiences.

GRADUATE PROGRAMS

The department offers both masters and doctoral degree programs which prepare graduates for work as practitioners, administrators, researchers, educators and leaders. 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 a central organizing framework of the curriculum. It provides a foundation for making informed

decisions based on observation, interaction, theoretical principles and procedures underlying assessments and interventions and consideration of the best available research evidence. Human behavior and participation in meaningful activities 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 contexts of clinical and community-based practice.

MASTERS DEGREE PROGRAMS

Please note that the Department of Occupational Therapy enrolled its final cohort of Entry-Level Master's students in the fall of 2018. The Entry-Level Program is transitioning the Entry-Level Occupational Therapy Doctoral (OTD) program in the summer 2019.

The master's degree programs prepare students for entry-level positions in occupational therapy and provide post-professional graduate studies for individuals who are already occupational therapists.

Program options are described below.

Entry-Level Program (for Non-OTs) (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. Program can be completed with 2½ years and must be completed on a full-time basis.

Prerequisites: (Total of six courses.) All prerequisites must be passed with a grade of B- or better and taken at an accredited college: one course in social sciences (i.e., anthropology, psychology, sociology); one course in developmental psychology or human development; one course in abnormal psychology; two courses in biology, including content in cell biology (anatomy and physiology may be substituted for the biology prerequisite; one biology course must have a lab component); 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 (4 semester hour units)

OTS 102 Gross Anatomy (4 semester hour units)

OTS 103 Neuroanatomy (4 semester hour units)

OTS 104 Kinesiology (3 semester hour units)

OTS 106 Occupation and Adaptation in the Child and Adolescent (3 semester hour units)

OTS 107 Occupation and Adaptation in the Adult Years (3 semester hour units)

OTS 137 Fieldwork Seminar (no credit)

OTS 138 Fieldwork Seminar (no credit)

OTS 205 Clinical Reasoning Seminar I: Observation and Interpretation (2 semester hour units)

OTS 206 Clinical Reasoning Seminar II: Interactive Reasoning in the Practice of Occupational Therapy (2 semester hour units)

OTS 207 Clinical Reasoning Seminar III: Procedural Reasoning in the Practice of Occupational Therapy (2 semester hour units)

OTS 209 Clinical Research (3 semester hour units)

OTS 219 Group Theory and Community-Based Practice (3 semester hour units)

OTS 224 Occupational Therapy Practice in Physical Dysfunction (5 semester hour units)

OTS 226 Occupational Therapy Practice with Pediatric Population (5 semester hour units)

OTS 227 Occupational Therapy Practice in Psychosocial Dysfunction (5 semester hour units)

OTS 229 Occupational Therapy Practice with Older Adults (5 semester hour units)

OTS 232 Health and Community Systems (2 semester hour units)

OTS 233 Occupational Therapy Management and Administration (2 semester hour units)

OTS 237 Fieldwork Experience (no credit)

OTS 238 Fieldwork Experience (no credit)

OTS 242 Health Conditions: Pathology and Prevention I (2 semester hour units)

OTS 243 Health Conditions: Pathology and Prevention II (2 semester hour units)

OTS 244 Health Conditions: Pathology and Prevention III (2 semester hour units)

The total number of minimum course semester hour units for the degree is 63. In addition to the 63 required semester hour units, non-thesis students may take six additional graduate level elective semester hour units in the department or wider university.

To maintain full-time status, a student must be registered for a minimum of nine semester hour units each semester.

Several course sequences are utilized 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 Science in Occupational Therapy

Required Courses: All of the option I requirements, but no electives. The same 63 semester hour units as Option I.

Thesis: 6 credit hours of thesis supervision (OTS 295, 296) and completion of thesis.

Total number of semester hours units required for the degree is 69 (63 semester hour units and six thesis semester hour units).

Post-Professional-Level Programs for Occupational Therapists

(Options III and IV)

These programs are for Occupational Therapists who are interested in developing their knowledge base in areas such as administration and management, aging, assistive technology, education, mental health, school-based practice, and upper extremity rehabilitation. Students may also choose a self-directed concentration focused on their individual interests.

Eligibility: Registered occupational therapists or candidates 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 208 (Clinical Reasoning Seminar IV, three semester hour units); OTS 209 (Clinical Research, three semester hour units); OTS 288 (Outcomes Measurement & Monitoring, three semester hour units). These required courses may be taken in any sequence or combination depending on student interest, schedule, and courses offered.

Concentration: Three courses in an area of concentration (nine semester hour units).

Electives: Three courses (nine semester hour units).

Practicum: One practicum (OTS 235, three semester hour units).

Total number of semester hour units for the degree is 30

Option IV (Thesis—research option)

Master of Arts or Master of Science

Required Courses: OTS 208 (Clinical Reasoning Seminar IV, 3 semester hour units); OTS 209 (Clinical Research, 3 semester hour units); OTS 288 (Outcomes Measurement & Monitoring, 3 semester hour units).

Concentration: Three courses in concentration (nine semester hour units).

Electives: Six semester hour units.

Thesis: Six semester hour units of thesis supervision (OTS 295 & 296) and completion of thesis.

Total number of semester hour units for the degree is 30.

DOCTORAL DEGREE PROGRAMS

The doctoral degree programs prepare students for entry-level positions in occupational therapy and provide post-professional graduate studies for individuals who are already occupational therapists.

Entry-Level Occupational Therapy Doctoral Degree Program (EL-OTD)

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. Program can be completed within 3 years and must be completed on a full-time basis.

Prerequisites: All prerequisites must be passed with a grade of B- or better and taken at an accredited college: one course in social sciences (i.e., anthropology, psychology, sociology); one course in developmental psychology or human development; one course in abnormal psychology; one courses in biology, including content in cell biology (anatomy and physiology may be substituted for the biology prerequisite; must have a lab component); human physiology and one course in introductory statistics. Certificate of Hepatitis B vaccination upon enrollment is required.

Entry-Level Doctoral Degree in Occupational Therapy

REQUIRED COURSES

OTS 102 Gross Anatomy (4 semester hour units) –*summer only*

OTS 103 Neuroanatomy (4 semester hour units) –*summer only*

OTS 104 Kinesiology (3 semester hour units) –*summer only*

OTS 106 Occupation and Adaptation in the Child and Adolescent (3 semester hour units)

OTS 107 Occupation and Adaptation in the Adult Years (3 semester hour units)

OTS 137 Fieldwork Seminar (1 semester hour units)

OTS 138 Fieldwork Seminar (1 semester hour units)

OTS 202 Bioethics (3 semester hour units)

OTS 204 Topics in Emerging Practice Areas (2 semester hour units)

OTS 205 Clinical Reasoning Seminar I: Observation and Interpretation (2 semester hour units)

OTS 206 Clinical Reasoning Seminar II: Procedural Reasoning in the Practice of Occupational Therapy (3 semester hour units)

OTS 207 Clinical Reasoning Seminar III: Interactive Reasoning in the Practice of Occupational Therapy (2 semester hour units)

OTS 209 Clinical Research (3 semester hour units)

OTS 210 Proposal and Methodology (3 semester hour units)

OTS 211 Foundations in OT (3 semester hour units)

OTS 213 DEC Seminar I (2 semester hour units)

OTS 214 DEC Seminar II (2 semester hour units)

OTS 215 DEC Seminar III (2 semester hour units)

OTS 216 Doctoral Capstone Experience (6 semester hour units)

OTS 219 Group Theory and Community-Based Practice (4 semester hour units)

OTS 224 Occupational Therapy Practice in Physical Dysfunction (5 semester hour units)

OTS 226 Occupational Therapy Practice with Pediatric Population (5 semester hour units)

OTS 227 Occupational Therapy Practice in Psychosocial Dysfunction (5 semester hour units)

OTS 229 Occupational Therapy Practice with Older Adults (5 semester hour units)

OTS 232 Health and Community Systems (3 semester hour units)

OTS 233 Occupational Therapy Management and Administration (2 semester hour units)

OTS 237 Fieldwork Experience (6 semester hour units)

OTS 238 Fieldwork Experience (6 semester hour units)

- OTS 242** Health Conditions: Pathology and Prevention I (3 semester hour units)
OTS 243 Health Conditions: Pathology and Prevention II (3 semester hour units)
OTS 244 Health Conditions: Pathology and Prevention III (2 semester hour units)
OTS 294 Mentorship (1 semester hour unit)
OTS 295 Mentorship (1 semester hour unit)

The total number of minimum course semester hour units for the degree is 106 In addition to the 106 required semester hour units, students may take six additional graduate level elective semester hour units in the department or wider university.

To maintain full-time status, a student must be registered for a minimum of nine semester hour units each semester. Several course sequences are utilized 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.

Post-Professional Doctoral Degree Program (PP-OTD)

The Doctor of Occupational Therapy (OTD) degree program at Tufts prepares occupational therapists to fulfill leadership roles. 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. This program can be completed on a **full time or part time basis** and requires a total of 30 credits hours. A master's degree is required for admission.

REQUIRED COURSES

- OTS 208** Clinical Reasoning Seminar IV: Evidence-Based Practice (3 semester hour units)
OTS 286 Leadership Project Planning (4 semester hour units)
OTS 287 Leadership Project Implementation (6 semester hour units)
OTS 288 Outcomes Measurement and Monitoring: Using Data to Inform Practice (3 semester hour units)
OTS 289 Integrative Paper (4 semester hour units)
OTS 297 and 298 Pro-seminar (2 semester hour units each)
Two graduate level courses in specialty area (total 6 semester hour units)

Total number of semester hour units for the degree is 30.

CERTIFICATE PROGRAMS

FACULTY ADVISORS:

Senior Lecturer Janet Curran Brooks, *Occupational Therapy Advisor – Hand and Upper Extremity Rehabilitation*
Senior Lecturer Margaret Morris, *Occupational Therapy, Advisor – School-Based Practice*

Certificate programs are offered on a non-degree, part-time basis to occupational therapists seeking advanced professional education in occupational therapy or preparing to enter a graduate degree program. Upon department approval, some of these courses can be used for the Occupational Therapy post-professional M.S. or OTD degree, if students are interested and accepted into that program.

Certificate programs give students the option of focusing on an area of specialization, such as hand and upper extremity rehabilitation, occupational therapy in the schools, or working with a faculty advisor to design their own program of study. For more information, contact the program administrator, Angela Foss, at 617-627-2320 or visit the website <https://asegrad.tufts.edu/academics/explore-graduate-programs/occupational-therapy>.

Certificate of Hand and Upper Extremity Rehabilitation

The hand and upper extremity rehabilitation specialization is intended for practicing occupational therapists who would

like to gain knowledge in the specialty area of hand and upper extremity therapy. Tufts Department of Occupational Therapy students who are interested in this content and practice area are also invited to apply. Therapists and students who complete this four-course series are well positioned to apply for positions in outpatient and hand therapy departments.

This certificate requires the following four courses: *which can be taken in any order*

OTS 274 Topics in Hand and Upper Extremity Rehabilitation I (fall, 3 semester hour units)

OTS 275 Topics in Hand and Upper Extremity Rehabilitation II (spring, 3 semester hour units)

OTS 276 Topics in Hand and Upper Extremity Rehabilitation III (summer, 3 semester hour units)

One research course (select one):

OTS 208 Clinical Reasoning IV: Evidence-Based Practice (3 semester hour units)

OTS 209 Clinical Research (3 semester hour units)

OTS 288 Outcomes Measurement and Monitoring (3 semester hour units)

Certificate of Advanced Professional Study in School-Based Practice (online only);

This asynchronous, online certificate is intended for practicing school therapists with an interest in expanding their knowledge in applicable special education law, best practices in evaluation and intervention, including systems approaches, translation and application of available evidence to their current practice, and participation in an online community of learners. Completion of this certificate requires three courses. Tufts Department of Occupational Therapy graduate students who are interested in schools practice certificate are encouraged to discuss the application process with the coordinator of the school's certificate.

This certificate requires three online courses:

Two core courses:

OTS 284 Therapy in Schools: Best Practices (online) (spring, 3 semester hour units)

OTS 285 Mentored Seminar in Schools Practice (online) (fall, 3 semester hour units)

One elective (select one):

OTS 193 Working with Children with Autism (online) (summer, 3 semester hour units)

OTS 194 Working with Children and Adolescents with Self-Regulation Issues (online) (summer, 3 semester hour units)

Certificate of Advanced Professional Studies

Occupational therapists are confronted with administrative and supervisory responsibilities and the need for increased specialization. Areas of practice such as health and wellness consulting, technology and assistive device development, and community-based health services are emerging practice areas. To help occupational therapists meet these demands, Tufts Department of Occupational Therapy, in conjunction with the Office of Graduate Studies, offers a part-time program, the Certificate of Advanced Professional Study.

This certificate program is open to those with a bachelor's, masters, or doctoral 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 as well as seasonal professionals eager to strengthen their experience.

The certificate requires four courses as follows:

OTS 209 Clinical Research (or equivalent with advisor consent) (3 semester hour units)

Specialty courses: Three specialty courses with an integrated focus are required (nine semester hour units). These courses and other electives are offered on the basis of interest, enrollment, and availability. 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.

For more information about these Certificate Programs, please contact the program administrator, Angela Foss (Angela.Foss@tufts.edu) at 617-627-2320, or visit <http://asegrad.tufts.edu/academics/explore-graduate-programs/occupational-therapy>

ADMISSION

The Department of Occupational Therapy has enrolled the final cohort for the Entry-Level Master's degree. All applications for admission to the Entry-Level OTD with requests for university-based financial aid, including scholarships and assistantships, must be submitted in a complete form by October 15 for summer entry. All applications for admission to the Post-Professional Master's degree program are due January 15th for fall entry. All applications for admission to the Post-Professional OTD program are due October 15th for a spring start and January 15th for a fall start.

For complete information on the application process, visit <http://www.ase.tufts.edu/occupationalTherapy/admissions>

ACCREDITATION AND CERTIFICATION

The Entry Level Occupational Therapy Master's 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, Web: <https://www.aota.org/education-careers/accreditation.aspx>

The Tufts University entry-level occupational therapy doctoral degree (OTD) program has been granted candidacy status by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA). The OTD program is now eligible to proceed to Step 2 of the Initial Accreditation Process (the Initial Review), with the submission of the Self-Study Report due November, 2020. The program would then participate in an Onsite Accreditation Team Visit, with the goal to receive formal accreditation before the first cohort of students graduate from the program.

Graduates of the entry-level master's 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, 12 South Summit Avenue, Suite 100, Gaithersburg, MD 20877-4150, phone 301-990-7979, fax 301-869-8492, or visit www.nbcot.org

After successful completion of this examination, the individual will be certified as an Occupational Therapist, Registered (OT). In addition, all states require licensure to practice. For specific information on individual state licensure procedures, see <https://www.aota.org/Advocacy-Policy/State-Policy/Licensure/StateRegs.aspx>

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. Upon approval, the student can substitute an elective for the required degree credit.

Leaves of Absence

To be granted a leave of absence, students must petition, in writing (<http://students.tufts.edu/student-affairs/what-we-help/your-health-wellness-and-safety/leaves-absence>), their advisor and departmental chair. The request must be accompanied by a letter of support from the student's academic advisor. 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 master's student must complete the six months of 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 performance 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.

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; the student's performance will be reviewed by the department. Withdrawal in any semester from two or more required courses after the add-drop period will usually result in a recommendation to the dean that the student be administratively withdrawn from the program.

In addition, any combination of a single grade of below B- in a required course and a W from a required course constitutes 2 unacceptable grades, will be reviewed by the department and may 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 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 Review Committee for a variance.

Required Occupational Therapy Courses

Students will take professional courses in accordance with the Accreditation Council for Occupational Therapy Education (ACOTE) Standards of an Accredited Educational Program.

Fieldwork

The Accreditation Council for Occupational Therapy Education (ACOTE) and the National Board for Certification in Occupational Therapy (NBCOT) require the completion of all academic program requirements including a minimum of 24 weeks' full time (or equivalent) Level II fieldwork as a prerequisite to taking the certification examination. Tufts requires that Level II fieldwork placements be successfully completed within 24 months following completion of academic preparation. Two Level II fieldwork placements are arranged with students through the department's fieldwork office. In addition to these placements, students participate in approximately 80 hours of course-related Level I experiences concurrent with specific courses arranged by the fieldwork team. Placements for Level I experiences and Level II field work are subject to availability at locations that have contracts with Tufts-Department of Occupational Therapy. The availability of specific sites and locations that offer fieldwork opportunities varies from semester to semester.

Doctoral Capstone Experience: (*EL-OTD Program Only*)

The Tufts University Department of Occupational Therapy doctoral experiential component (DEC) is an integral part of the program's curriculum design, supporting the student's deeper dive into scholarship and application in one of the following areas: clinical practice skills, research skills, administration, leadership, program and policy development, advocacy, education or theory development. The DEC consists of a focused, capstone project collaboratively developed with a faculty and site mentor. The DEC provides students with a meaningful, guided opportunity to focus on specific career goals and objectives. The intent of the DEC experience is for students to develop advanced skills (those beyond a generalist level). The Doctoral Capstone Experience occurs in a 14-week time frame after the student has successfully completed the academic and fieldwork program of the curriculum.

For more detailed information, please visit the website <http://www.ase.tufts.edu/occupationalTherapy>.

Philosophy

Professor Avner Baz, Chair, *Ethics, aesthetics, epistemology, Kant, Wittgenstein, ordinary language*

Visiting Professor Lydia Amir, *Ethics, modern philosophy, philosophy of humor, history of philosophy, philosophy of love*

Professor Jody Azzouni, *Philosophy of language, philosophy of logic, philosophy of mathematics, philosophy of science, metaphysics*

Professor Nancy Bauer, *Dean of Academic Affairs for Arts and Sciences; Feminism, modern European philosophy, philosophy and film*

Visiting Professor Mario De Caro, *Naturalism, ethics, free will, philosophy of mind*

Senior Lecturer David Denby, *Metaphysics, philosophy of language, ethics*

Professor Daniel C. Dennett, *University Professor; Austin B. Fletcher Professor of Philosophy; Director, Center for Cognitive Studies; Philosophy of mind, philosophy of psychology*

Associate Professor Brian Epstein, *Metaphysics, philosophy of language, philosophy of social science*

Associate Professor Patrick Forber, *Philosophy of biology, philosophy of science, philosophy of probability*

Professor Ray Jackendoff, *Seth Merrin Professor of Philosophy Emeritus*

Professor Erin Kelly, *Ethics, political philosophy, philosophy of law*

Lecturer Monica Link Kim, *Ethics, Chinese Philosophy*

Research Professor Peter Levine, *Public policy, civic engagement*

Associate Professor Lionel McPherson, *Ethics, political and social philosophy*

Associate Professor Dilip Ninan, *Philosophy of language, metaphysics, philosophy of mind*

Associate Professor Christiana Olfert, *Ancient philosophy, early modern philosophy, ethics*

Visiting Professor Amelie Rorty, *(history of ethics and moral psychology; ancient philosophy; political theory; literary and art criticism)*

Senior Lecturer Susan Russinoff, *Philosophy of language, logic, philosophy of logic, history of logic, critical thinking pedagogy*

Professor George E. Smith, *Philosophy of science, logic*

Assistant Professor Riccardo Strobino, *Medieval Latin Philosophy; Classical Arabic Philosophy; History and Philosophy of Logic; Aristotle; Avicenna*

Associate Professor Sigrún Svavarsdóttir, *Moral philosophy, practical rationality*

Professor Stephen L. White, *Philosophy of mind, epistemology, meta-ethics, aesthetics*

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 via systematic and historical study of problems that arise in metaphysics, ethics, and epistemology, as well as in the foundations 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 undertaking graduate study in some other areas. Non-majors may engage in a philosophical study of problems and concepts from their own fields by taking related courses in philosophy, such as feminist 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, including:

- Phil 2
- At least one course in logic: Phil 33 or Phil 103 or another 100-level Logic course
- At least one course numbered 100 or above in each of the following areas:
 1. History (ancient through early 20th-century, □ including phenomenology and early analytic philosophy)
 2. Value Theory (including moral philosophy, social and political philosophy, and aesthetics)
 3. Metaphysics and Epistemology (including philosophy of language, philosophy of mind, and philosophy of science)

See the Philosophy Department website for approved courses for each area.

