This guide contains a list of courses by track (and descriptions) available for Environmental Studies Majors during Spring 2016.

**Upper level courses** often have pre-requisites, contact the instructor or department to confirm you meet those.

Changes in the listed courses might occur after the publication of this resource. Therefore, it is strongly recommended that you **check SIS** to make sure the information is correct.

Please let Sara Gomez know (sara.gomez@tufts.edu) should issues regarding a course arise.
Core courses and special listings

CHEM 008  Environmental Chemistry (Core course)
EC 008  Principles of Economics with Environmental Applications  (Core course)
EC 030  Environmental Economics (Core course)
EOS 002  Environmental Geology w/ Lab (Core course)
UEP 094  Environmental Policy, Planning and Politics (Core course)
ENV 099  Environmental Internship (Internship)
ENV 095  Special topics in Environmental Studies (Lunch & Learn)  - Does not count towards major

Unlisted courses that are environmentally-themed might be taken to count towards individual tracks if approved, but not to replace core courses. Examples include: Departmental seminars, Experimental College classes, University Seminars and Advanced Independent Research courses offered by different departments.

Track I: Environmental Science

ANTH 042  Extreme Environments: human adaptability to novel habitats
BIO 106  Microbiology w/Lab
BIO 130  Animal Behavior
BIO 133  Ecological Models and Data
BIO 144  Principles of Conservation Biology
BIO 164  Marine Biology
CEE 032  Environmental Engineering Principles
CEE 054  Fundamental Epidemiology
CEE 194-A  Special topics: Intro to Remote Sensing
CEE 214  Water Resource Systems
CHEM 042  Analytical Chemistry
EC 013  Statistics
EC 030  Environmental Economics
ENV 107  Intro to Geographic Information Systems
ENV 196-1  Research, Methods and Communication
ENV 197  Advanced GIS
ENV 199  Senior Honors Thesis
EOS 104  Geological Applications of GIS
EOS 133  Field Hydrogeology
EOS 288  Groundwater Modeling
ES 56  Probability and Statistics
MATH 021  Introductory Statistics
PHIL 033  Logic
UEP 232  Intro to GIS

Track II: Sustainability, Policy and Equity

ANTH 042  Extreme Environments: human adaptability to novel habitats
BIO 133  Ecological Models and Data
BIO 144  Principles of Conservation Biology
BIO 164  Marine Biology
CD 140  Problems of Research: Statistics
CD 142  Research Methods and Design
## Track II: Sustainability, Policy and Equity (Continued)

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<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CD 144</td>
<td>Qualitative and Ethnographic Methods on Applied Social Science Research</td>
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<tr>
<td>CEE 054</td>
<td>Fundamental Epidemiology</td>
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<tr>
<td>CEE 158</td>
<td>Occupational and Environmental Health</td>
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<td>CEE 173</td>
<td>Health Effects and Risk Assessment</td>
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<tr>
<td>CEE 194-A</td>
<td>Selected Topics: Introduction to Remote Sensing</td>
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<tr>
<td>CH 030</td>
<td>Community Health Methods</td>
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<td>CHEM 008</td>
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<td>EC 107</td>
<td>Econometric Analysis</td>
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<td>EC 130</td>
<td>Topics in Environmental Economics</td>
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<td>EC 132</td>
<td>Economics of Energy Markets</td>
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<td>EC 191-02</td>
<td>Intermediate Selected Topics: Urbanization in the Developing World</td>
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<td>ENV 107</td>
<td>Intro to Geographic Information Systems</td>
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<td>ENV 196-1</td>
<td>Research, Methods and Communication</td>
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<td>ENV 199</td>
<td>Senior Honors Thesis</td>
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<tr>
<td>ES 027</td>
<td>Public Health Engineering</td>
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<tr>
<td>INTR 92</td>
<td>Quantitative Methods in International Relations</td>
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<td>MATH 021</td>
<td>Introductory Statistics</td>
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<tr>
<td>NUTR 221</td>
<td>Global Food Business</td>
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<td>NUTR 233</td>
<td>Agricultural Science and Politics I</td>
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<tr>
<td>PHIL 124</td>
<td>Bioethics</td>
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<tr>
<td>PS 103</td>
<td>Political Science Research Methods</td>
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<tr>
<td>PSY 013</td>
<td>Social Psychology</td>
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<td>PSY 031</td>
<td>Statistics for Behavioral Science</td>
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<tr>
<td>PSY 032</td>
<td>Experimental Psychology</td>
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<tr>
<td>PSY 036</td>
<td>Experimental Social Psychology</td>
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<tr>
<td>SOC 113</td>
<td>Urban Sociology</td>
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<tr>
<td>UEP 094</td>
<td>Environmental Policy, Planning and Politics</td>
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<tr>
<td>UEP 101</td>
<td>Land Use Planning</td>
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<tr>
<td>UEP 221</td>
<td>Climate Change Policy</td>
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<td>UEP 230</td>
<td>Negotiation and Conflict Resolution</td>
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<tr>
<td>UEP 232</td>
<td>Intro to GIS</td>
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<tr>
<td>UEP 281</td>
<td>Toxic Chemicals &amp; Human Ecology</td>
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<tr>
<td>UEP 284</td>
<td>Developing Sustainable Communities</td>
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## Track III: Environmental Communication