- One 100-level seminar (which can also count for any of the above requirements and which must be drawn from among Phil 187, 188, 191, 192, 197, or, under appropriate circumstances, 195, 291, or 292). Students planning to undertake graduate work in philosophy are urged also to (1) write a senior honors thesis in Philosophy and/or (2) petition to take Phil 297, Graduate Writing Seminar.
- Four elective courses.

Students may count no more than five courses numbered below 100 for the major. At least seven courses constituting a Philosophy major must be offered or cross-listed by the Tufts Philosophy Department.

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 Phil 24, 43, 48, 124, 125)
5. Seminar: Ethics, Law, and Society, Phil 197.

The individual research project is initiated during the Ethics, Law and Society seminar and extends six weeks into the spring semester.

UNDERGRADUATE MINOR PROGRAMS

For more detailed information on minor programs administered by the Philosophy Department, please visit the Department website: <http://as.tufts.edu/philosophy/undergraduate/minor>.

Minor in Philosophy

The minor in Philosophy requires the completion of six courses, including:

- 1 One of Phil 2, 3, 6, 24, 33, 39, 43, or 48
2. Two Philosophy courses at the 100 level
3. Three other Philosophy courses

Minor in Cognitive and Brain Sciences (administered through the Center for Cognitive Studies)

The minor in Cognitive and Brain Sciences requires seven courses. At least five 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 15, Data Structures
3. PSY 195, Senior Seminar in Cognitive and Brain Sciences (full year, one course credit).
4. The remainder of the seven courses are to be selected from at least two of the following groups:

a. Psychology courses

- PSY 11** Developmental Psychology
PSY 25 Physiological Psychology

PSY 26 Animal Learning and Cognition
PSY 27 Perception
PSY 28 Cognitive Psychology
CSHD 51 Intellectual Development of Young Children
PSY 80 Psychology of Music
PSY 103 Brain and Behavior
PSY 118 Topics in Infancy
PSY 122 Cognitive Aging
PSY 126 Origins of Cognition
PSY 129 Cognitive Neuroscience
PSY 140 Mathematical Psychology
PSY 142 Seminar in Affective Neuroscience
PSY 144 Memory and Retention
PSY 145 Mental Representation
PSY 180 Music, Language, and the Brain

b. Philosophy, Linguistics and Psycholinguistics courses

PHIL 3 Language and Mind
PHIL 33 or 103 Logic
PHIL 38 Rational Choice
PHIL 110/PSY 153 Biological Foundations of Language
PHIL 111/PSY 150 Semantics
PHIL 112/PSY 151 Syntactic Theory
PHIL 113/PSY 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 170 Computation Theory
PHIL 191 Foundations of Cognitive Science
PSY 149 Psychology of Language
PSY 152 Psychology of Bilingualism
PSY 155 Phonological Theory
CD 152 Development of Thought and Language
CD 155 The Young Child's Development of Language
CD 177 Bilingual Studies
CD 195 Developmental Disorders in Language and Reading
CD 243 Reading, Dyslexia, and the Brain
ED/ML/GER 114 Linguistic Approaches to Second □ Language Acquisition

c. Computer Science courses

COMP 131 Artificial Intelligence
COMP 135 Machine Learning and Data Mining
COMP 150 BBR Behavior-Based Robotics
COMP 150 MOD Computational Models in Cognitive Science
COMP 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 the DARS coordinator at Student Services.

Minor in Linguistics
(administered through the Center for Cognitive Studies)

The minor in Linguistics has three components. First, it offers students a grounding in contemporary linguistic theory and its constituent domains of phonology (sound structure), morphology (word structure), syntax (grammatical structure), and semantics (the structure of meaning), with attention to a great variety found among languages of the world. Second, the minor addresses the interaction of the study of language with fields as diverse as philosophy, literature, child development, neuroscience, and evolutionary theory. Third, as part of the appreciation of linguistic diversity, the minor requires students to develop proficiency in one or more foreign languages.

Language Requirement: Students may not use the Culture Option to fulfill Part 2 of the Arts and Sciences Foreign Language Requirement; they must either complete six semesters (or equivalent) of one foreign language, or three semesters each (or equivalent) of two foreign languages.

The selection of courses must be approved by the student's linguistics advisor. Students may petition their advisor to include other courses in category 3.

In addition to the language requirement, the minor in Linguistics requires six courses, of which no more than two may also be used toward the student's major.

Affiliated faculty include:

Maryanne Wolf, *Child Development*

Chip Gidney, *Child Development*

Gregory Crane, *Classics*

Anne Mahoney, *Classics*

John Fyler, *English*

Hosea Hirata, *GRALL*

Saskia Stoessel, *GRALL*

John Julian, *Romance Languages*

Professor Ray Jackendoff, *Seth Merrin Professor of Philosophy Emeritus*

Daniel Dennett, *Philosophy*

Ariel Goldberg, *Co-Director; Psychology*

Philip Holcomb, *Psychology*

Gina Kuperberg, *Psychology*

The minor in Linguistics requires six courses, including:

1. **LING 15/PHIL 15/PSY 64** Introduction to Linguistics

2. Two of the following:

LING 112/PHIL 112/PSY 151 Syntactic Theory

LING 113/PHIL 111/PSY 150 Semantics

LING 155/PSY 155 Phonological Theory

3. Three of the following:

A third course from category 2

LING/PHIL 3 Language and Mind

LING/PHIL 33 or 103 Logic

LING 92/ML 96 Romance Linguistics

LING 101/ENG 101 Old English

LING 114/ED/ML/GER 114 Linguistic Approaches to Second Language Acquisition

LING/PHIL 133 Philosophy of Language

LING 137/ANTH 137 Language and Culture

LING/PSY 149 Psychology of Language

LING/PSY 152 Psychology of Bilingualism

LING 153/PHIL 110/PSY 153 Biological Foundations of Language

LING 155/ CD 155 The Young Child's Development of Language

LING 71/CLS 71 Historical Linguistics

LING/CLS 170 Indo-European Linguistics

LING 177/CD 177 Bilingual Studies

LING/CD 195 Developmental Disorders of Language and Reading

LING/CD 243 Reading, Dyslexia and the Brain

LING 80 Psychology of Music

LING 91/191 Special Topics in Linguistics/Advanced Topics in Linguistics

LING 93 Independent Research in Linguistics

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 the subject 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 other departmental events. 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 is designed to be completed over four terms. Requirements are as follows:

Program Requirements

Summary

The Master's in Philosophy requires completing twelve courses. Coursework must satisfy a breadth requirement. Two courses, one of which must be a designated basic course, are required from each of three (3) distribution areas.

Coursework

The coursework consists of twelve (12) upper-level philosophy courses (courses numbered 100 or above). We do not accept transfer courses.

The twelve (12) courses must include:

- Phil 103 Logic
Students with proven strength in logic may be able to be exempt from the logic requirement.
- Phil 297 Graduate Writing Seminar
This course is designed to help students prepare a writing sample in order to apply to doctoral programs.

Coursework must satisfy a breadth requirement. Two courses are required in each of these three (3) areas:

1. Normative philosophy
2. History of philosophy
3. Metaphysics and epistemology

All upper-level philosophy courses, except the graduate writing seminar, fall into at least one of three distribution areas. See the Course Distribution list found on the Department of Philosophy website (<http://as.tufts.edu/philosophy/sites/all/themes/asbase/assets/documents/gradMAcourseDistributionList.pdf>) for allocation.

Students are not required to concentrate their coursework in a particular area. Nonetheless, students may well focus more on some areas but not others in the courses they take. While deciding which courses to take, students should be aware that some are offered regularly and some are not.

Physical Education/Athletics

John Morris, *Director of Athletics*

Alexis Mastronardi, *Senior Associate Athletic Director*

Matt Callahan, *Assistant Director of Recreation & Club Sports, Physical Education Coordinator*

John Casey, *Associate Athletic Director; Baseball*

Matt McMasters, *Athletics Business Operations Manager*

Paul Sweeney, *Director of Athletic Communications*

Matt Malone, *Assistant Athletic Director /Facilities and Events Operations*

Dan Kopcso, *Director of Sports Performance*

TBD, *Director of Sports Medicine*

COACH/LECTURERS:

Kate Bayard, *Women's tennis*

Carla Berube, *Women's basketball*

Brian Dawe, *Women's crew*

David Sach, *Women's Fencing*

John Casey, *Baseball*

Jay Civetti, *Football*

Casey D'Annolfo, *Men's lacrosse*,

Lauren Ebstein, *Assistant Director Athletic Communications, Associate Head Softball Coach*

Kevin Farr, *Assistant Football*

Frank Hauser, *Assistant Football*

Adam Hoyt, *Men and Women's swimming*

Karl Gregor, *Men's tennis*

Ken Legler, *Sailing*

Christina McDavitt Mattera, *Field hockey*

Joe Raho, *Men's and Women's squash*

Cheryl Milligan-Pinzino, *Softball*

Kristen Morwick, *Women's cross country and track and field*

Patrick Norton, *Ice Hockey*

Alex O'Keefe, *Assistant Strength and Conditioning*

George Pendergast, *Golf*

Joshua Shapiro, *Men's soccer*

Robert Sheldon, *Men's basketball*

Courtney Farrell Shute, *Women's lacrosse*

Cora Thompson, *Women's volleyball*

Noel Wanner, *Director of Rowing; Men's Crew*

Martha Whiting, *Women's soccer*

Marten Vandervelde, *TP3 Fitness Program Manager/Assistant Strength and Conditioning*

Joel Williams, *Men's cross country and track and field*

TRAINERS:

Michael Buonopane, *Sports medicine*

Ryan Burchill, *Sports medicine*

Patricia Cordeiro, *Sports medicine*

Brett Hayes, *Sports medicine*

Danielle Monteiro, *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, aerobics, physical fitness, and outdoor education are some examples of the diverse offerings of the department. Approximately 50 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.

Two Semester-hour units are granted for Physical Education courses that are skill-oriented. Introductory level courses are offered on a pass-fail basis. 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 to engage in general recreational activities. Tufts fields a total of thirty varsity teams for men and women, supports twenty-five club sports organizations, and offers several intramural sports programs.

For more detailed information, please visit the Physical Education website:

https://tufts.prestosports.com/information/PE_Classes/PE_Index

For more detailed information about athletics programs, please visit the Athletics website

<http://gotuftsjumbos.com/>.

Physics and Astronomy

Professor Hugh Gallagher, *Chair; Experimental high-energy physics*

Professor Peggy Cebel, *Experimental condensed matter polymer physics*

Professor Lawrence H. Ford, *Cosmology, general relativity, astrophysics*

Professor Gary R. Goldstein, *Theoretical high-energy physics*

Professor W. Anthony Mann, *Experimental high-energy physics*

Professor Austin Napier, *Experimental high-energy physics*

Professor Krzysztof Siwa, *Experimental high-energy physics*

Professor Roger G. Tobin, *Experimental condensed matter physics, physics education*

Professor Alexander Vilenkin, *L. and J. Bernstein Chair in Evolutionary Science; Cosmology, general relativity, astrophysics*

Associate Professor Timothy Atherton, *Theoretical condensed matter physics*

Associate Professor Pierre-Hugues Beauchemin, *Experimental high-energy physics*

Associate Professor Peter Love, *Quantum computing*

Associate Professor Danilo Marchesini, *Astronomy/astrophysics*

Associate Professor Anna Sajina, *Astronomy/astrophysics*

Associate Professor Cristian Staii, *Experimental condensed matter physics, biological physics*

Assistant Professor Mark Hertzberg, *Cosmology, general relativity*

Assistant Professor Taritree Wongjirad, *Experimental high energy physics*

Research Professor Kenneth Olum, *General relativity and cosmology, quantum field theory*

SECONDARY APPOINTMENTS:

Professor Bruce Boghosian, *Mathematics; quantum computing, fluid dynamics*

Professor David Hammer, *Education; science education*

Professor Fiorenzo Omenetto, *Biomedical engineering; optical physics*

Professor Igor Sokolov, *Mechanical engineering, nanomechanics, nanophotonics*

Associate Professor Thomas Vandervelde, *Electrical and computer engineering, semiconductors, optoelectronics*

Assistant Professor Jeffrey Guasto, *Mechanical Engineering*

Senior Lecturer Robert F. Willson, *Tufts University School of Medicine; 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, computer science, law, medicine, dentistry, meteorology, public health, and teaching.

UNDERGRADUATE CONCENTRATION REQUIREMENTS—COLLEGE OF LIBERAL ARTS

Minimum Grade Policy

A minimum GPA of 2.0 in the courses applied to a major, and no more than one course with a grade less than C-. This policy applies to all majors offered by the department for students entering September 2013 or later. A course used to fulfill the concentration requirement must be at least 3 credits (semester-hour units).

Major in Physics

Eight courses in physics more advanced than Physics 12 and including Physics 13 and 64; two courses in mathematics more advanced than Mathematics 42 and 44. 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 12, including Physics 13 and 64; two courses in mathematics more advanced than Mathematics 42 and 44; 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

Major in Chemical Physics Foundation: Chemistry 1, 11, or 16; Chemistry 2 or 12; Physics 1 or 11; Physics 2 or 12. Concentration: Ten or more advanced courses (at least 3 SHU's each), four courses in Chemistry (with a prerequisite of Chemistry 2 or 12), four courses in Physics (with a prerequisite of Phys 2 or 12), and two courses in Mathematics (Math 70 or courses with a prerequisite of Math 42, 44, or 70). The courses must include the following: Physics 13; one course in advanced laboratory training, either Physics 64 (counts as one advanced physics course) or both Chemistry 33 and 34 (count as one advanced chemistry course); either Chemistry 31 or Physics 52; either Chemistry 32 or Physics 61; and either Chemistry 51 or Chemistry 61. Faculty advisors 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 12, including Physics 13 and either Physics 31 or 64; two courses in mathematics more advanced than Mathematics 42 and 44; 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, and 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 courses is required: introductory (10 courses), humanities/arts/social science (6 courses), free elective (2 courses), foundation (8 courses), and a physics/engineering concentration requirement (12 courses). A course used to fulfill the concentration requirement must be at least 3 credits (semester-hour units).

The introductory requirement includes Physics 11 and 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.

The concentration requirement comprises 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; and four approved elective courses in computer science, engineering, mathematics, or science.

UNDERGRADUATE MINOR PROGRAM

The program requires the completion of five courses, with a minimum grade of C-. Prematriculation credits may not be applied towards the requirements for the minor. Minimum grade policy applies to students entering September 2013 or later. A course used to fulfill the concentration requirement must be at least 3 credits (semester-hour units).

Physics Minor

Five courses in physics, which must include Physics 13. The other courses may be selected from among Physics 11, 12 (or 1, 2), and courses in physics numbered 15 or higher.

Astrophysics Minor

Five courses, at least three of which must be courses in astronomy numbered 15 or higher. The remaining courses may be selected from among Physics 11, 12 (or 1, 2), 13, and courses in physics or astronomy numbered 15 or higher.

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 30 semester-hour units 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 nine semester-hour units.

Master of Science, Astrophysics Track

The curriculum requirements consist of seven core courses and one elective course (which must be at least 3 semester-hour units). A minimum of 30 semester-hour units are required. Any exceptions or substitutions must be approved by the student's advisory committee.

The core program consists of seven physics and astronomy courses: Physics 131, 145, 153, and 163; Astronomy 121 and 122; and Physics 146 or 164 or a course in radiative processes in astrophysics which could be taken at another institution. The additional graduate-level elective must be approved by the student's advisory committee.

Master of Science, Physics Education Track

A minimum of ten courses and 30 semester-hour units are required. Any exceptions or substitutions must be approved by the student's advisory committee.

The core program consists of eight courses, four in Physics and Astronomy (Physics 131, 145, 153, and 163) and four in education (Education 111, Education 130, one foundations course, and two semesters of proseminar). Additionally, two elective courses from physics and/or astronomy, each at least 3 semester-hour units, must be selected in consultation with the student's advisory committee.

Successful completion of the course requirements shall satisfy the requirements for a Master of Science degree.

Doctor of Philosophy

The doctoral candidate must demonstrate proficiency in four core fields: classical mechanics, classical electromagnetism, statistical mechanics, and quantum mechanics, either by achieving satisfactory grades in the relevant courses (A- or better in Physics 131 and 153; A- or better average in the sequences Physics 145/146 and Physics 163/164) or through special examinations in those fields. However, a student whose average grade in classical mechanics (131) and classical electromagnetism (145, 146) is at least A- (3.67) will be exempt from the examinations in both subjects. Similarly, a student whose average grade in statistical mechanics (153) and quantum mechanics (163 and 164) is at least A- (3.67) will be exempt from the examinations in both of those subjects. Graduate courses taken at other institutions may in some cases be used to fulfill part of this requirement.

The doctoral candidate must also complete courses in any two of five specialized fields: astronomy/astrophysics (121 or 122), condensed matter physics (173 or 174), particle physics (183 or 184), general relativity and cosmology (167 or 268), and advanced quantum mechanics (263).

By the end of the second year, the candidate must choose a field of specialization and obtain a research advisor. The current research areas in the department are astronomy and astrophysics, biophysics, condensed matter physics, cosmology, general relativity, particle physics, and physics education.

By the end of the third year, the candidate must have completed the basic proficiency requirement and taken an oral examination in the chosen specialized field. Satisfactory performance on the oral examination qualifies the candidate to undertake a program of independent research under the guidance of the research advisor, culminating in the preparation and defense of a doctoral dissertation.

Doctor of Philosophy, Astrophysics Track

Students who wish to pursue the doctorate must complete the course requirements for the Master of Science in the Astrophysics track and fulfill additional requirements.

The doctoral candidate must demonstrate proficiency in five core fields: classical mechanics, classical electromagnetism, statistical mechanics, quantum mechanics, and astronomy, either by achieving satisfactory grades in the relevant courses (A- or better in Physics 131, 145, 153, 163; A- or better average in the sequence Astronomy 121/122) or through special examinations in those fields. However, a student whose average grade in classical mechanics (131) and classical electromagnetism (145) is at least A- (3.67) will be exempt from the examinations in both subjects. Similarly, a student whose average grade in statistical mechanics (153) and quantum mechanics (163) is at least A- (3.67) will be exempt from the examinations in both those subjects. Graduate courses taken at other institutions may in some cases be used to fulfill part of this requirement.

By the end of the third year, the candidate must have completed the basic proficiency requirement and taken an oral examination in astrophysics. Satisfactory performance on the oral examination qualifies the candidate to undertake a program of independent research under the guidance of the research advisor, culminating in the preparation and defense of a doctoral dissertation.

Doctor of Philosophy, Chemical Physics Track

The curriculum requirements for the Chemical Physics track meld those of Chemistry with those of Physics. The curriculum has more emphasis on chemical synthesis than the core program in Physics and more electricity and magnetism than the core program in Chemistry. These greater core requirements are balanced with a greater flexibility in the elective courses.

The core program consists of seven graduate-level classroom courses, at least three of which must be Chemistry courses (Chem 133, 136, or 131 and at least one of 150, 151, 152, 161 and 162) and three must be Physics courses (163, 164, or 153). These are to be completed by the fourth semester in residence. Additionally, two elective courses must be chosen from Chemistry 132, 151, or 162 or Physics 131, 146, 173 or 174. Other appropriate courses may be substituted with the approval of the student's advisory committee.

Two oral presentations are required: a public seminar by the end of the fourth semester and a presentation to the student's research committee in the fifth semester. The seminar is based on current literature, can be presented in either department, and is evaluated by the research committee. The topic for the presentation to the committee is chosen by the student in consultation with the research committee. This presentation may be waived for students having at least a 3.3 average in the core courses. In addition, the student must prepare a written, original research proposal by the end of the eighth semester. This proposal shall be somewhat distinct from the thesis work and defended orally before the advisory committee.

Doctor of Philosophy, Physics Education Track

The curriculum requirements for the Physics Education track meld those of Education with those of Physics and Astronomy. The student's faculty advisory committee will consist of at least one

member from the Education department and one from the Physics and Astronomy department in addition to the research advisor.

Students who wish to pursue the doctorate must complete the course requirements for the Master of Science in the Physics Education track and fulfill additional requirements.

The doctoral candidate must demonstrate proficiency in four core fields of physics: classical mechanics, classical electromagnetism, statistical mechanics, and quantum mechanics, either by achieving grades of A- or better in the core physics courses or through special examinations in those fields. However, a student whose average grade in classical mechanics (131) and classical electromagnetism (145) is at least A- (3.67) will be exempt from the examinations in both subjects. Similarly, a student whose average grade in statistical mechanics (153) and quantum mechanics (163) is at least A- (3.67) will be exempt from the examinations in both of those subjects.

Following completion of the core courses, the doctoral student shall complete:

- An oral qualifying examination in physics, similar to that required of other physics doctoral students. This should ordinarily be completed in the third year.
- A written dissertation proposal, also presented orally to the advisory committee. This should ordinarily be completed in the fourth year.

For more detailed information, please visit the website <http://as.tufts.edu/physics>.

Political Science

Professor Deborah J. Schildkraut, Chair, *American politics, political psychology, racial and ethnic politics*

Professor David Art, *Comparative politics, political economy, Europe*

Professor Jeffrey M. Berry, *John Richard Skuse, Class of 1941, Professor of Political Science; American politics, political behavior*

Professor Robert Devigne, *Political theory*

Professor Ioannis Evrigenis, *Political theory*

Professor James M. Glaser, *Dean of Academic Affairs for the Arts and Sciences; American politics, political behavior*

Professor Peter Levine, *Lincoln Filene Professor of Citizenship & Public Affairs, Civic Studies, political theory*

Professor Malik Mufti, *International relations, comparative politics, Middle East*

Professor Brian Schaffner, *Newhouse Professor of Civic Studies; American politics, political behavior*

Professor Vickie Sullivan, *Cornelia M. Jackson Chair; Political theory*

Associate Professor Michael Beckley, *International relations*

Associate Professor Consuelo Cruz, *Comparative politics, Latin America*

Associate Professor Richard C. Eichenberg, *International relations, foreign policy, political behavior*

Associate Professor Kelly M. Greenhill, *International relations, security studies*

Associate Professor Eitan Hersh, *American politics, political behavior, elections*

Associate Professor Nimah Mazaheri, *Comparative politics and political economy*

Associate Professor Elizabeth Remick, *Comparative politics, East Asia*

Associate Professor Pearl T. Robinson, *Comparative politics, Africa, African-American politics*

Associate Professor Oxana Shevel, *Comparative politics, post-Communist region*

Associate Professor Jeffrey W. Taliaferro, *International relations, security studies*

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 graduate 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

The major requires ten courses overall: two political science foundation courses and eight additional political science courses. Students are required to take at least one course in each of four subfields: American politics and government (or American public policy), comparative politics and government, international relations, and political theory and philosophy. 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 have met this requirement in the past are:

PS 15 Sophomore Seminar: Politics in the City

PS 103 Political Science Research Methods

PS 104 Seminar: New Media, New Politics

PS 107 Political Participation and Mass Behavior

PS 108 Public Opinion and U.S. Democracy

PS 111 Political Psychology

PS 117 Politics in the American South

PS 124 Seminar: Comparative Political Economy of Advanced Industrial Democracies

PS 130 Seminar: African Political Economy

PS 135 Comparative Revolutions

PS 160 Force, Strategy and Arms Control

PS 166 Seminar: The Causes of Modern War

PS 181 Public Opinion and Foreign Policy

PS 198, 199 Senior Thesis

Each year, other courses may 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 required to take eight of the ten political science courses in the Tufts University Department of Political Science. All of the other requirements of the major—the two foundation courses, the course in each of the four major subfields, the methodologically focused course, and the advanced seminar—must also be fulfilled in the Tufts University Department of Political Science.

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 requirements, programs, and additional information about the major on the department's website at <http://as.tufts.edu/politicalscience/undergraduate/major>. New majors should familiarize themselves with this material.

UNDERGRADUATE MINOR PROGRAM

Students interested in completing a minor concentration in political science may choose from six different options: Political Science (general), American Politics, Comparative Politics, Foreign Policy Analysis, Political Economy, 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 found on the website at <http://as.tufts.edu/politicalscience/undergraduate/minor>.

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 or foreign policy as their field of concentration. Students are registered at Tufts and are billed all the costs of the program. This includes Tufts tuition, room, board, fees and medical insurance, if not waived by the student. Students are housed at American University in Washington, D.C., but all costs are billed by and payable to Tufts by the billing due date.

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 Tufts' Medford/Somerville campus. Interested students can find more information here: <http://as.tufts.edu/politicalscience/undergraduate/tuftsInWashington>.

Psychology

Professor Samuel R. Sommers, *Chair; Social perception and judgment*

Professor Richard A. Chechile, *Mathematical psychology, memory*

Professor Robert G. Cook, *Dean of Graduate School of Arts and Sciences; Animal cognition and learning*

Professor Gina R. Kuperberg, *Cognitive neuroscience, language (semantics), neuropsychiatry*

Professor Klaus A. Miczek, *Moses Hunt Professor of Psychology; Psychopharmacology*

Professor Aniruddh Patel, *Music cognition*

Professor J.P. de Ruiter, *Cognition and psycholinguistics*

Professor Lisa M. Shin, *Director of Undergraduate Program; Clinical neuroscience*

Professor Holly A. Taylor, *Spatial cognition, language, memory*

Professor Ayanna K. Thomas, *Director of Graduate Program; Memory and aging*

Professor Heather L. Urry, *Affective neuroscience*

Associate Professor Ariel M. Goldberg, *Linguistics and psychology of language*

Associate Professor Keith B. Maddox, *Social cognition*

Associate Professor Jessica D. Remedios, *Social cognition*

Assistant Professor Paul Muentener, *Cognitive development*

Assistant Professor Elizabeth Race, *Cognitive neuroscience*

Assistant Professor Nathan Ward, *Applied cognition*

Lecturer Alexander H. Queen, *Clinical psychology*

Research Assistant Professor Herbert E. Covington, III, *Psychopharmacology*

Research Assistant Professor Laura E. de Ruiter, *Psycholinguistics*

Visiting Associate Professor Tad T. Brunyé, *Applied cognition*

Visiting Scientist Raymond S. Nickerson, *Cognition and human factors*

SECONDARY APPOINTMENTS:

Professor Linda Tickle-Degnen, *Occupational Therapy; Social functioning and wellness*

Professor Matthias Scheutz, *Computer Science; Artificial intelligence, robotics, cognitive science*

Psychology concerns processes and principles of behavior. Increased understanding of oneself and others through the study of psychology is useful in almost any endeavor. The 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 psychological science, 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

Because Psychology courses span all five distribution areas, students should check SIS (and for special topics courses, the department's website) for the most up-to-date information regarding distribution area. Most departmental courses count toward either the social sciences or natural sciences distributions.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The Psychology Department offers undergraduate majors in Psychology, Biopsychology, Clinical Psychology, Cognitive and Brain Sciences, and Engineering Psychology. Psychology, Biopsychology, Clinical Psychology, Cognitive and Brain Sciences, and Engineering Psychology majors may not double major in any of the other majors offered by the Psychology Department. Additional details regarding major requirements and policies can be found on-line in the department's Undergraduate Handbook. The Psychology Department does not have a minimum grade criterion for counting a course toward any of its five majors; a passing grade is required. Unless stated otherwise, in the language that follows, all requirements and all references to "course" refer to a course of 3 semester-hour credits or more (e.g., 3 semester-hour credits of Psychology 1 are required; 2 related fields courses of at least 3 semester-hour credits each are required).

Major in Psychology

This major is intended for students interested in exploring a variety of topics in psychology. Eleven courses distributed as follows:

Psychology 1; 1 course from among Psychology 11, 12, 13, 14, 15, and 17; 1 course from among Psychology 22, 25, 26, 27, 28, and 29; Psychology 31; Psychology 32; 2 Psychology courses numbered above 100; 2 other departmental courses (i.e., any other Tufts courses with a Psychology listing); and 2 approved courses in related fields.

Courses taken to fulfill the Psychology major (including related-field requirements) normally may not be taken pass-fail (Psychology 99 is an exception). No more than 2 independent study courses (Psychology 91, 92, 97, 99, 191, 192, 199; note that 181 and 182 are not independent study) may be counted toward the concentration requirements. No more than 1 course taken to fulfill the 100-level requirement may be an independent study course (i.e., an honors thesis student may use 1 semester of Psychology 199 as an elective and 1 semester as a 100-level course, but these would be the only 2 independent study courses allowed to count toward major requirements).

Students scoring 4 or 5 on the Psychology AP exam, 6 or 7 on the International Baccalaureate (Higher Level) exam, or A or B on the GCE A-level exam earn credit for Psychology 1. Students may substitute Child Study and Human Development 1 for Psychology 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 must be completed at Tufts. Double majors in Psychology and Mathematics can use Math 162 as a substitute for Psychology 31. Students who are double majoring in Psychology and Economics can use Econ 13 as a substitute for Psychology 31. Students double majoring in Biology or Community Health and one of the Psychology majors may use Bio 132 or Community Health/CEE 6 to fulfill their statistics requirement. These students should bear in mind that their stats course may not have covered analysis of variance (ANOVA), a technique with which they will need to familiarize themselves before taking Psychology 32.

In recommending students for Latin honors, in addition to the general college requirements, Psychology does not normally recommend students for *summa cum laude* unless they have done independent empirical research supervised by a faculty member in the department. Students graduating with a major in Psychology may choose either a B.A. or B.S.

Major in Biopsychology

This interdepartmental major, for students particularly interested in neurobiology and behavior, requires 5 courses in Biology and 5 in Psychology. These include the following: Cells and Organisms (Biology 13), General Genetics (Biology 41), Animal Behavior (Biology 130), 1 course in animal physiology (chosen from among Biology 75, 110, 115, 116, 117, and 134) and an elective in Biology; Statistics (Psychology 31 or Biology 132 or Community Health/CEE 6), Experimental Psychology (Psychology 32), Brain and Behavior (Psychology 103), plus 2 electives approved by the Psychology Department (see Psychology website for list of current electives). Students can earn Tufts credit for PSY 25 or for PSY 103, but not for both courses. Students who took PSY 25 before declaring a Biopsychology major should speak with their advisor about substituting an additional Psychology elective from the approved list for the PSY 103 requirement.

Biopsychology majors may not double major in Psychology or Biology. Independent research is strongly encouraged, but is not required. Students majoring in Biopsychology can select a major advisor from either the Psychology or Biology departments. Students graduating with a major in Biopsychology earn a B.S.

Major in Clinical Psychology

This major is intended for students interested in entering graduate or professional schools in mental health or human services and/or working with psychiatric patients. Required courses are Psychology 1, 12, 31, 32 (or 38), 71, 106, 181, and 182; 2 other courses in Psychology, 1 of which must be numbered above 100; and 2 approved courses in related fields. See listing for Psychology major above for details regarding AP, IB, and GCE A-level test equivalency as well as potential substitutions for Psychology 31. Students graduating with a major in Clinical Psychology who have taken Psychology 32 may choose either a B.A. or B.S. (Students completing the old major requirements and not taking PSY 32 earn a B.A.).

Major in Cognitive and Brain Sciences

This interdisciplinary major draws on psychology, neuroscience, linguistics, philosophy of the mind, and computer science. 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 fields. Students may choose to be broadly interdisciplinary, or they may choose primarily to "track" within a single discipline such as psychology, philosophy, linguistics, or computer science.

This major consists of 14 courses, including the following 8 requirements: Intro to Psychology (Psychology 1), Intro to Cognitive and Brain Sciences (Psychology 9), Statistics (Psychology 31), Experimental Psychology (Psychology 32), Intro to Linguistics (Philosophy 15/Psychology 64), Intro to Computer Science (Computer Science 11), Data Structures (Computer Science 15), a two-semester sequence of Psychology 195 as a senior. See listing for Psychology major above for details regarding AP, IB, and GCE A-level test equivalency as well as potential substitutions for Psychology 31.

Three intermediate courses are required, one from each of the following groups: Group A: Psychology 11, 25, 26, 27, 28, 29, 103, CSHD 51; Group B: Computer Science 131, 150CMCS, 150DR, 150HRI, 150NLP, 171; Group C: Philosophy 3, 33 or 103, 191-02 (Foundations of Cognitive Science), Psychology 150, 151, 155.

Three advanced courses are required, drawn from at least 2 of the following groups (only 1 of which may be independent study/directed research): Group 1: Psychology 80, 91, 92, 103, 112, 117, 118, 121, 122, 123, 124, 126, 127, 129, 131, 139, 140, 142, 144, 145, 146, 147, 148, 154, 191, 192, 199; Group 2: Psychology 149, 150, 151, 152, 153, 155, 180; CSHD 114, 145, 152, 155, 156, 177, 195, 250; Education 114; Group 3: Computer Science 86, 93, 105, 131, 135, 150CMCS, 150DR, 150HRI, 150NLP, 170, 171, 177, 193; Group 4: Philosophy 38, 114, 117, 126, 130, 132, 133, 134, 170, 191-02 (Foundations of Cognitive Science). Note that for all four groups, courses may only be used if not already counted as intermediate courses as described above.

Cognitive and Brain Sciences majors are encouraged but not required to complete a senior research project which entails either (a) completing an honors thesis in Psychology, CSHD, Computer Science, or Philosophy; (b) completing a research experience with a faculty member in one of these departments or with a faculty member in the Neuroscience Department of the Medical School; or (c) completing a faculty-supervised review paper of the literature on a particular issue within one of these areas. Planning for such projects should begin by the end of junior year.

In addition, students are encouraged, after consultation with their advisor, to augment the Cognitive and Brain Sciences major by taking electives from Psychology (especially 37, 40, 41, 46, 48, 49, 107, 108), Anthropology (150), Biology (13, 14, 116, 134), and Math (11, 12, 13, 121). Students graduating with a major in Cognitive and Brain Sciences earn a B.S.

Major in Engineering Psychology

This interdisciplinary program, commonly called human factors engineering, 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. The Master's degree is one achieved in progress towards the Doctoral degree, and is not a separate terminal degree. 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 6 semester-hour credits of experimental psychology or comparable research experience. Students having a Master's degree in psychology may apply for the doctoral program directly if their Master's degree included an empirical thesis.

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 affective science; cognitive psychology; applied cognitive psychology; cognitive development; experimental psychopathology; neuroscience; physiological psychology and psychopharmacology; and social psychology. Considerable emphasis is placed on the student's ability to undertake research. These skills are demonstrated in connection with course work, independent research, and the thesis and/or dissertation. All graduate students are expected to participate in supervised research each semester, as well as periodic teaching activities.

General Program Requirements

The program is based around five major annual milestones:

Year 1: First-Year Project

Year 2: Master's Thesis

Year 3: Conceptual Review

Year 4: Conceptual Presentation

Year 5: Dissertation

There is no formal language requirement for either the master of science degree or the doctor of philosophy degree.

Master of Science

The requirements for the Master's degree include 30 semester-hour credits. More detail about course requirements can be found on-line in the department's Graduate Handbook. Non-Psychology courses need prior approval from the Graduate Committee. Required courses are Psychology 201, 202, 207, 208, 298, 290, 295, and 296. In addition, students must take one core course (options are Psychology 231, 232, 233, 234, 235) and two additional 200-level Psychology or other Tufts graduate courses.

Students must demonstrate expertise in statistics and experimental design. This can be done by either receiving a grade of A- or

better in Psychology 208 (Advanced Statistics II) or taking a written qualifying exam. Statistical expertise must be verified before being admitted to the Ph.D. portion of the program.

The Master's thesis is to be completed by the end of the second year. A written proposal outlining this thesis should be submitted and orally defended at a minimum of six months prior to the defense date. 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.

Doctor of Philosophy

The requirements for the Doctor of Philosophy degree include 39 semester-hour credits beyond those required for the Master's degree. More detail about course requirements can be found on-line in the department's Graduate Handbook. Required courses are: one core course (Psychology 231, 232, 233, 234, 235); one career preparation course (Psychology 260, 261, 262); one 200-level Psychology course; one 100 or 200 level course from Psychology or another department; and Psychology 291, 292, 293, 294, 297, 298, 299.