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<tr>
<td>ANTH 020</td>
<td>Global Cities</td>
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<td>BIO 010</td>
<td>Plants and Humanity</td>
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<td>BIO 118</td>
<td>Plant Physiology</td>
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<td>BIO 144</td>
<td>Principles of Conservation Biology</td>
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<td>BIO 164</td>
<td>Marine Biology</td>
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<tr>
<td>CD 140</td>
<td>Problems of Research: Statistics</td>
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<tr>
<td>CD 144</td>
<td>Qualitative And Ethnographic Methods In Applied Social Science Research</td>
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Track III: Environmental Communication (Continued)

CEE 158      Occupational and Environmental Health
CEE 194-A    Selected Topics: Introduction to Remote Sensing
CH 030       Community Health Methods
DR 027       Public Speaking
EC 030       Environmental Economics
EC 107       Econometric Analysis
ELS 105      Entrepreneurial Marketing
ENG 160      Environmental Justice and World Literature
ENV 107      Intro to Geographic Information Systems
ENV 150      Environment, Communication and Culture
ENV 196-1    Research, Methods and Communication
ENV 197      Advanced GIS
ENV 199      Senior Honors Thesis
EXP 58       Social Marketing
FAM 064      Photography Foundations
FAM 065      Photography and Computer
PHIL 124     Bioethics
PS 103       Political Science Research Methods
PSY 013      Social Psychology
PSY 031      Statistics for Behavioral Science
PSY 032      Experimental Psychology
PSY 036      Experimental Social Psychology
SOC 040      Media and Society
SOC 102      Qualitative Research Methods
UEP 101      Land Use Planning
UEP 232      Intro to GIS

Track IV: Food, Nutrition and the Environment

BIO 010      Plants and Humanity
CD 140       Problems of Research: Statistics
CD 142       Research Methods and Design
CD 144       Qualitative And Ethnographic Methods In Applied Social Science Research
CEE 054      Fundamental Epidemiology
CEE 194-A    Selected Topics: Introduction to Remote Sensing
CH 030       Community Health Methods
EC 013       Statistics
EC 035       Economic Development
EC 048       Health Economics
EC 130       Topics in Environmental Economics
ENV 107      Intro to Geographic Information Systems
ENV 196-1    Research, Methods and Communication
ENV 197      Advanced GIS
ENV 199      Senior Honors Thesis
HIST 154     Health and Healing in Medieval and Early Modern Europe
NU 101       Introductory Human Nutrition
NUTR 221     Global Food Business
Track IV: Food, Nutrition and the Environment *(Continued)*

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<td>NUTR 227</td>
<td>International Nutrition</td>
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<td>NUTR 238</td>
<td>Economics of Food Policy Analysis</td>
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<tr>
<td>NUTR 327</td>
<td>Food Systems</td>
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<td>PS 103</td>
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<td>SOC 102</td>
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<td>UEP 232</td>
<td>Intro to GIS</td>
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COURSE DESCRIPTIONS

ANTH 20 GLOBAL CITIES
Cathy Stanton
MoWe 4:30PM - 5:45PM
Introductory-level urban anthropology class exploring cities as intersections of people, ideas, capital, and the physical environment. Themes include anthropological understandings of space and place-making; utopic and dystopic urban visions of the city; urban mobility; cities as nodes in global environments, economies, and networks of people and production; sensory experience and expressive culture in cities; urban “nature” (e.g., parks); difference and inequality in urban landscapes; the growth of urban populations and megacities; and tensions between the city as planned or conceptualized and the city as a lived experience.