A written proposal outlining the dissertation should be submitted and orally defended at minimum of six months prior to the defense date. The dissertation 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.

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

Department of Studies in Race, Colonialism, and Diaspora (RCD)

Chair: Associate Professor Kris Manjapra

The Department of Studies in Race, Colonialism, and Diaspora (RCD) home of six curricular tracks:

- Africana Studies
- American Studies
- Asian American Studies
- Latino Studies
- Native American and Indigenous Studies
- Colonialism Studies

The department engages the critical, comparative, and interdisciplinary analysis of societies and cultures in the United States and around the world. The RCD Department offers rigorous, scholarly curricula for the study of race, colonialism, transnational migration, and struggles for social justice and cultural sovereignty, with attention to class and other kinds of social difference and hierarchy. By foregrounding, the relationship between historical, social, political, cultural, and ethical inquiry, the department furnishes students with the necessary tools to interrogate contemporary and historical social inequalities. Moreover, beyond the classroom, this approach prepares students to negotiate their place as leaders in continually changing local and global communities.

The RCD's six tracks are interlocking in nature, combining topics and methods drawn from the humanities and social sciences and foregrounding analytical, thematic, theoretical, and political affiliations. Students develop depth in their particular major (Africana Studies or American Studies) or minor course (Africana Studies, Asian American Studies, Latino Studies, Colonialism Studies, or Native American and Indigenous Studies), while gaining a comparative understanding of the vast inter-regional constellation of studies in race, colonialism, and diaspora. Our curricula enable students to connect studies of race, ethnicity, colonialism, empire, and migration in the United States to studies of colonial processes around the world. RCD studies are guided by the fundamental intellectual mandate of social justice, providing a curricular home for engaged scholarship addressing the most urgent, historically-rooted, social questions of our time.

NOTE: Students should check the RCD website (<http://as.tufts.edu/rcd>) for more information and the respective major or minor track websites for requirements of each track and a list of courses that meet the requirements and/or meet with the director of the track that interests them.

Students interested in more information about the RCD and its tracks may contact Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu.

Students interested in learning more about RCD studies should contact Director of Studies, Professor Kendra Field, Kendra.Field@tufts.edu

Students interested in the major or minor Africana Studies should contact Africana Studies Track Director, Professor H. Adlai Murdoch, H.Murdoch@tufts.edu.

Students interested in the American Studies major should contact Interim American Studies Track Director, Professor Kerri Greenidge, Kerri.Greenidge@tufts.edu.

Students interested in the Asian American Studies minor should contact Director of Studies, Professor Kendra Field, Kendra.Field@tufts.edu

Students interested in the Colonialism Studies minor should contact Colonialism Studies Track Director, Professor Amahl Bishara, Amahl.Bishara@tufts.edu.

Students interested in the Latino Studies minor should contact Latino Studies Track Director, Professor Adriana Zavala, Adriana.Zavala@tufts.edu.

Students interested in the Native American and Indigenous Studies minor should contact NAIS Track Director, Professor Amahl Bishara, Amahl.Bishara@tufts.edu.

Africana Studies

The Africana Studies track is part of the Department of Studies in Race, Colonialism, and Diaspora.

TRACK DIRECTOR:

Professor H. Adlai Murdoch, *Romance Languages and Department of Studies in Race, Colonialism, and Diaspora*

Collaborating Faculty

For an updated list, please see: <http://ase.tufts.edu/africanaStudies/faculty/>

Africana Studies Major

Africana Studies is an interdisciplinary field that focuses on the people of the African continent and people of African descent in the global African Diaspora. The Africana Studies major exposes students to the historical, political, social, economic, and cultural systems and institutions that frame the lived conditions and experiences of Africana peoples in the countries of the African continent and in its diasporic populations. In addition, Africana Studies critically interrogates the various socio-historical contexts in which racialized western epistemologies developed, while examining such neglected areas of study as the important contributions to human labor, political and cultural expression, social development, and science and industry made by people of African descent in the modern era. Africana Studies offers an interdisciplinary approach to the philosophical foundations of knowledge production and highlights the complex interaction between resistance, identity and culture in providing an enabling context for a range of identitarian expressions by Africans and peoples of African descent. It also provides a critical approach to selected historical, social and cultural processes that are essential to an enhanced understanding of contemporary globalization.

Africana Studies as it is structured today grew out of the curricular transformation generated by the international process of decolonization and by the changes wrought by the civil rights and Black Power eras that called for social, political, and economic justice in the United States and abroad and demanded a more diverse and inclusive educational agenda. As also is true for the related fields of Asian American Studies and Latino Studies, the field has grown and expanded since its origins more than four decades ago. Africana Studies in the contemporary era incorporates varied disciplinary and interdisciplinary approaches, but retains its distinctive focus on social justice. The field also highlights key moments of black resistance and revolution as well as 19th and early- and mid-20th century intellectual movements focusing on various political, linguistic, and cultural factors undergirding the experiences of peoples of Africa and its global diaspora.

The goal of an in-depth study of Africa and the African Diaspora is the development of critical thinking, research, and writing skills that emerge from an increased awareness of the political, social, cultural, and historical roles played by peoples of African descent as well as the socio-political and economic challenges that continue to be faced by that global community. The primary goal of the track is to give students a broader and more contextualized understanding of the scope and substance of the black experience in a variety of related areas. Graduates of Africana Studies tracks go on to careers in academia, government, education and public service. The intellectual skills acquired in this discipline are also an excellent preparation for careers in public health, public policy and urban planning, journalism, law and criminal justice, business, and the international sector.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

The BA in Africana Studies requires the completion of ten courses. Course content must be drawn from the interrelated fields of African studies, African Diaspora studies, African American studies, and courses focused on comparative studies or topics relevant to Africana studies, and selected from the following categories: one course each from Category 1 (Foundations) and Category 2 (Methodology and Concentration), with the remaining eight courses being electives.

Two Core Courses (one from each category):

Category I (Foundations): One Introductory course, drawn from the following circulating courses: Introduction to Africana Studies; WEB DuBois and the Foundations of Africana; A World View of Race; Black World Literature, African-American History to 1865.

Category II (Methodology and Concentration): a course drawn from the following courses: Race and US Africa Policy; African Politics; Critical Race Theory; African History; History of African-American Music.

Eight Elective Courses:

Category III (Distribution/Electives): at least five of these courses should come from the student's main area of concentration (drawn from the designated areas Africa, African American, and Other Diasporas). The other three should be selected from the other two areas, at least one from each.

Africana Studies majors are encouraged to fulfill their foreign language requirement in a language of Africa or the African Diaspora, e.g., Twi, Swahili, or Arabic, or one that will assist work in areas of Africa or the Diaspora, e.g., French, Portuguese.

Majors in Africana Studies may take up to five courses that are also counted towards another major. Up to four courses may be transferred from other institutions (e.g. non-Tufts programs abroad). At least three courses of the major must be at the 100 level. Up to two courses of independent study (including senior honors thesis) may be counted towards the major. Courses with grades lower than C- will not be accepted towards the major. The foregoing is a minimal track. For many purposes further preparation involving additional language and additional 100-level courses is needed.

Africana Studies Minor

The Africana Studies Minor requires six disciplinary and interdisciplinary courses drawn from African studies, African Diaspora studies, African American studies, and comparative studies or topics relevant to Africana studies. Of these six courses, two are core courses and four are electives.

1. Two core courses as outlined for the major.
2. Four elective courses drawn from any two of the elective options for the major.

Students are encouraged to declare their interest in an Africana Studies minor not later than the beginning of their senior year. One elective may be an independent study course (including senior honors thesis); three courses may be counted towards a major; normally up to two courses may be transferred from other institutions. At least one course of the minor must be at the 100 level. Courses with grades lower than C- will not be accepted towards the minor.

Students interested in pursuing an Africana Studies Major or Minor should contact Professor Adlai Murdoch, Track Director, H.Murdoch@tufts.edu; or Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu

For more detailed information, please visit the website <http://ase.tufts.edu/africanastudies/>.

American Studies

The American Studies track is part of the Department of Studies in Race, Colonialism, and Diaspora.

TRACK DIRECTOR:

Professor Kerri Greenidge, Department of Studies in Race, Colonialism, and Diaspora

Collaborating Faculty

For an updated list, please see: <https://as.tufts.edu/americanStudies/faculty/>

American Studies is an interdisciplinary field that studies the paradigmatic narratives that shape our received understandings of the American past and present. American Studies considers contexts such as settler colonialism, slavery, labor, capitalism, immigration, and war, all of which have influenced the ideas, history, culture, and society of the United States. Students examine how political, economic, and social differences inform and are reproduced by institutions and in public areas such as the law, education, work, health, and the environment. Students attend to the intersecting dynamics of race, class, religion, region, gender, and sexuality, and consider how these dynamics are mediated by literature, music, the visual arts, and popular culture.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

To graduate with a Bachelor of Arts degree in American Studies, a student must complete ten courses, including one Foundation course (AMER 10-20); one Integrative Seminar (AMER 170-189); one History course with at least two-thirds of course content focused on some aspect of the U.S.; and five courses that form a thematic interdisciplinary cluster, including at least two courses at the 100+ level and representing two disciplines or more. Beyond these eight courses there are then three options to complete the major: 1) A student may propose a Senior Special Project, completed in the fall semester, and one elective course, both pertinent to their cluster. 2) A student may propose an Honors Thesis, taken in both semesters of the senior year, which integrates or expands some aspect of the student's cluster; or 3) In substitution of a Senior Special Project or Honors Thesis, a student may opt or be advised to complete the major requirements by taking an additional integrative seminar (AMER 170-189) and an elective pertinent to their interdisciplinary cluster.

Note: AP courses may not count toward the American Studies major. A grade of C- or better is required for a course to count toward the major. No more than ONE independent study course or internship will count toward the cluster. Internships for credit must be supervised by an American Studies faculty member and pre-approval must be granted by the track director.

The track director and faculty advisors work closely with students in tailoring individual tracks reflecting particular interests and providing a framework for the continued integration of knowledge at more advanced levels.

Students interested in pursuing an American Studies Major should contact Professor Kerri Greenidge, Track Director, Kerri.Greenidge@tufts.edu; or Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu.

For more detailed information, please visit the website <https://as.tufts.edu/americanStudies/>.

Asian American Studies

The Asian American Studies track is part of the Department of Studies in Race, Colonialism, and Diaspora.

DIRECTOR OF STUDIES:

Professor Kendra Field, History and Department of Studies in Race, Colonialism, and Diaspora

Collaborating Faculty:

For an updated list, please see <http://as.tufts.edu/asianamericanstudies/faculty>

Asian American Studies is an interdisciplinary field dedicated to an examination of the diasporic East Asian, Southeast Asian, South Asian, and Pacific Islander populations. It applies the methods and perspectives of traditional academic disciplines, such as history, sociology, political science, education, psychology and literature, to understanding the histories, communities, and cultures of Asian Americans. The Asian American community today is a diverse one that is comprised of people of different ethnicities, religions, class backgrounds and immigration histories. Scholars of Asian American Studies seek to foster greater public

awareness of this diversity and the many social, legal and political contributions Asian Americans have made in society. At the same time, Asian American Studies research challenges students to confront issues of inequality, power and exclusion. Although the original focus has been on the United States, given our increasingly global society and the growing transnational nature of Asian American communities, Asian American Studies has sought to think about the connections that can be made across Asian Diaspora around the globe.

The Tufts Asian American Studies track is part of the Consortium on Studies of Race, Colonialism and Diaspora. The Asian American Studies Minor provides a track of study so that students can examine the histories and experiences of Asian Americans alongside their degree pursuits. The track offers courses that introduce students to Asian American Studies and also offers the opportunity for students to craft their own areas of expertise by taking coursework on concepts and issues that intersect with the Asian American experience such as immigration, health care, gender and educational access.

The AAST minor requires six courses and must fulfill the following requirements:

1. One introductory survey/foundation course on Asian American experiences with at least a third of its content on Asian American history
2. At least one course focused on race in which Asian American experiences are addressed in a sociopolitical context.
3. At least one course with full or partial focus on Asian American experiences beyond the foundation
4. Up to two elective courses that while they may not have direct Asian American content, must address topics relevant to the historical and/or contemporary experiences of Asian Americans. Examples include: immigration, educational access, bilingualism, health disparities, labor relations, environmental justice, media representations, cultural resistance productions, comparative race and ethnic studies.
5. Capstone Project or Course.

A maximum of two courses from the minor may be double counted for another major or foundation or distribution requirement.

Students interested in pursuing an Asian American Studies Minor should contact Professor Kendra Field, Director of Studies, Kendra.Field@tufts.edu; or Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu.

For more detailed information, please visit the website <http://as.tufts.edu/asianamericanstudies/>.

Colonialism Studies

The Colonialism Studies track is part of the Department of Studies in Race, Colonialism, and Diaspora.

TRACK DIRECTOR:

Professor Amahl Bishara, Anthropology and Department of Studies in Race, Colonialism, and Diaspora

Collaborating Faculty:

For an updated list, please see <https://as.tufts.edu/colonialismStudies/faculty/>

Colonialism Studies is a track in the Consortium of Studies in Race, Colonialism and Diaspora. The Colonialism Studies minor is designed to offer students a strong foundation to understand processes of colonialism, anti-colonial independence movements, and the national and global effects of colonialism. Students explore the historical and present-day colonial formations. This course of study connects the differentiated concerns of

slavery, military colonialism, war, processes of extraction, and accumulation, cultural imperialism, gendered and sexual violence. Students consider problems and contexts that are specific to the Americas, Africa, Europe and Asia, and ones that cross and bind together world regions. Colonialism Studies exposes the meaningful links among multiple sites, communities, and subjects where colonialisms have forcibly shaped and remade terrains of rule, Diaspora, struggle, contestation, and cultural expression.

The minor requires five courses:

1. One introductory survey course (see the course listing on the Colonialism Studies website)
2. Two courses with a full or partial focus on the processes of colonialism, focusing on the same world region or on the comparison between two or more world regions
3. One additional course that contributes to the analytical understanding of power relations through political, economic, gender-based, historical, or cultural analysis; and a senior capstone project or option course.

4. The senior capstone project is an independent study culminating in an original piece of work intended to draw together a student's experience at Tufts. The project should reflect an understanding of the conceptual approaches explored during the completion of the minor. The capstone project will be evaluated by two members of the Colonialism Studies committee.

As an alternative to the senior capstone project, a student has the option of taking an approved Colonialism Studies course during the first or second semester of senior year, and fulfilling the capstone requirement by writing a research paper (minimum 15 pages), or completing an oral presentation or a performance, which integrates the knowledge and methodologies from the course with other conceptual approaches explored in courses taken for the minor. In the case of the option course, the capstone project will be evaluated by the course instructor and one other member of the Colonialism Studies committee.

The choice of capstone or option course must be approved by the Colonialism Studies committee before it begins.

In completing the above requirements, students must select courses distributed across at least three departments/programs.

Students in the minor are strongly recommended to pursue the study of a foreign language to an advanced level.

A maximum of two courses from the minor may be double counted for another major or foundation or distribution requirement.

Students interested in pursuing a Colonialism Studies Minor should contact Professor Amahl Bishara, Track Director, Amahl.Bishara@tufts.edu; or Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu.

For more detailed information, please visit the website <http://as.tufts.edu/ColonialismStudies/>.

Latino Studies

The Latino Studies track is part of the Department of Studies in Race, Colonialism, and Diaspora.

TRACK DIRECTOR:

Professor Adriana Zavala, Art History and Department of Studies in Race, Colonialism, and Diaspora

Collaborating Faculty:

For an updated list, please see <http://as.tufts.edu/latinostudies/faculty>

The Latino Studies minor requires six courses. The minor provides the opportunity to study Latinas/os within the U.S. sociopolitical and cultural context, as well as a framework for understanding this population's historical transnational connections to Latin America. Courses explore the impact of U.S.-Latin American relations in

shaping migration flows, as well as the impact of colonialism and war, racism, inequality, and cultural, social, and political marginalization on U.S. Latino experiences. Our curriculum also underscores the vibrant contributions of Latinas/os in U.S. history and social life, in music, theater, film, the visual arts, literature, and popular culture.

The following courses are required:

- One introductory survey course focused on U.S. Latinos; if a student takes more than one of these courses, it can count toward the 50 percent category.
- One Latin American survey course.
- One survey course in comparative race relations in the U.S. context.
- One core course with at least 50 percent Latino content.
- One elective course relevant to Latino Studies with substantial and/or relevant Latino content, in which a student must do a substantial project or paper on a Latino topic. An independent study course with a Latino Studies faculty on a Latino Studies topic may also count.
- The capstone experience (LST0198): There are two options to complete this requirement:
 1. Complete a senior capstone project, which is an independent study developed in consultation with the capstone advisor or LST Track Director. To receive credit, the student must enroll in LST0198 (Latino Studies Capstone Project) and consult with the capstone advisor or LST Track Director about his or her plans for the project at least one semester before enrolling.
 2. Take a sixth course from anyone of the lists of approved courses above.

NOTE: Students should check the Latino Studies website for a list of courses that meet these requirements and/or meet with the director of the minor. All courses taken for the Latino Studies minor track must be taken for a letter grade. Courses with a letter grade of C- or lower will not be accepted toward the minor. A maximum of two courses from the minor may be double counted for another major or foundation or distribution requirement.

Students interested in pursuing a Latino Studies Minor should contact Professor Adriana Zavala, Track Director, Adriana.Zavala@tufts.edu; or Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu.

For more detailed information, please visit the website <https://as.tufts.edu/latinostudies/faculty>.

Native American and Indigenous Studies

The Native American and Indigenous Studies track is part of the Department of Studies in Race, Colonialism, and Diaspora.

TRACK DIRECTOR:

Professor Amahl Bishara, Anthropology and Department of Studies in Race, Colonialism, and Diaspora

Collaborating Faculty:

For an updated list, please see: <http://as.tufts.edu/rcd/programs/nativeamericanindigenous>.

The minor in Native American and Indigenous Studies (NAIS) offers concentrated study in Native American and Indigenous histories, cultures, and politics. It introduces students to comparative settler colonialism studies and to the politics of Native American Studies as well as to global critical Indigenous studies and methodologies. The minor encourages attention to local

tribal communities and activist research, in particular through its inclusion of a capstone internship option.

Requirements:

1. One foundational course focused in Native American and Indigenous Studies that introduces the field not only substantively but also in terms of its methods, theoretical groundings, and history.
2. One course with a regional focus in the Indigenous Americas.
3. One course on global indigeneity and/or comparative settler colonialisms.
4. One related course with a substantial focus in NAIS or colonialism, or another course from the above three categories.
5. One culminating capstone experience approved by the faculty advisor such as an advanced research course, an independent study, or an internship-based project.

Course lists are available on the department website.

Students interested in pursuing a Native American and Indigenous Studies Minor should contact Professor Amahl Bishara, Track Director, Amahl.Bishara@tufts.edu; or Cynthia Sanders, Department Administrator, 106 Eaton Hall, 617-627-2311, Cynthia.Sanders@tufts.edu.

For more detailed information, please visit the website <http://as.tufts.edu/rcd/programs/nativeamericanindigenous>.

Quantitative Economics

(FOR DEGREE REQUIREMENTS, SEE ECONOMICS.)

Religion

Associate Professor Heather Curtis, *Chair; History of Christianity and American religions*

Associate Professor Kenneth Gorden, *Islam and Sufism*

Professor Brian Hatcher, *Packard Chair of Theology; Hinduism and religion in modern South Asia*

Associate Professor Joseph Walser, *Buddhism and religion in ancient South Asia*

Assistant Professor Jennifer Eyl, *Early Christianity and religions of the ancient Mediterranean*

Assistant Professor Elana Jefferson-Tatum, *African and African Diaspora Religions; Race, Religion, and Colonialism*

Senior Lecturer Peggy Hutaff, *Christian Studies*

Senior Lecturer Elizabeth Lemons, *Religion and Culture*

SECONDARY APPOINTMENTS:

Professor Gary Leupp, *History; Japanese history and Japanese Buddhist studies*

Associate Professor Kevin Dunn, *English; Bible as literature*

Assistant Professor Marie-Claire Beaulieu, *Classics; Greek religion, epigraphy, medieval Latin*

The Department of Religion is dedicated to the exploration and critical analysis of religion as a central aspect of human history and culture. Courses seek to promote reflection on the diversity of religious experience; empathetic engagement with a range of beliefs, texts, and practices; mastery of a range of methods for studying religion; and reflection on the role religion plays in shaping human customs, values, beliefs, and institutions.

A graduate degree in religion is not offered. However, some 100-level courses may be 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 advisor 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 thematic concentration. Students must demonstrate that they have taken at least three classes in that specialty. 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 advisor 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 religious 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 advisor 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 website <http://ase.tufts.edu/religion/>.

Romance Studies

Professor and Chair Pedro Ángel Palou, *Mexican literature, Latin American studies, Film studies*
Professor Gérard Gasarian, *Nineteenth- and Twentieth-century French poetry*
Professor Nina Gerassi-Navarro, *Latin American literature and culture*
Professor José Antonio Mazzotti, *Latin American literature and culture, colonial studies*
Professor H. Adlai Murdoch, *Francophone Caribbean studies, Film studies*
Professor Isabelle H. Naginski, *Nineteenth-century French prose, Franco-Russian literary relations, women writers*
Associate Professor Zeina Hakim, *Seventeenth- and eighteenth-century French literature*
Associate Professor Vincent J. Pollina, *Medieval and Renaissance French and Italian literature*
Associate Professor Pablo M. Ruiz, *Latin American modern literature, Borges, travel narratives*
Assistant Professor Mona El Khoury, *Francophone literature*
Senior Lecturer/Coordinator of Italian Studies Laura Baffoni Licata, *Italian literature and culture*
Senior Lecturer/Coordinator Cristina Pausini, *Italian Language*
Senior Lecturer/Coordinator Anne Poncet-Montange, *French Language*
Senior Lecturer/Coordinator Marta Rosso-O'Laughlin, *Spanish Language*
Senior Lecturer/Course Administrator María-Concepción Lagunas Davis, *Spanish Language*
Senior Lecturer Juliana Berte, *Hispanic Linguistics*
Senior Lecturer Anne de Laire Mulgrew, *Spanish language*
Senior Lecturer Nancy Levy-Konesky, *Spanish language*
Senior Lecturer Amy Millay, *Spanish language and literature*
Senior Lecturer Tracy Pearce, *French language*
Senior Lecturer Kathleen Pollakowski, *Spanish language and literature*
Senior Lecturer Anne-Christine Rice, *French language*
Senior Lecturer Claire Schub, *Twentieth- and twenty first-century French literature*
Lecturer/Coordinator Cristiane Soares, *Portuguese Language*
Lecturer/Course Administrator Marisol Fernandez-Garcia, *Spanish Language*
Lecturer/Course Administrator Anne Taieb, *French Language*
Lecturer Isabel Castro, *Spanish language*
Lecturer Brenna Heitzman, *French language*
Lecturer Magdalena Malinowska, *Spanish language*
Lecturer Carmen Merolla, *Italian language*
Lecturer Ester Rincon, *Spanish language*
Susan Sánchez-Casal, *Director, Tufts-in-Madrid program*
Jeanne Fourneyron, *Director, Tufts-in-Paris program*
Loreto Pomar, *Director, Tufts-in-Chile program*

The Romance languages all derive from the Latin language spoken in different parts of the Roman Empire. Courses in French, Italian, Portuguese, and Spanish lead students to an understanding of the spoken or written language, and allow them to read and appreciate a 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.

French, Italian, Portuguese, Spanish, and Latin American Studies are considered strong Liberal Arts concentrations; they are well regarded by employers and by graduate and professional schools. In recent years the department's senior majors have entered such diverse fields as banking, business, medicine, and teaching. Several are employed by international firms; others have gone on to law, medical, or business schools. Those electing to continue their study of Romance languages are frequently admitted to the most prestigious graduate programs. Recent surveys by government agencies, private foundations, and the popular press reveal a growing need for teachers of foreign languages, literatures, and civilizations at both the secondary and the university levels. Entry-level salaries are rapidly improving, and the human rewards are

great.

LANGUAGE HOUSES

The Department of Romance Studies 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, 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 Studies offers undergraduate majors an unusual opportunity for study in Spain, France, and Chile. Because these programs are supervised and sponsored by Tufts, students enrolled in them receive letter grades on their transcripts and remain eligible for financial aid from the University.

Tufts-in-Paris Program

Preparation equivalent to completion of French 21 and 22 is prerequisite to the program; completion of one third-year level course, such as French 31 or 32 or French 121 or 122 is highly recommended. Students are registered in the University of Paris I (Panthéon-Sorbonne), the University of Paris III (Sorbonne Nouvelle), Sciences Po (Paris), 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 and 32 or 34 are highly recommended. Students live in Madrid or Alcalá de Henares, and take classes within the Tufts-in-Madrid program, and at the Autonomous University of Madrid or the University of Alcalá. Internships available. For more information concerning the Tufts-in-Madrid Program, write to the Department of Romance Studies, the Office of Tufts Study Abroad, or see the program website at www.tufts-skidmore.es.

Tufts-in-Chile Program

(See Tufts Programs Abroad for description.)

Preparation equivalent to completion of Spanish 21 and 22 is prerequisite to the program; Students are registered in both universities; University of Chile and Catholic University. Fall registration takes place at University of Chile. Spring registration takes place at both universities.

For more information concerning the Tufts-in-Chile Program, write to the Department of Romance Studies or to the Office of Tufts Study 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 upon 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. Scholarship assistance is available. 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, Italian, or Portuguese and who have previously studied the language will be placed in the appropriate course level by their scores on the SAT Subject Tests, Advanced Placement Test, or 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, Italian, or Portuguese 3 may complete the language requirement by choosing anyone of the three available options (see College of Liberal Arts Information, Foundation Requirements). Four course credits equivalent to French/Spanish/Italian/Portuguese 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 on the Romance Studies website. 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

The French major requires ten courses as follows:

French 22, or equivalent; French 31 and 32, or equivalent; four 100-level courses in literature; two 100-level courses to be selected from among the various course offerings in advanced language and culture, including French 121, 122, 124, 125, and all 100-level French courses unless specified otherwise, or their equivalents, or up to two additional 100-level courses in French literature; one course taught in any language in a related field, or one additional 100-level course in French language, culture, or literature. (Students participating in programs abroad may count toward the satisfaction of the latter two requirements a wide range of courses in language, literature, art history, geography, history, civilization, and other areas.) No more than three semester hours units in Independent Study may be counted toward the major. No more than six semester hours units 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

The Spanish major requires ten courses as follows:

Spanish 22, or higher (e.g. SPN-0023, SPN-0024, SPN-100 or higher); two courses taught in Spanish in the introductory survey of literature sequence; three 100-level courses in Latino, Latin American and/or Spanish Peninsular literature, taught in Spanish; three courses to be selected from among the various course offerings in advanced language and culture, including Spanish 121, 122, 124, etc.; One additional course (maybe 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 three semester hours units in Independent Study (SP 193 or 194) may be counted toward the major. No Independent Study can be taken during the senior year if the student is writing an honors thesis (SPN 199, six credits). 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 Studies, which count toward the Italian Studies major. The list appears on the Romance Studies website. It is highly recommended that seniors returning from overseas programs enroll in an appropriate Italian course in the Department of Romance Studies during their final year of study. Interested students should consult the designated advisor for the major.

Major in Italian Studies

The Italian Studies major requires ten courses distributed as follows among Sections I, II, III, IV, and V:

Section I: Two courses in Composition and Conversation, taught in Italian, in the Department of Romance Studies: Italian 21 and 22, or equivalent;

- Section II: Two survey courses of literature, taught in Italian: Italian 31, and 32, or equivalent;
- Section III: One 100-level course of advanced Italian language, taught in Italian: Italian 121;
- Section IV: Two literature or culture courses at the 100-level, taught in Italian;
- Section V: Three elective courses in Italian literature, culture, or related fields, taught in Italian or English (see Guidelines, attached to the Checklist for the Major, for acceptable courses).

Courses taught in departments other than Romance Studies must be devoted exclusively to Italian culture (as attested by course description and syllabus), and must be approved by the Department of Romance Studies for credit in the major. No more than three semester hours units in Independent Study may be counted toward the major. No more than six semester hours units combining an Independent Study and an honors thesis may be counted toward the major.^[1] All courses taken for credit in the major must be completed with a grade of C- or better.

UNDERGRADUATE MINOR PROGRAMS

Minor in Italian

The minor in Italian requires 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) one further course in Italian language, literature, and/or culture, taught in Italian on the Medford/Somerville campus; b) a course in Italian literature or culture taught in English translation (e.g., Italian 51, 52, 55, 75); c) one of the Italian culture courses listed in the Guidelines for acceptable courses; (d) an upper-level course taught in Italian, completed in a program abroad (or in another academic institution in the US) in one of a variety of disciplines. No more than three semester hours units 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 Studies during their final year of study.

Interested students should consult the designated advisor for the minor.

Minor in Portuguese

The minor in Portuguese requires six courses as follows:

Four courses in Portuguese language, literature, and/or culture above the intermediate level (Portuguese 3-4). Two courses chosen from among the following: a) Up to two more courses in Portuguese language, literature, and/or culture; b) Up to two courses of the Lusophone culture or civilization courses listed in the Guidelines for acceptable courses taught in English or Spanish; (c) One upper-level culture or literature course taught in Portuguese in a program abroad; (d) A second upper-level course taught in Portuguese and completed in a program abroad may be counted if approved by the minor coordinator. No more than three semester hours units in Independent Study may be counted toward the minor.

It is highly recommended that seniors returning from overseas programs enroll in an appropriate Portuguese course in the Department of Romance Studies during their final year of study.

Interested students should consult the designated advisor 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 eighteen semester hours units. Please note the following stipulations:

- 1) Of the fifteen semester hour units taken in the Department of Romance Studies, no more than three semester hour units 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 SAT Subject Test score).
- 3) Students cannot receive credit toward the minor for courses taken below this initial placement.
- 4) Students must consult the designated advisor for the special minor in the Department of Romance Studies.
- 5) Independent Studies will not be available.
- 6) All courses used in fulfillment of the minor must be taken for a grade.

FRENCH OR SPANISH

The minor requires fifteen semester hour units above French 3 or Spanish 3.

The remaining three semester hour units must be taken in the social sciences or the humanities, concentrating on the area in which the target language is spoken.

ITALIAN

The minor requires fifteen semester hour units above Italian 2.

The remaining three semester hour units must be taken in the social sciences or the humanities, concentrating on the area in which the target language is spoken.

DEPARTMENTAL HONORS

The departmental honors program provides the opportunity for especially qualified students in French, Spanish, or in Italian Studies to write a senior honors thesis in close cooperation with a faculty adviser. The project usually bears six semester hour units, each of which may count toward the major as a 100-level literature course. Note: No more than six semester hour units combining an Independent Study and an honors thesis maybe 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 Thesis Honors, With High Thesis Honors, or With Thesis Honors is to be awarded at Commencement.

The applicant's name must have appeared on the Dean's List at least for two semesters prior to the first term of the senior year. Interested students should consult with the potential advisor (usually chosen for expertise in the general subject matter of the thesis) and the Chair of the department toward the end of the junior year. Sophomores planning to spend the junior year abroad should consider enrolling in the department honors program upon their return. Since final arrangements must be made in September of the senior year, those studying overseas are advised to correspond with the Chair and with a potential adviser in the Spring semester of their junior year.

GRADUATE PROGRAM**Master's Degree**

A masters 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 attainment both in course work and in the general examination.

For more detailed information, please visit the website <http://as.tufts.edu/romancestudies/graduate>.

Russian

(FOR DEGREE REQUIREMENTS, SEE INTERNATIONAL LITERARY AND CULTURAL STUDIES.)

School Psychology

(FOR DEGREE REQUIREMENTS, SEE EDUCATION.)

Sociology

Professor Paul Joseph, Chair, Sociology of war and peace, political sociology, globalization

Associate Professor Freedeen Blume Oeur, Gender and masculinity, education, youth, sociological and feminist theory

Associate Professor Helen Marrow, Immigration, race and ethnic relations, social inequalities and social policies, health, qualitative research methods

Associate Professor Sarah Sobieraj, Mass media, political sociology, civil society and the public sphere, sociology of culture, social movements

Associate Professor Rosemary CR Taylor, Comparative historical study of health and disease, public policy, science, technology, and risk, qualitative methodology

Assistant Professor Felipe Dias, Social stratification, comparative race and gender inequality, labor markets, quantitative and experimental methods, immigration, Latin America.

Assistant Professor Daanika Gordon, Race & ethnicity, crime & social control, urban sociology, research methods

Assistant Professor Jill Weinberg, Crime, law, deviance, sports, the body, research methods

Full Time Lecturer Anjuli Fahlberg, Violence and conflict, social movements, urban politics, Latin America, participatory action research

Sociology is the systematic study of social institutions, social inequalities, and social and cultural identities. Sociology studies how social structures shape human behaviors, social categories, and social meanings. Sociology also studies how behavior (agency) in turn constructs social structure. Institutions include media and culture, health and medicine, education, the military, organizations, urban environments, law, and more. Areas of study include group identities as well as social inequalities such as race, immigration, class, gender, and globalization. Sociology students learn how to critically examine and analyze social structure and culture; how social and cultural constructs such as gender, race, and class influence people's lives; and how people change society by forming social movements and using the media.

UNDERGRADUATE CONCENTRATION REQUIREMENTS

Major in Sociology

All Sociology majors must complete ten (10) Sociology courses. None of the ten courses may be taken pass-fail, and courses with grades below C- will not be counted. At least six (6) of the courses must be listed or cross-listed by the Tufts University Department of Sociology. Three (3) courses must be the following core courses, at least two (2) of which must be taken in the Tufts University Department of Sociology:

SOC 001 Introduction to Sociology; and

SOC 103 Sociological Theory (Spring only); and

Research Methods Requirement:

To satisfy the research requirement you may take:

1. Option 1: SOC 100 Research Design and Interpretation (*Fall only*) **OR**
2. Option 2: SOC 101 Quantitative Research Methods **AND** SOC 102 Qualitative Research Methods

One (1) of the ten required courses must be a seminar, numbered 180 or above, and designated as a seminar (SEM:), (must be taken in the Sociology Department on the Tufts Medford Campus). Sociology 193, 194, 197, 198 and 199 do not count for this requirement. Six (6) of the ten required courses are unrestricted electives (Five [5] if 101 AND 102 are taken as the research requirement), except for students who choose to complete a cluster.

Summa Honors: For Sociology majors graduating in 2020 and beyond, the requirements for eligibility for summa honors will include the following, in addition to the university's summa requirements: students must take at least five (5) Sociology courses numbered 100 or above. Included in this five (5) 100+ course requirement are a research methods course, theory, and a senior seminar.

Majoring in Sociology Using a Cluster Option

Students who major in Sociology may choose electives that complete one of the following cluster options:

1. Media, Culture, and Society
2. Social Inequalities and Social Change
3. Globalization, Transnationalism, and Immigration.
4. Data Analysis and Interpretation

Minor in Sociology

The minor requires the completion of six courses, none of which may be taken pass-fail and grades below C- will not be counted towards the minor. Courses must include: Introduction to Sociology (Soc 001); one research methods course: (Sociology 100 or 101 or 102); one theory course: (Sociology 103); and three sociology elective courses. Details are available from the department. Students are encouraged to declare their minor by junior year.

For more detailed information, please visit the website <http://as.tufts.edu/sociology>

Spanish

(FOR DEGREE REQUIREMENTS, SEE ROMANCE STUDIES)

Urban and Environmental Policy and Planning

Professor Julian Agyeman, *Sustainability policy and planning, environmental and food justice, intercultural cities*
Professor Sheldon Krimsky, *Lenore Stern Professor in the Humanities and Social Sciences; Environmental policy and ethics*
Associate Professor and Chair Mary E. Davis, *Environmental health, economic analysis*
Professor Justin Hollander, *Land use planning, urban redevelopment, shrinking cities*
Assistant Professor Shomon Shamsuddin, *Social policy, housing policy, community development*
Senior Lecturer Laurie Goldman, *Social welfare and housing policy, policy implementation, public and nonprofit management*
Assistant Professor Shan Jiang, *Spatial data analytics; infrastructure and transportation planning;*
Senior Lecturer Penn S. Loh, *Director of the Masters of Public Policy Program and Community Practice; Environmental justice*
Senior Lecturer Ann Rappaport, *Environmental management and policy*
Lecturer Rebecca Shakespeare, *Geographic information systems, qualitative GIS, neighborhood dynamics, housing affordability*
Assistant Professor Kristin Skrabut, *Urban anthropology; Poverty and development; Latin America*
Lecturer Sumeeta Srinivasan, *Spatial models and geographic information systems*
Senior Lecturer Jonathan Witten, *Land use planning, local government law, natural resources policy*

The Department of Urban and Environmental Policy and Planning (UEP) offers four graduate programs culminating in either a Master of Arts (M.A.), Master of Science (M.S.), or a Master of Public Policy (M.P.P.) degree, as well as an undergraduate Minor in Urban Studies. Students enrolled in one of the department's graduate programs who complete a sequence of GIS courses are also eligible for a graduate certificate in GIS. UEP also is a key participant in two interdisciplinary programs at Tufts: Environmental Studies Program and Water: Systems, Science and Society (WSSS) Program. 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 community well-being by helping them understand, empathize with, and respond to the social, economic, and environmental needs of individuals and communities.