ANTH 042 EXTREME ENVIRONMENTS: HUMAN ADAPTABILITY TO NOVEL HABITS
Stephen Bailey
MoWe 10:30AM - 11:45AM
Humans’ biological, cultural, and technological adaptations to five environments that test the extremes of our ability to inhabit: subtropical deserts, the arctic, the high plateaus of central Asia and South America, megacities, and space. Biological adaptations, including short term, developmental, and evolutionary, to multifactorial stressors in those environments. Interplay of biological with cultural adaptations ranging from educational, media, and literary negotiation of the unfamiliar, through complex social behaviors such as optimizing energy expenditures, to technological solutions as basic as fire or as complex as space suits. How these cultural responses buffer natural selection, but may also introduce novel stresses. Recommendations: Anthropology 40 or an equivalent introductory college biology course recommended.

BIO 010 PLANTS AND HUMANITY
George S Ellmore
TuWeFr 9:30AM - 10:20AM
(Cross-listed as ENV 10.) Principles of botany accenting economic aspects and multicultural implications of plants, their medicinal products, crop potential, and biodiversity. Emphasis placed on global aspects of this dynamic science, with selected topics on acid rain, deforestation, biotechnology, and other applications. Also covered are medicinal, poisonous, and psychoactive species, as well as nutritional sources from seaweeds and mushrooms to mangos and durians. Three lectures.

BIO 106 MICROBIOLOGY WITH LAB
Benjamin Wolfe
MoWe 1:30PM - 2:45PM
A survey to provide a general understanding of bacteria and viruses. Bacterial structure, growth, ecology, pathogenic mechanisms, and viral life cycles. The laboratory will familiarize students with microbiological methods and various groups of microorganisms. Three lectures, one laboratory per week. One and one-half credits. Requires completion of CHEM 0002 and BIO 0013 and BIO 0014 or graduate student.

BIO 118 PLANT PHYSIOLOGY
George S Ellmore
TuTh 12:00PM - 1:15PM
Interaction of living plant components performing biological functions including water transport, mineral uptake, movements, and signalling between plant parts in response to environmental cues. Prerequisites: Biology 13 and 14, or equivalent. Introductory chemistry recommended.
BIO 130 ANIMAL BEHAVIOR
Philip T.B. Starks
TuThFr 8:30AM - 9:20AM
(Cross-listed as ENV 130.) An examination of ethological theory: the development of behavior, orientation, migration, communication, and social behavior. Particular emphasis will be placed on the functioning of animal societies. Recommendations: BIO 13 and 14, or equivalent.

BIO 133 ECOLOGICAL MODELS AND DATA
Elizabeth E. Crone
TuTh 3:00PM - 4:15PM (LEC)
Mo 1:30PM - 4:00PM (LAB)
Probability and likelihood, fitting simple models to data, and using models to make predictions. Examples come from problems in ecology, with emphasis on monitoring plant and animal populations and forecasting how these populations will respond to changing environments. Includes use of discrete probability distributions (binomial and Poisson), building mixed and compounded probability distributions, an introduction to Bayesian statistics, and use of the open-source statistics program, R. Students should have a good working knowledge of high school algebra and an interest in ecology.

BIO 144 PRINCIPLES OF CONSERVATION ECOLOGY
Michael Reed
MoWe 1:30PM - 2:45PM
Learning and application of principles from population ecology, population genetics, and community ecology to the conservation of species and ecosystems. Focus on rare and endangered species, as well as threatened ecosystems. Includes applications from animal behavior, captive breeding, and wildlife management. Readings from current texts and primary literature. Prerequisite: Biology 14 or equivalent.

BIO 164 MARINE BIOLOGY
Jan Pechenik
TuWeFr 9:30AM - 10:20AM
(Cross-listed as ENV 164.) An intermediate-level introduction to the biology of marine organisms. Following a detailed survey of major marine animal and plant groups, the course will consider aspects of biology that are particularly relevant to marine organisms: adaptation to salinity and temperature fluctuation, bioluminescence and its ecological significance, locomotory mechanics, food-chain dynamics, dispersal and substrate selection, and control of species diversity. Requires completion of BIO 0013 or equivalent or BIO 0003 with a B- or better and BIO 0014 or graduate student.

CD 140 PROBLEMS OF RESEARCH: STATISTICS
Staff
Tu 1:20PM - 4:20PM
Elementary statistics procedures up through and including analysis of variance. Instruction and practice in use of prepackaged computer programs useful in social science research. Recommendations: Senior or graduate status and background in fundamental mathematics or elementary statistics.
CD 142 RESEARCH METHODS AND DESIGN
Kathleen A Camara
We 6:00PM - 9:00PM
Introduction to research design and field and laboratory methods relevant to child-study research. Topics will include experimental, quasi-experimental, and correlational design; measurement of behavior; data reduction; generalizability of findings; and ethical issues. Students will analyze and evaluate research studies and prepare a research proposal. Recommendations: Permission of instructor.