UNDEGRADUATE PROGRAM

Undergraduate Minor in Urban Studies

The Minor in Urban Studies provides students with an opportunity to pursue their love of cities and communities and to study urban issues in depth. Students can select from a variety of courses that examine the interplay among the different groups occupying the urban space, the problems they confront, their struggle for recognition and power, and the forces shaping the physical terrain they inhabit. The minor offers a good foundation for students contemplating graduate work in urban planning, environmental policy, public administration, public policy, law, or social work. It also can 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. The completion of five courses from at least three different departments is required. Interested students should contact the Department of Urban and Environmental Policy and Planning (uep@tufts.edu). For more detailed information, please visit:

<http://as.tufts.edu/uep/programs/minor>.

AFFILIATED PROGRAMS

Environmental Studies Program

UEP actively engages with the undergraduate environmental studies program teaching a core course and participating in program governance and development. The program's Sustainability, Policy, and Equity track is closely aligned with UEP, as is the Food Systems, Nutrition and the Environment track. Opportunities for UEP students include teaching assistant positions as well as collaborations with faculty and students in a wide variety of disciplines.

Water: Systems, Science and Society (WSSS) Program

All of the major graduate schools at Tufts University participate in the graduate certificate program in Water: Systems, Science and Society (WSSS), which is a model for integrative graduate education that organizes research and training on water policies and issues across disciplinary boundaries. MA/MS/PhD student participation in the program does not add time to their degrees and is done through their home department. The goals of this unique certificate program are to develop interdisciplinary research and practices that will make significant contributions, and to educate a diverse, ethical, skilled set of professionals who are trained in a multidisciplinary approach within a specialized degree.

UEP students enrolled in the WSSS certificate program select either the practicum track or the research track, and

take either 2 or 3 WSSS-approved courses that also count toward the UEP degree. UEP faculty participate in all aspects of WSSS including teaching courses and serving on the WSSS Steering Committee.

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 well-being by helping them understand, empathize with and respond to the social, economic and environmental needs of individuals and communities.

We offer four graduate programs in public policy and planning: a Master of Arts (M.A.) degree in urban and environmental policy and planning (accredited by the Planning Accreditation Board), a Master of Science (M.S.) degree in Environmental Policy and Planning, a Master of Science (M.S.) degree in Sustainability, and a Master of Public Policy (M.P.P.) degree. These degrees equip public-spirited individuals for rewarding careers in government, nonprofit organizations, citizen advocacy groups, and the private sector.

UEP has a flexible M.A./M.S. and M.P.P. curriculum built around a set of six core values:

1. An appreciation of the inextricable linkages between social, economic and environmental issues and the ability to make policy and planning recommendations accordingly.
2. 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.
3. An appreciation of the deeply embedded nature of gender, age, race, class, disability, culture, sexual orientation, and gender identity in all aspects of public policy and planning.
4. An appreciation of the centrality of spatial, social and environmental justice to all aspects of public policy and planning.
5. An appreciation of the need to understand the role of individual and community rights and responsibilities in public policy and planning.
6. 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.

The accredited urban planning degrees (M.A./M.S.) also requires a set of competencies based on three areas:

Knowledge—Upon completion of the MA program, students should have basic familiarity with:

- The history, structure and function of urban and metropolitan settlements.
- Economic influences on policy and planning (e.g., "market" and "polis" relations).
- Environmental, social and cultural influences on policy and planning.
- The different roles of government, governance and citizenship in policy and planning.
- The history, theory and processes of both policy making and planning together with implementation procedures and practices.
- Evaluation of policy and planning.
- The administrative, legal and political aspects of policy and plan-making.
- Areas of specific policy or planning content-based knowledge related to their professional interest(s) and an in-depth knowledge of one policy or planning domain through the thesis or other terminal project.

Skills—Upon completion of the accredited urban planning M.A./M.S. program, students should have basic skills in the following:

- Critical thinking skills
 - Individual problem identification and documentation of the extent of the problem as well as the political, social, environmental and spatial context
 - Identifying possible analysis strategies and their implications
 - Identifying criteria for proposing and selecting solutions
 - Evaluating the development and results of policies and plans

- Research skills
 - Research design
 - Literature collection and analysis
 - Identifying and assessing data sources and limitations
 - Development of data collection instruments and tools
- Data analysis skills
 - Interpreting and synthesizing data
 - Drawing inferences from specific observations to make more generalizable findings
 - Comparative and longitudinal analysis
 - Recognizing and accounting for limitations to findings
- Qualitative skills
 - Direct observation and analysis of primary and secondary qualitative data
- Quantitative skills
 - Descriptive and inferential statistics
 - Basic forecasting
 - Use of spreadsheets and statistical software
- Spatial analysis skills
 - Ability to identify spatial problems and frame spatial questions for analysis and research
 - Use of Geographic Information Systems for basic spatial analysis and mapping
- Communication skills
 - Written, oral and graphic communication
 - Presentation strategies and methods

Policy and Planning in Practice—The accredited urban planning M.A./M.S. program will provide the following professional opportunities and training:

- At least 150 hours, supervised, in an organization relevant to the student's interests
- Demonstration through the Internship Agreement and Learning Assessment that the internship gave the opportunity for significant learning in a field relevant to the student's interests and meets at least one of his or her career goals
- Reflections on the role of ethics in professional policy and planning processes, practices and behavior
- Synthesis and application of policy and planning content-based knowledge from theory into practice
- Collaborative group management, problem solving, negotiation and mediation
- Organizational management, including decision making and strategic problem solving, human resource development, and financial management and resource development
- Political and economic power mapping

Master of Arts in Urban and Environmental Policy and Planning and Master of Science in Environmental Policy and Planning

The accredited urban planning Master of Arts (M.A.) in Urban and Environmental Policy and Planning and Master of Science (M.S.) in Environmental Policy and Planning degrees require completion of twelve or thirteen courses (36-39 credit hours) plus a thesis or capstone exam for a minimum of 42 credit hours. 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. The two degrees are identical in their core requirements and differ in the choice of environmental electives and thesis/capstone topic selected in consultation with a student's academic advisor.

Degree Requirements

The M.A./M.S. degrees require a minimum of 42 credit hours. Individual course requirements are as follows:

- Five required core courses (16 credit hours) covering theoretical foundations of policy and planning, and the development of relevant professional skills;
- Seven to eight elective courses or modules (20-24 credit hours) approved by student's advisor;
- An internship in public policy or planning; and
- A master's thesis (may count for 3 or 6 credit hours) or capstone exam (3 credit hours).

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 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 center on the following:

- Sustainable communities
- Environmental and food justice
- Community development and housing
- Race, class, and social welfare policy
- Child and family policy
- Land use planning
- Natural resource policy and planning
- Science/technology, ethics, and environmental policy
- Environmental health and risk
- Corporate management of environmental issues
- Climate change
- International urban and environmental policy
- Program evaluation
- Applied research methods and data analytics
- Planning tools, techniques, and strategies
- Citizen roles in policy and planning
- Policy and planning for intercultural cities

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 reports.

Capstone Exam

The capstone exam requirement represents a topic-based assessment of an individual student's interests in the fields of policy and planning. The student chooses major and minor topics in collaboration with a faculty advisor and reader(s) in a fashion similar to the selection of a thesis topic. There are three separate components to the capstone exam: (1) a detailed literature review; (2) a take-home exam; and (3) an oral exam.

Master of Science (M.S.) in Sustainability

The M.S. in Sustainability degree requires a minimum of 36 credit hours. Individual course requirements are as follows:

- Six required core courses (19 credit hours) covering the foundations of sustainability policy and planning, and the development of relevant professional skills;
- Five electives (14 credit hours) approved by student's advisor
- An internship or capstone experience (3 credit hours).

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

1. Socio-ecological Systems Thinking for Sustainability
2. Economics for Policy and Planning
3. Quantitative Reasoning
4. Intro to GIS
5. Field Projects

In addition, students select a sixth core course from the following options:

Program Evaluation OR the two-part course module: Sustainability Analytics AND Sustainability Metrics and Decision Tools

Electives

Five electives (minimum of 14 credit hours) are selected in consultation with an advisor, focused on theoretical foundations, policy, and planning for sustainability.

Internship or capstone experience

Students will elect to complete an internship or capstone experience (3 credit hours), in consultation with an advisor.

Master of Public Policy

The Master of Public Policy (M.P.P.) is 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 30-credit hour degree in one year; part-time enrollment options are also available.

Degree Requirements

- Four required core courses that enable 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.
- Four elective courses in a public policy area.
- Two additional elective courses in policy and planning fields or professional skills.

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 (two credit hours, fall, in the first semester of student's program)
4. Integrative Seminar (one credit-hour, spring, in the last semester of the student's program)

The required *Reflections on Public Policy* seminar 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. Electives are chosen among the full list of the department's course offerings in consultation with the student's advisor. 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 advisor. In addition, with the advisor's approval, one class at a consortium school may be taken 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 this area(s) of interest.

All our courses focus on urban, social and/or environmental policy issues. A student can choose from one or more of these areas or 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
- Community Development, Planning and Politics
- Community Economic Development
- Climate Change Policy, Planning and Action
- Environmental Law
- Water Resources Policy and Planning and Watershed Management
- Corporate Management of Environmental Issues
- Developing Sustainable Communities
- Environmental Justice, Security and Sustainability
- International Planning and Urban Policy

Professional Practice Electives

Students also have opportunities to enroll in courses that enhance their professional practice skills, such as:

- Leadership and Organizational Development
- Financial Analysis and Management
- Philanthropy and Fundraising
- Negotiation, Mediation, and Conflict Resolution
- Program Evaluation
- Local Government Finance

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 application deadline for international applicants is December 31; the deadline for the M.P.P. program is January 15 (all applicants) Late applications may be considered.

Combined Bachelor's/M.A. Degrees Program

The Combined Bachelor's/Master's Degrees Program is offered by the College of Liberal Arts and the Graduate School of Arts and Sciences and is administrated by UEP. Exceptional students may combine undergraduate and graduate courses and are simultaneously enrolled in the bachelor's and master's degrees. It is expected that the student will complete the Combined Bachelor's/Master's Degrees Program in five years.

The Program is open to all majors offered in the College of Liberal Arts. Potential related majors include (but not limited to) anthropology, architectural studies, biology, community health, economics, environmental studies, sociology, and political science. The relevant master's degree is the Master of Arts (M.A.) in Urban and Environment Policy and Planning or the Master of Science (M.S.) in Environmental Policy and Planning, which requires two years of full-time study ordinarily for a total of 42 credit hours.

Students seeking admission to the Program should consult their undergraduate major advisors and UEP student affairs coordinator before applying. 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. A student may elect to withdraw from the Program at any time by filing the appropriate petition.

Joint and Dual Degree Programs

UEP offers a joint master's degree program with the departments of Civil and Environmental Engineering and Economics. Students complete core requirements in UEP and the affiliated department to receive a single M.S. degree. It is possible to complete the joint degree requirements in two years. UEP also offers dual degree programs with the Fletcher School, Department of Civil and Environmental Engineering in the School of Engineering, Friedman School of Nutrition Science and Policy, Department of Public Health and Community Medicine in the School of Medicine, Boston College Law School, and Boston College Carroll School of Management.

For the dual degree programs, each department/school reviews candidates based on its own requirements and criteria. The candidate's admission to UEP is not affected by that of the other department/school, and vice versa. Students are required to meet with academic advisors from both UEP and the other department/school to plan a course of study that balances each student's background and interests with the requirements of the specific program.

Please note: these programs are not available to students in the M.P.P. program.

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 and environmental engineering. The joint degree program results in an M.S. degree, while the dual degree program results in both the M.A. and M.S. degrees. The former requires twelve full semester courses or equivalent in course modules, plus a thesis, while the latter requires seventeen courses or equivalent in course modules, plus a thesis, and can be completed in five semesters.

Environmental Economics and Urban Planning

There is a natural linkage between economics and public policy and planning. Public policy issues have inspired some of the classic studies in economics. Also the tools of economic analysis can be applied to a wide variety of policy and planning questions. The joint M.S. degree in UEP/Economics offers students an opportunity to explore these longstanding linkages and to develop skills in policy analysis and planning using economic analysis. A student who completes the program is awarded an M.S. degree in Environmental Economics and Urban Planning.

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 M.A. 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.

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 non profit 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 programs with the Agriculture, Food, and Environment (AFE) program and the Food Policy and Applied Nutrition (FPAN) program of the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy are 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 these programs 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 two programs, the dual degree can be completed in three instead of four years. Students receive both an M.A. degree in urban and environmental policy and planning and an M.S. degree in agriculture, food, and environment or an M.S. degree in food policy and applied nutrition.

UEP and Public Health and Community Medicine

Increasingly, public health, community planning and environmental policy have become integrated in the field. A student completing this dual degree program earns an M.P.H. (Master of Public Health) degree from the School of Medicine and an M.A. degree in urban and environmental policy and planning. The program generally requires six semesters of full-time study. Students enroll in three semesters at UEP and three semesters (including summers) at the M.P.H. program. The preferred sequence of enrollment is for students to enroll in UEP for their first and second semesters. The student then enrolls in the M.P.H. program in their third and fourth semesters, and splits their final year between UEP and M.P.H. enrollment. Students are encouraged to integrate their knowledge in both programs from the start, as those enrolled in either program may take courses to fulfill degree requirements via cross registration.

UEP and the Boston College Law School

This program is for students interested in exploring the connections between the law and urban and environmental policy and planning. Students receive two degrees—an M.A. and a Juris Doctor (M.A./J.D.). The dual degree program recognizes that the fields of law and planning are inexorably linked. Planning (including policy analysis) is a process of guiding future developmental patterns; the law frames the mechanisms and limits of governments' control over this process. Planning and law immerses students in broad debates and critical thinking about the environment, human settlements, social and environmental justice, corporate responsibility, and land use. All of these issues are guided by constitutional, equitable, and pragmatic principles.

The M.A./J.D. is offered through collaboration between UEP and the Boston College Law School. There is currently no graduate program in New England which offers the combined strengths of this dual degree program.

During their first year, students choose to take courses either through UEP or the law school exclusively. Students split their courses between the department and the law school in the years that follow. Students may transfer credits toward each degree, allowing them to concentrate their studies and complete the program in four years (as opposed to five, which would be typical if a student were pursuing each degree separately). For detailed information on the requirements for the J.D., please contact the Boston College Law School, Newton, MA 02459, or visit www.bc.edu/schools/law/home.html.

UEP and the Boston College Carroll School of Management

This program is designed for students who want to develop leadership and management skills to implement policy and planning initiatives, and those interested in social entrepreneurship, corporate social responsibility and sustainability. Students receive two degrees—a Master of Arts and a Master of Business Administration (M.A./M.B.A.). The dual degree recognizes that the fields of planning, policy and management have always been linked, but the value of the nexus increases with a complex global economy and growing world population. Planning, policy and management disciplines have embedded in them broad debates and critical thinking about the environment, human settlements, social and environmental justice, corporate responsibility, sustainable communities, and land use, each guided by core values, accountability and professional practice. The values-driven nature of both programs means that in scholarship and practice, faculty and students in the dual program actively negotiate the evolving relationship between business and civil

society.

The M.A./M.B.A. program, offered through collaboration between UEP and Boston College's Carroll School of Management (CSOM), is unique, offering students the opportunity to capitalize on the strengths of two nationally recognized schools. During their first year, students choose to take courses either through UEP or CSOM exclusively. Students split their coursework between UEP and CSOM in the years that follow, ultimately spending three semesters registered at CSOM and three semesters registered at UEP. For detailed information on requirements for the M.B.A., please see www.bc.edu/content/bc/schools/csom/graduate.html.

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. (See Interdisciplinary Doctorate in this bulletin for program description.)

CERTIFICATE PROGRAMS

In addition to the master's programs, UEP 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 current careers or to move into new professional work. A third certificate in program evaluation is offered in collaboration with the Department of Child Study and Human 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 (12 credit hours) for credit. Courses for the certificate programs are drawn from the curriculum of the M.A./M.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, visit <http://gradstudy.tufts.edu>.

Certificate Program in Community Environmental Studies

The certificate in community environmental studies (CES) provides professional training for careers in today's 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 (12 credit hours).

CES Core Courses

Select at least one core course from the following:

UEP 200 Land Use Planning I: Nonregulatory Tools and Techniques (fall)

UEP 201 Land Use Planning II (spring)

UEP 207 Environmental Law (spring)

UEP 221 Climate Change Policy and Planning (spring)

UEP 223 Fundamentals of U.S. Agriculture (fall)

UEP 279 Water Resources Policy, Planning, and Watershed Management (fall)

CES Electives

Select up to three skills and environmental policy electives from the following:

UEP 161B Writing and Public Communication

UEP 173 Transportation Planning

UEP 205 Urban Planning and Design

UEP 206 Planning for Low Impact Development

UEP 230 Negotiation, Mediation, and Conflict Resolution

UEP 232 Introduction to Geographic Information Systems

UEP 233 Regional Planning: Tools and Techniques

- UEP 234** Qualitative Analysis for Planning and Public Policy
UEP 242 International Planning and Urban Policy
UEP 264 Green Urban Design
UEP 265 Corporate Management of Environmental Issues
UEP 278 Environmental Justice, Security, and Sustainability
UEP 284 Developing Sustainable Communities
UEP 286 Environmental Ethics
UEP 294-16 Special Topics: Public Health and the Built Environment

(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 (MCO) 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 in effective management who are committed to social policy and 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 (12 credit hours).

MCO Core Courses

Select at least one core course from the following:

- UEP 251** Economics for Policy and Planning (spring)
UEP 253 Financial Analysis and Management (spring)
UEP 256 Program Evaluation (fall and spring)
UEP 261 Community Development, Planning, and Politics (spring)
UEP 276 Leadership and Organizational Development (fall)

MCO Electives

Select up to three skills and urban and social policy electives from the following:

- UEP 161A** Writing and Public Communication
UEP 205 Urban Planning and Design
UEP 213 Housing Policy
UEP 230 Negotiation, Mediation, and Conflict Resolution
UEP 240 U.S. Social Welfare Policy
UEP 251 Economics for Planning and Policy Analysis
UEP 271 Community Economic Development
UEP 275 Policy Implementation and Innovation
UEP 282 Social Policy for Children and Families
UEP 284 Developing Sustainable Communities
UEP 294 Local Government Finance

(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 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. 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 (format code: UEP = Urban and Environmental Policy and Planning; CD = Child Study and Human 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 advisor.

1. Foundation course:

UEP 256 (also **CD 247**) Program Evaluation

2. One course in applied statistics and data analysis, for example:

CD 140 Problems of Research: Statistics

MPH 205 Principles of Biostatistics

NUTR 209 Statistical Methods for Nutrition Research

NUTR 211 Nutrition Data Analysis

PSY 107/108 Advanced Statistics

SOC 101 Quantitative Research Methods

UEP 254 Quantitative Reasoning for Policy and Planning

3. One course in research methods, for example:

CD 142 Problems of Research: Methods and Design

ED 271 Methods of Educational Research

MPH 201 Principles of Epidemiology

NUTR 210 Survey Research in Nutrition

OTS 210 Research Methods

SOC 105 Field Research

4. One elective in your area of interest or expertise: education, child development, nonprofit management, social or environmental policy, nutrition, or public health.

Certificate in GIS

A GIS certificate is available to students currently enrolled in one of the department's graduate programs. The certificate is awarded upon completion of five courses, including Introductory and Advanced GIS, and three additional approved electives. This certificate is only available to currently enrolled graduate students in the Graduate School of Arts and Sciences.

Certificate of Advanced Graduate Study (CAGS) in Urban Justice and Sustainability

The Certificate of Advanced Graduate Study in Urban Justice and Sustainability is a post-master's program for working professionals who are interested in enhancing their skillsets to be more effective in advancing urban justice and sustainability through public policy and planning practice, research, and activism. The certificate is rooted intellectually in three inter-related policy/planning themes: social justice, sustainability, and community engagement. The curriculum is delivered as a hybrid online plus on-campus program with opportunities for peer-to-peer and student-to-faculty interaction.

Required courses include an introductory five-day, on-campus summer intensive course; four online courses over the fall and spring semesters; and a concluding five-day summer intensive course. Students also pursue an independent project with mentorship and guidance from a UEP advisor.

For more detailed information, please visit the UEP website <http://as.tufts.edu/uep>.

Urban Studies

FACULTY COORDINATOR: **Justin Hollander**

The Minor in Urban Studies provides students with an opportunity to pursue their love of cities and communities and to study urban issues in depth. Students can select from a variety of courses that examine the interplay among the different groups occupying the urban space, the problems they confront, their struggle for recognition and power, and the forces shaping the physical terrain they inhabit. The minor offers a good foundation for students contemplating graduate work in urban planning, environmental policy, public administration, public policy, law, or social work. It also can 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. The completion of five courses (15 credits) from at least three different departments is required. Interested students should contact the Department of Urban and Environmental Policy and Planning (uep@tufts.edu). For more detailed information, please visit: <http://as.tufts.edu/uep/programs/minor>.

Water: Systems, Science & Society (WSSS) Graduate Certificate

PROGRAM DESCRIPTION

The goal of the graduate certificate program in Water: Systems, Science & Society (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 and knowledge to be an expert in a particular discipline. To ensure sufficient depth and expertise in that 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, Fine Arts, Engineering, Medicine, the Cummings School of Veterinary Medicine, the Friedman School of Nutrition Science and Policy, and the Fletcher School of Law and Diplomacy.

Curriculum: Incoming WSSS students join an interdisciplinary cohort of students from across Tufts' graduate schools. All students take courses containing water content and participate in joint activities, such as planning the annual WSSS symposium. Additionally, students customize their certificate by choosing to pursue one of two tracks: **practicum track or research track.**

Practicum Track: The practicum track offers WSSS students an opportunity to work in **small, interdisciplinary groups** through the completion of their practicum course. Many of the groups have the opportunity to **travel to domestic and international sites** and work directly with **clients in the water field**. Students often apply their learning from the practicum course in their individual WSSS internship requirement, which may align with the other graduate degree requirements of their school. The goal of the practicum track is for students to **gain professional experience** that equips them for creating solutions to real-world water issues.

Research Track: The research track offers WSSS students an opportunity to work on **self-directed projects** around water-related issues and topics. Topics may address local or international challenges and may warrant the **opportunity to travel to study locations**. Students may undertake their research individually or in **small, interdisciplinary groups** and may align their WSSS research project with the other graduate degree requirements of their school. The goal of the research track is for students to **gain presentation and publication experience** which equips them for pursuing future research activities and careers in the water field.

The WSSS graduate certificate requirements are completed in addition to the student's degree requirements, but the WSSS program usually will not add time to a graduate degree program. Upon completion of these activities, students receive a certificate and transcript notation for Water: Systems, Science & Society, as well as their graduate degree.

Note: Occasionally modifications may be made to these requirements; therefore, please confirm with school coordinators or program co-chairs at time of application.

For more information, please contact Jill Parlee, Assistant Director of Programs, Tufts Institute of the Environment, wsss@tufts.edu, 617-627-4140.

For more detailed information, including the curriculum timeline, the full list of track requirements, a list of approved WSSS courses, student and alumni information, and many other resources, please visit the WSSS website: www.tufts.edu/water.

Women's, Gender, and Sexuality Studies

DIRECTOR:

Hilary Binda,

Senior Lecturer, Visual and Critical Studies Department

Founding Director, Tufts University Prison Initiative at Tisch College of Civic Life

Senior Fellow, Tisch College

PROGRAM ADMINISTRATOR:

Audrey Aduama

AFFILIATED FACULTY:

More than fifty faculty members across Arts and Sciences are affiliated with WGSS as teaching faculty and/or mentors for senior projects. For an updated list and information about affiliated faculty please see the program website:

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

Women's, Gender, and Sexuality Studies is an interdisciplinary program that focuses on research and teaching in three overlapping fields of inquiry. Scholarship in Women's, Gender, and Sexuality Studies integrates knowledge and methodologies from many disciplines to analyze the various historical and political circumstances, social and economic forces, and cultural representations that shape gendered lives. It emphasizes the fundamental intersection of gender and sexuality with other crucial categories of human identity and experience, including race, ethnicity, and class. It explores the connections between the individual and institutional systems of power in local, national, and transnational contexts. It draws on the insights of feminist theory and practice and develops new modes of critical thought and new models for activism. The program offers a number of interdisciplinary courses, including introductory courses and special topics courses open to all undergraduates; in addition, it brings together a wide range of courses taught in different departments and programs, each contributing a unique approach to specific topics and materials within the broad and diverse study of women, gender, and sexuality. Additionally, the WGSS program organizes lectures, faculty research colloquia, and other academic events, including annual public forums in which students present their research and capstone projects.

UNDERGRADUATE MAJOR REQUIREMENTS

The major in Women's, Gender, and Sexuality Studies gives students the opportunity to pursue their own intellectual interests within the multi-faceted study of women, gender, and/or sexuality. All majors take two interdisciplinary courses offered by the Program (WGSS 72: Intro to WGSS and WGSS 190: Doing Feminist Research); two core courses that explore the broad, foundational questions and arguments within specific disciplines or interdisciplinary fields of study; and five electives chosen from at least three different departments or programs that engage particular subjects, issues, and materials in the study of women, gender, and/or sexuality. In addition, all majors do a capstone project in the senior year, either as a mentored independent project (WGSS 193) or, if eligible, an honors thesis (WGSS 198/199). The director of WGSS serves as academic advisor to the major and oversees the progress of all students in the program. Two faculty mentors from different disciplines appropriate to the topic advise on the capstone project or thesis in the senior year. With the director's approval, one internship for credit, one Experimental College course, and one independent research course may count as electives. All courses must be taken for a letter grade and receive a grade of C- or higher. With approval from the director, up to 12 SHUs can be transferred from another institution towards the major.

UNDERGRADUATE MINOR REQUIREMENTS

The WGSS interdisciplinary minor complements and may also integrate with a student's major. Students pursuing the minor in Women's, Gender, and Sexuality Studies take a total of 18 SHUs, including two interdisciplinary courses offered by the program (WGSS 72: Intro to WGSS and WGSS 190: Doing Feminist Research) and three electives from at least two different departments or programs that engage particular subjects, issues, and materials in the study of women, gender, and/or sexuality. It is recommended that one core course be included among the electives. In addition, all minors do a capstone project in the senior year, either as a mentored independent project (WGSS 193) or, with approval from the program director, by doing a substantial research paper/project in a fourth WGSS elective course. The director advises on course selection to fit each student's interests and to identify a framework for the capstone project. Two faculty mentors from different disciplines appropriate to the topic advise on the capstone project in the senior year. If completed by doing a substantial research paper/project in a fourth WGSS elective, the instructor of the course acts as mentor and grades the paper, a copy of which must be delivered to the WGSS office to fulfill the capstone requirement. All courses must be tak-

en for a letter grade and receive a grade of C- or higher. With approval from the director, six SHUs can be transferred from another institution towards the minor.

GRADUATE COURSES

Tufts is one of the nine institutional members of the Graduate Consortium in Women's Studies (GCWS), which offers a changing curriculum of interdisciplinary, team-taught graduate level courses for credit toward a Tufts graduate degree (with departmental advisor approval). Undergraduates doing research in a relevant topic can apply to be admitted to a GCWS course. The courses have a Tufts registration number. For more information about specific courses, the application process, and other Consortium programs for graduate students, including conferences, a dissertation writing workshop, and the annual Mother Board writing prize, contact the Consortium at 617-642-3485 or visit <http://mit.edu/gcws>.

WGSS CURRICULUM

Women's, Gender, and Sexuality Studies lists at least twenty courses each semester in a wide range of subjects and materials offered by departments and programs, including those taught regularly and as special topics within the WGSS Program. See the Program website at <http://ase.tufts.edu/wgss> for specific semester listings, course descriptions, and other information about the Women's, Gender, and Sexuality Studies requirements and curriculum.

World Literature

Tufts makes available a wide range of courses on foreign literatures in English translation, Anglophone literatures abroad, diaspora literatures and other cross-cultural literary surveys, as well as introductory survey courses of foreign literatures in the original languages. For a full list of such courses, see the information about International Literary and Visual Studies (ILVS) at the following site: <http://ase.tufts.edu/ILVS>, and the course offerings of the various foreign language and literature departments: Classics (which comprises Greek and Latin); Drama; International Literary and Cultural Studies (which comprises Arabic, Chinese, German, Hebrew, Japanese, Judaic Studies, Middle Eastern Studies, and Russian); and Romance Studies (which comprises French, Italian, Portuguese, and Spanish). The nearest equivalent to a major in World Literature is the major in ILVS. Please see the description of that major at the site referred to above. The Department of English and the Department of Drama and Dance also offer majors with a broadly international and cross-cultural orientation. See those departmental websites for details.

Undergraduate

Minor Requirements

Additional Information:

- [Declare a Minor](#)
- [Minor Certification Form](#)

Latin American Studies is increasingly important in the world and for the United States in particular. Latin American Studies is an Interdisciplinary minor, which encourages students to integrate the varying disciplinary perspectives of the arts, literature, social sciences, and history, along with the study of languages of the area, into a coherent view of Latin America.

The Latin American Studies Minor (LAS) allows students to explore the region from a multidisciplinary perspective. It encourages students to integrate their study of the arts and literature, history, and social sciences into a unified view of Latin America.

In pursuing the minor, students can draw on resources throughout the university, including courses on Latin America in Anthropology, History, Music, Political Science, and Romance Studies. In their senior project, students also have the opportunity to explore a theme of particular interest with the coordinated support of the faculty advisors from different fields.

In addition to providing insight into the culture, economy, history, and politics of our hemispheric neighbors, Latin American Studies offers students planning to pursue careers in diplomacy, international business, and law or graduate study in the humanities and social sciences a solid grounding in the region that will help link theory with Latin American reality and culture with history and politics.

There are three requirements for completing a minor in Latin American Studies:

1. Study of one of the region's languages for three years or the equivalent.
2. Five courses in Latin American Studies, including at least one course from each of two disciplinary areas: Arts, Literature, and Culture, and Social Science.
3. A senior project (normally done in the second semester of the senior year) that integrates at least two of the three disciplinary areas of the minor. This project may be written work, a photography exhibit, a performance or some other creative work. Student will work with at least two core LAS faculty advisors from two different disciplines, as project director and second reader. Students will participate in a monthly senior project seminar taught by the entire Latin American Studies faculty and receive a full course credit for their project. The project will conclude with an oral defense.

Courses marked with an asterisk (*) are only partly on Latin America. Students may credit only one of those courses for the minor and only if the student does the written work for the course on a Latin American subject and the instructor testifies to that in writing. Students may count no more than one asterisked course for the minor.

Courses marked with a double asterisk (**) are Latino Studies courses. Students can credit no more than one Latino Studies course for the Latin American Studies minor.

Students are allowed to double-count for the minor no more than two courses that they are also using to fulfill their major.

Students are allowed to count for the minor no more than two courses taken at other institutions, even if they have been accepted for transfer credits. Courses taken at Tufts programs abroad are exempt from this limitation.

Research Resources

Students thinking about conducting a research project, such as a senior thesis, should be aware of the numerous support programs and publication opportunities on Tufts campus. For details about this program visit the [Academic Resource Center](#) website.

Requirements for the Latin American Studies major consist of 10 courses as follows (This is NOT a complete list, please consult each Department's listing):

I. Three courses in the Social Sciences or History:

- ANTH 128: Mesoamerican Archeology
- ANTH 16: Intr. Latinx Cultures *
- HST 18: Colonial Latin America
- HST 19: Modern Latin America
- HST 115: Revolution in Latin America: Mexico and Cuba
- HST 116: Revolution in Central & South America
- HST 192: Research Seminar in Latin American History
- PS 127: Latin American Politics
- PS 138: Political Violence in State and Society
- PS 170: Seminar: International Human Rights and Humanitarian Law
- SOC 188: Comparative Social Inequality
- SOC 050: Globalization and Social Change
- SOC 072: Sociology of Latinxs **
- SOC 148: Latin American Society

II. Three courses in Art History, Literature or Culture (at least one course must have an advanced Language pre-requisite):

- DR 51: Latino Theatre and Film**
- DR 70: Latin American Theatre and Film
- FAH 7: Introduction to Latin American Art
- FAH 81/181: Twentieth-Century Mexican Art
- FAH 83/183: Gender in Latin American Art
- FAH 84/184: Latin American Cinema
- FAH 92-01 Colonial Mexican Art & Architecture
- FAH 280: Decolonial Aesthetics**
- SPN 31: Survey of Latin American Literature from Nation Building to the 21st Century
- SPN 33: Survey of Latin American Literature from Colonial Times to Nation Building
- SPN 50/150: Latin American Civilization
- SPN 104: Poetry in Spanish America
- SPN 107: Testimonial and Chronicle Writing of Latin America
- SPN 108: Latin American Women Writers
- SPN 148: Health in the Spanish Speaking-World
- SPN 151: New Latin American Film
- SPN 153: Borges and the Encyclopedic World
- SPN 154: Experiments with Reality in Latin American Fiction
- SPN 155: Film and Representation in Latin America
- SPN 159: Mapping the Latin American Metropolis
- SPN 180/VISC 192: Icons of Latin America
- SPN 184: Mexican Cinema & Identity
- SPN 191/SPN192: Special Topics: Latin American literature or civilization
- VMS 80: A view of Ancient Middle and South American Art
- VMS 155: Reimagining the Americas, Colonialism, and Visual Culture
- VMS 190: The Art of Building Empire
- VMS 182: Art of the Maya: Ancient Cultures and Modern Survivors
- VISC 192/SPN 180: Icons of Latin America

- III. **Three electives from any of the approved courses listed.** One of these electives may be a Latino Studies course or a Natural Science course (if specific to Latin America) upon approval of the LAS program director. An internship may also be considered with the approval of the director. If a student decides to write a Senior Thesis, one of these electives will be the first semester of the Senior Thesis.
- IV. **One Senior Seminar or a one-semester Independent Research Project LAS 197/198 (in consultation with the Major adviser), or the second semester of a Senior Thesis.**

IMPORTANT NOTES:

- At least one of the requirements must focus on pre-20th century Latin America and at least one of the requirements must focus on indigenous cultures/societies.
- This list is a sample of courses but is **NOT** a complete list. Before you register, consult the listings in the course's home department.

Courses listed with an asterisk (*) are not exclusively concerned with Latin American material. Students who wish to count these courses for LAS must first consult with the course instructor, they must focus their course work on appropriate LAS topics, and they must complete a Course Content Certification Form. Students may count no more than one asterisked course for the minor.

Courses listed with a double asterisk ()** are Latino Studies courses. Students may credit no more than one Latino Studies course for the major or minor.

Advising

Students may contact any of the [LAS faculty](#) for advising.

Research Resources

Students thinking about conducting a research project, such as a senior thesis, should be aware of the numerous support programs and publication opportunities on Tufts campus. For details about this program visit the [Academic Resource Center](#) website.

Urban and Environmental Policy and Planning

Professor Julian Agyeman, *Sustainability policy and planning, environmental and food justice, intercultural cities*
Professor Sheldon Krimsky, *Lenore Stern Professor in the Humanities and Social Sciences; Environmental policy and ethics*
Associate Professor Mary E. Davis, *Environmental health, economic analysis*
Associate Professor Justin Hollander, *Land use planning, urban redevelopment, shrinking cities*
Assistant Professor Shomon Shamsuddin, *Social policy, community development*
Lecturer Laurie Goldman, *Social welfare and housing policy, policy implementation, and public and nonprofit management*
Assistant Professor Shan Jiang, *Spatial data analytics; infrastructure and transportation planning;*
Lecturer Penn S. Loh, *Director of the Masters of Public Policy Program and Community Practice; Environmental justice*
Lecturer Barbara Parmenter, *Student Affairs Coordinator; Geographic information systems*
Lecturer Ann Rappaport, *Environmental management and policy*
Assistant Professor Kristin Skrabut, *Urban anthropology; Poverty and development; Latin America*
Lecturer Sumeeta Srinivasan, *Spatial models and geographic information systems*
Lecturer Jonathan Witten, *Land use planning, local government law, natural resources policy*

The Department of Urban and Environmental Policy and Planning (UEP) offers four graduate programs culminating in either a Master of Arts (M.A.), Master of Science (M.S.), or a Master of Public Policy (M.P.P.) degree, as well as an undergraduate Minor in Urban Studies. Students enrolled in one of the department's graduate programs who complete a sequence of GIS courses are also eligible for a graduate certificate in GIS. UEP also is a key participant in two interdisciplinary programs at Tufts: Environmental Studies Program and Water: Systems, Science and Society (WSSS) Program. 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 community well-being by helping them understand, empathize with, and respond to the social, economic, and environmental needs of individuals and communities.

UNDEGRADUATE PROGRAM

Undergraduate Minor in Urban Studies

The Minor in Urban Studies provides students with an opportunity to pursue their love of cities and communities and to study urban issues in depth. Students can select from a variety of courses that examine the interplay among the different groups occupying the urban space, the problems they confront, their struggle for recognition and power, and the forces shaping the physical terrain they inhabit. The minor offers a good foundation for students contemplating graduate work in urban planning, environmental policy, public administration, public policy, law, or social work. It also can 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. The completion of five courses from at least three different departments is required. Interested students should contact the Department of Urban and Environmental Policy and Planning (uep@tufts.edu). For more detailed information, please visit:

<http://as.tufts.edu/uep/programs/minor>.

AFFILIATED PROGRAMS

Environmental Studies Program

UEP actively engages with the undergraduate environmental studies program teaching a core course and participating in program governance and development. The program's Sustainability, Policy, and Equity track is closely aligned with UEP, as is the Food Systems, Nutrition and the Environment track. Opportunities for UEP students include teaching assistant positions as well as collaborations with faculty and students in a wide variety of disciplines.

Water: Systems, Science and Society (WSSS) Program

All of the major graduate schools at Tufts University participate in the graduate certificate program in Water: Systems, Science and Society (WSSS), which is a model for integrative graduate education that organizes research and training on water policies and issues across disciplinary boundaries. MA/MS/PhD student participation in the program does not add time to their degrees and is done through their home department. The goals of this unique certificate program are to develop interdisciplinary research and practices that will make significant contributions, and to educate a diverse, ethical, skilled set of professionals who are trained in a multidisciplinary approach within a specialized degree.

UEP students enrolled in the WSSS certificate program select either the practicum track or the research track, and

take either 2 or 3 WSSS-approved courses that also count toward the UEP degree. UEP faculty participate in all aspects of WSSS including teaching courses and serving on the WSSS Steering Committee.

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 well-being by helping them understand, empathize with and respond to the social, economic and environmental needs of individuals and communities.

We offer four graduate programs in public policy and planning: a Master of Arts (M.A.) degree in urban and environmental policy and planning (accredited by the Planning Accreditation Board), a Master of Science (M.S.) degree in Environmental Policy and Planning, a Master of Science (M.S.) degree in Sustainability, and a Master of Public Policy (M.P.P.) degree. These degrees equip public-spirited individuals for rewarding careers in government, nonprofit organizations, citizen advocacy groups, and the private sector.

UEP has a flexible M.A./M.S. and M.P.P. curriculum built around a set of six core values:

1. An appreciation of the inextricable linkages between social, economic and environmental issues and the ability to make policy and planning recommendations accordingly.
2. 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.
3. An appreciation of the deeply embedded nature of gender, age, race, class, disability, culture and sexual orientation in all aspects of public policy and planning.
4. An appreciation of the centrality of spatial, social and environmental justice to all aspects of public policy and planning.
5. An appreciation of the need to understand the role of individual and community rights and responsibilities in public policy and planning.
6. 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.

The accredited urban planning degrees (M.A./M.S.) also requires a set of competencies based on three areas:

Knowledge—Upon completion of the MA program, students should have basic familiarity with:

- The history, structure and function of urban and metropolitan settlements.
- Economic influences on policy and planning (e.g., "market" and "polis" relations).
- Environmental, social and cultural influences on policy and planning.
- The different roles of government, governance and citizenship in policy and planning.
- The history, theory and processes of both policy making and planning together with implementation procedures and practices.
- Evaluation of policy and planning.
- The administrative, legal and political aspects of policy and plan-making.
- Areas of specific policy or planning content-based knowledge related to their professional interest(s) and an in-depth knowledge of one policy or planning domain through the thesis or other terminal project.

Skills—Upon completion of the accredited urban planning M.A./M.S. program, students should have basic skills in the following:

- Critical thinking skills
 - Individual problem identification and documentation of the extent of the problem as well as the political, social, environmental and spatial context
 - Identifying possible analysis strategies and their implications
 - Identifying criteria for proposing and selecting solutions
 - Evaluating the development and results of policies and plans

- Research skills
 - Research design
 - Literature collection and analysis
 - Identifying and assessing data sources and limitations
 - Development of data collection instruments and tools
- Data analysis skills
 - Interpreting and synthesizing data
 - Drawing inferences from specific observations to make more generalizable findings
 - Comparative and longitudinal analysis
 - Recognizing and accounting for limitations to findings
- Qualitative skills
 - Direct observation and analysis of primary and secondary qualitative data
- Quantitative skills
 - Descriptive and inferential statistics
 - Basic forecasting
 - Use of spreadsheets and statistical software
- Spatial analysis skills
 - Ability to identify spatial problems and frame spatial questions for analysis and research
 - Use of Geographic Information Systems for basic spatial analysis and mapping
- Communication skills
 - Written, oral and graphic communication
 - Presentation strategies and methods

Policy and Planning in Practice—The accredited urban planning M.A./M.S. program will provide the following professional opportunities and training:

- At least 150 hours, supervised, in an organization relevant to the student's interests
- Demonstration through the Internship Agreement and Learning Assessment that the internship gave the opportunity for significant learning in a field relevant to the student's interests and meets at least one of his or her career goals
- Reflections on the role of ethics in professional policy and planning processes, practices and behavior
- Synthesis and application of policy and planning content-based knowledge from theory into practice
- Collaborative group management, problem solving, negotiation and mediation
- Organizational management, including decision making and strategic problem solving, human resource development, and financial management and resource development
- Political and economic power mapping

Master of Arts and Master of Science

The accredited urban planning Master of Arts (M.A.) in Urban and Environmental Policy and Planning and Master of Science (M.S.) in Environmental Policy and Planning degrees require completion of twelve or thirteen courses (36-39 credit hours) plus a thesis or capstone exam for a minimum of 42 credit hours. 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. The two degrees are identical in their core requirements, and differ in the choice of environmental electives and thesis/capstone topic selected in consultation with a student's academic advisor.

Degree Requirements

The M.A./M.S. degrees require a minimum of 42 credit hours. Individual course requirements are as follows:

- Five required core courses (16 credit hours) covering theoretical foundations of policy and planning, and the development of relevant professional skills;
- Seven to eight elective courses or modules (20-24 credit hours) approved by student's advisor;
- An internship in public policy or planning; and
- A master's thesis or capstone exam (may count for 3 or 6 credit hours).

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 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 center on the following:

- Sustainable communities
- Environmental and food justice
- Community development and housing
- Race, class, and social welfare policy
- Child and family policy
- Land use planning
- Natural resource policy and planning
- Science/technology, ethics, and environmental policy
- Environmental health and risk
- Corporate management of environmental issues
- Climate change
- International urban and environmental policy
- Program evaluation
- Applied research methods
- Planning tools, techniques, and strategies
- Citizen roles in policy and planning
- Policy and planning for intercultural cities

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 reports.

Capstone Exam

The capstone exam requirement represents a topic-based assessment of an individual student's interests in the fields of policy and planning. The student chooses major and minor topics in collaboration with a faculty advisor and reader(s) in a fashion similar to the selection of a thesis topic. There are three separate components to the capstone exam: (1) a detailed literature review; (2) a take-home exam; and (3) an oral exam.

Master of Science (M.S.) in Sustainability

The M.S. in Sustainability degree requires a minimum of 36 credit hours. Individual course requirements are as follows:

- Six required core courses (19 credit hours) covering the foundations of sustainability policy and planning, and the development of relevant professional skills;
- Five electives (14 credit hours) approved by student's advisor
- An internship or capstone experience (3 credit hours).

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

1. Socio-ecological Systems Thinking for Sustainability
2. Economics for Policy and Planning
3. Quantitative Reasoning
4. Intro to GIS
5. Field Projects

In addition, students select a sixth core course from the following options:

Program Evaluation OR the two-part course module: Sustainability Analytics AND Sustainability Metrics and Decision Tools

Electives

Five electives (minimum of 14 credit hours) are selected in consultation with an advisor, focused on theoretical foundations, policy, and planning for sustainability.

Internship or capstone experience

Students will elect to complete an internship or capstone experience (3 credit hours), in consultation with an advisor.

Master of Public Policy

The Master of Public Policy (M.P.P.) is 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 30-credit hour degree in one year; part-time enrollment options are also available.

Degree Requirements

- Four required core courses that enable 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.
- Four elective courses in a public policy area.
- Two additional elective courses in policy and planning fields or professional skills.

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 (two credit hours, fall, in the first semester of student's program)
4. Integrative Seminar (one credit-hour, spring, in the last semester of the student's program)

The required *Reflections on Public Policy* seminar 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. Electives are chosen among the full list of the department's course offerings in consultation with the student's advisor. 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 advisor. In addition, with the advisor's approval, one class at a consortium school may be taken 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 this area(s) of interest.

All our courses focus on urban, social and/or environmental policy issues. A student can choose from one or more of these areas, or 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
- Community Development, Planning and Politics
- Community Economic Development
- Climate Change Policy, Planning and Action
- Environmental Law
- Water Resources Policy and Planning and Watershed Management
- Corporate Management of Environmental Issues
- Developing Sustainable Communities
- Environmental Justice, Security and Sustainability
- International Planning and Urban Policy

Professional Practice Electives

Students also have opportunities to enroll in courses that enhance their professional practice skills, such as:

- Leadership and Organizational Development
- Financial Analysis and Management
- Philanthropy and Fundraising
- Negotiation, Mediation, and Conflict Resolution
- Program Evaluation
- Local Government Finance

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 application deadline for international applicants is December 31; the deadline for the M.P.P. program is January 15 (all applicants) 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. (See Interdisciplinary Doctorate in this bulletin for program description.)

Combined Bachelor's/M.A. Degrees Program

The Combined Bachelor's/Master's Degrees Program is offered by the College of Liberal Arts and the Graduate School of Arts and Sciences and is administrated by UEP. Exceptional students may combine undergraduate and graduate courses and are simultaneously enrolled in the bachelor's and master's degrees. It is expected that the student will complete the Combined Bachelor's/Master's Degrees Program in five years.

The Program is open to all majors offered in the College of Liberal Arts. Potential related majors include (but not limited to) anthropology, architectural studies, biology, community health, economics, environmental studies, sociology, and political science. The relevant master's degree is the Master of Arts (M.A.) in Urban and Environment Policy and Planning or the Master of Science (M.S.) in Environmental Policy and Planning, which requires two years of full-time study ordinarily for a total of 42 credit hours.

Students seeking admission to the Program should consult their undergraduate major advisors and UEP student affairs coordinator before applying. 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. A student may elect to withdraw from the Program at any time by filing the appropriate petition.

Joint and Dual Degree Programs

UEP offers a joint master's degree program with the departments of Civil and Environmental Engineering and Economics. Students complete core requirements in UEP and the affiliated department to receive a single M.S. degree. It is possible to complete the joint degree requirements in two years. UEP also offers dual degree programs with the Fletcher School, Department of Civil and Environmental Engineering in the School of Engineering, Friedman School of Nutrition Science and Policy, Department of Public Health and Community Medicine in the School of Medicine, Boston College Law School, and Boston College Carroll School of Management.

For the dual degree programs, each department/school reviews candidates based on its own requirements and criteria. The candidate's admission to UEP is not affected by that of the other department/school, and vice versa. Students are required to meet with academic advisors from both UEP and the other department/school to plan a course of study that balances each student's background and interests with the requirements of the specific program.

Please note: these programs are not available to students in the M.P.P. program.

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 and environmental engineering. The joint degree program results in an M.S. degree, while the dual degree program results in both the M.A. and M.S. degrees. The former requires twelve full semester courses or equivalent in course modules, plus a thesis, while the latter requires seventeen courses or equivalent in course modules, plus a thesis, and can be completed in five semesters.

Environmental Economics and Urban Planning

There is a natural linkage between economics and public policy and planning. Public policy issues have inspired some of the classic studies in economics. Also the tools of economic analysis can be applied to a wide variety of policy and planning questions. The joint M.S. degree in UEP/Economics offers students an opportunity to explore these longstanding linkages and to develop skills in policy analysis and planning using economic analysis. A student who completes the program is awarded an M.S. degree in Environmental Economics and Urban Planning.

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 M.A. 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.

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 non profit 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 programs with the Agriculture, Food, and Environment (AFE) program and the Food Policy and Applied Nutrition (FPAN) program of the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy are 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 these programs 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 two programs, the dual degree can be completed in three instead of four years. Students receive both an M.A. degree in urban and environmental policy and planning and an M.S. degree in agriculture, food, and environment or an M.S. degree in food policy and applied nutrition.

UEP and Public Health and Community Medicine

Increasingly, public health, community planning and environmental policy have become integrated in the field. A student completing this dual degree program earns an M.P.H. (master of public health) degree from the School of Medicine and an M.A. degree in urban and environmental policy and planning. The program generally requires six semesters of full-time study. Students enroll in three semesters at UEP and three semesters (including summers) at the M.P.H. program. The preferred sequence of enrollment is for students to enroll in UEP for their first and second semesters. The student then enrolls in the M.P.H. program in their third and fourth semesters, and splits their final year between UEP and M.P.H. enrollment. Students are encouraged to integrate their knowledge in both programs from the start, as those enrolled in either program may take courses to fulfill degree requirements via cross registration.

UEP and the Boston College Law School

This program is for students interested in exploring the connections between the law and urban and environmental policy and planning. Students receive two degrees—an M.A. and a Juris Doctor (M.A./J.D.). The dual degree program recognizes that the fields of law and planning are inexorably linked. Planning (including policy analysis) is a process of guiding future developmental patterns; the law frames the mechanisms and limits of governments' control over this process. Planning and law immerses students in broad debates and critical thinking about the environment, human settlements, social and environmental justice, corporate responsibility, and land use. All of these issues are guided by constitutional, equitable, and pragmatic principles.

The M.A./J.D. is offered through collaboration between UEP and the Boston College Law School. There is currently no graduate program in New England which offers the combined strengths of this dual degree program.

During their first year, students choose to take courses either through UEP or the law school exclusively. Students split their courses between the department and the law school in the years that follow. Students may transfer credits toward each degree, allowing them to concentrate their studies and complete the program in four years (as opposed to five, which would be typical if a student were pursuing each degree separately). For detailed information on the requirements for the J.D., please contact the Boston College Law School, Newton, MA 02459, or visit www.bc.edu/schools/law/home.html.

UEP and the Boston College Carroll School of Management

This program is designed for students who want to develop leadership and management skills to implement policy and planning initiatives, and those interested in social entrepreneurship, corporate social responsibility and sustainability. Students receive two degrees—a Master of Arts and a Master of Business Administration (M.A./M.B.A.). The dual degree recognizes that the fields of planning, policy and management have always been linked, but the value of the nexus increases with a complex global economy and growing world population. Planning, policy and management disciplines

have embedded in them broad debates and critical thinking about the environment, human settlements, social and environmental justice, corporate responsibility, sustainable communities, and land use, each guided by core values, accountability and professional practice. The values-driven nature of both programs means that in scholarship and practice, faculty and students in the dual program actively negotiate the evolving relationship between business and civil society.

The M.A./M.B.A. program, offered through collaboration between UEP and Boston College's Carroll School of Management (CSOM), is unique, offering students the opportunity to capitalize on the strengths of two nationally recognized schools. During their first year, students choose to take courses either through UEP or CSOM exclusively. Students split their coursework between UEP and CSOM in the years that follow, ultimately spending three semesters registered at CSOM and three semesters registered at UEP. For detailed information on requirements for the M.B.A., please see www.bc.edu/content/bc/schools/csom/graduate.html.

CERTIFICATE PROGRAMS

In addition to the master's programs, UEP 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 current careers or to move into new professional work. A third certificate in program evaluation is offered in collaboration with the Department of Child Study and Human 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 (12 credit hours) 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 M.A./M.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, visit <http://gradstudy.tufts.edu>.

Certificate Program in Community Environmental Studies

The certificate in community environmental studies (CES) provides professional training for careers in today's 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 (12 credit hours).

CES Core Courses

Select at least one core course from the following:

UEP 200 Land Use Planning I: Nonregulatory Tools and Techniques (fall)

UEP 201 Land Use Planning II (spring)

UEP 207 Environmental Law (spring)

UEP 221 Climate Change Policy and Planning (spring)

UEP 223 Fundamentals of U.S. Agriculture (fall)

UEP 279 Water Resources Policy, Planning, and Watershed Management (fall)

CES Electives

Select up to three skills and environmental policy electives from the following:

UEP 161B Writing and Public Communication

UEP 173 Transportation Planning

UEP 205 Urban Planning and Design

UEP 206 Planning for Low Impact Development

UEP 230 Negotiation, Mediation, and Conflict Resolution

UEP 232 Introduction to Geographic Information Systems

UEP 233 Regional Planning: Tools and Techniques

UEP 234 Qualitative Analysis for Planning and Public Policy

- UEP 242** International Planning and Urban Policy
UEP 264 Green Urban Design
UEP 265 Corporate Management of Environmental Issues
UEP 278 Environmental Justice, Security, and Sustainability
UEP 284 Developing Sustainable Communities
UEP 286 Environmental Ethics
UEP 294-16 Special Topics: Public Health and the Built Environment

(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 (MCO) 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 in effective management who are committed to social policy and 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 (12 credit hours).

MCO Core Courses

Select at least one core course from the following:

- UEP 251** Economics for Policy and Planning (spring)
UEP 253 Financial Analysis and Management (spring)
UEP 256 Program Evaluation (fall and spring)
UEP 261 Community Development, Planning, and Politics (spring)
UEP 276 Leadership and Organizational Development (fall)

MCO Electives

Select up to three skills and urban and social policy electives from the following:

- UEP 161A** Writing and Public Communication
UEP 205 Urban Planning and Design
UEP 213 Housing Policy
UEP 230 Negotiation, Mediation, and Conflict Resolution
UEP 240 U.S. Social Welfare Policy
UEP 251 Economics for Planning and Policy Analysis
UEP 271 Community Economic Development
UEP 275 Policy Implementation and Innovation
UEP 282 Social Policy for Children and Families
UEP 284 Developing Sustainable Communities
UEP 294 Local Government Finance

(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 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. 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 (format code: UEP = Urban and Environmental Policy and Planning; CD = Child

Study and Human 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 advisor.

1. Foundation course:

UEP 256 (also **CD 247**) Program Evaluation

2. One course in applied statistics and data analysis, for example:

CD 140 Problems of Research: Statistics

MPH 205 Principles of Biostatistics

NUTR 209 Statistical Methods for Nutrition Research

NUTR 211 Nutrition Data Analysis

PSY 107/108 Advanced Statistics

SOC 101 Quantitative Research Methods

UEP 254 Quantitative Reasoning for Policy and Planning

3. One course in research methods, for example:

CD 142 Problems of Research: Methods and Design

ED 271 Methods of Educational Research

MPH 201 Principles of Epidemiology

NUTR 210 Survey Research in Nutrition

OTS 210 Research Methods

SOC 105 Field Research

4. One elective in your area of interest or expertise: education, child development, nonprofit management, social or environmental policy, nutrition, or public health.

Certificate in GIS

A GIS certificate is available to students currently enrolled in one of the department's graduate programs. The certificate is awarded upon completion of five courses, including Introductory and Advanced GIS, and three additional approved electives. This certificate is only available to currently enrolled graduate students in the Graduate School of Arts and Sciences.

For more detailed information, please visit the UEP website <http://as.tufts.edu/uep>.