CD 144 QUALITATIVE AND ETHNOGRAPHIC METHODS ON APPLIED SOCIAL SCIENCE RESEARCH
Jayanthi Mistry
MoWe 3:00PM - 4:15PM
An interdisciplinary overview of qualitative research methods. Focus on providing tools and strategies for practitioners and researchers in social sciences to pursue systematic inquiry in applied settings.

CEE 032 ENVIRONMENTAL ENGINEERING PRINCIPLES
Kurt D. Pennell
TuTh 1:30PM - 2:45PM
Water quantity and quality, air quality, energy utilization, climate change, and sustainability. Material and energy balance. Chemical and biological transformations. Elementary transport and fatemodeling. Quantitative description of natural and engineered processes affecting environmental sustainability at local, regional, and global scales. Recommendations: ES 2, MATH 34 (formerly MATH 12), CHEM 1 or 11 or 16, and PHY 11

CEE 054 FUNDAMENTAL EPIDEMIOLOGY
Mark A Woodin
TuTh 1:30PM - 2:45PM
(Cross-listed as CH 54 and ENV 54.) A single course which provides students an introduction to epidemiologic techniques and analyses, including such topics as incidence and prevalence, age adjustment, and other techniques appropriate for the handling of confounders, the measurement of risk through the odds ratio and relative risk, and the interpretation of epidemiologic results. The course will feature applications of epidemiologic techniques to topics appropriate for public and community health applications such as those found in infectious disease control, screening for personal risk factors, and the conducting of disease cluster evaluations.

CEE 158 OCCUPATIONAL AND ENVIRONMENTAL HEALTH
David M Gute
MoWe 3:00PM - 4:15PM
(Cross-listed as ENV 158.) An examination of current topics in the area of occupational and environmental health, with particular emphasis on the types of materials that produce human health effects. Both clinical and epidemiologic data will be used to assess the public health importance of environmental pollutants and to evaluate the effectiveness of control strategies. Recommendations: Senior standing or consent of instructor.

CEE 173 HEALTH EFFECTS AND RISK ASSESSMENT
Anne Marie C Desmarais
MoWe 4:30PM - 5:45PM
CEE 194-A/ENV 196-2 SPECIAL TOPICS: INTRO REMOTE SENSING
Magaly Koch
TuTh 4:30PM - 5:45PM
This introductory course with no prerequisites deals with remote sensing sensors and their applications, the basics of image acquisition, processing and data analysis used in the field of geomatics, as well as conceptual issues involved with collecting data in the electromagnetic spectrum, storing, processing and analyzing remotely sensed datasets and images. The class focuses on learning fundamentals and designing a workflow in remote sensing to solve an environmentally based problem with real-world applications. The course is especially suitable for students exposed to Geographic Information Systems (GIS) who wish to explore collection of environmental data and imagery from remote platforms and explore the basics of visual interpretation, digital analysis and application of remote sensing in industry and academia.

CEE 214 WATER RESOURCE SYSTEMS
James F Limbrunner
MoWe 1:30PM - 2:45PM
Mathematical models of water resource and environmental systems are presented in combination with optimization procedures, decision theory, and environmental applied statistics to generate an integrated approach to the planning, design, and management of complex water resources systems. Water resources systems applications are formulated as decision problems where an optimal solution is sought, yet cost, safety, environment, and technology appear as competing constraints. Applications include regional water quality management; siting treatment plants; reservoir system operations; and design, irrigation, flood control, and watershed planning.

CH 030 COMMUNITY HEALTH METHODS
Shalini Tendulkar
TuTh 10:30AM - 11:45AM
Community health frameworks used to identify community health priorities and resources, as well as to develop and evaluate sustainable interventions in collaboration with community leaders. Emphasis on community health skills including assessment strategies; finding, analyzing and presenting public health data; and identifying and critically evaluating evidence-based interventions and assessing their potential fit with identified community priorities.

CHEM 008 ENVIRONMENTAL CHEMISTRY
Jonathan Kenny
MoWe 3:00PM - 4:15PM
An introductory course designed primarily to give non-science majors an appreciation of basic chemical principles underlying the causes of and possible solutions to current environmental problems. The concept of equilibrium in complex systems; thermodynamic limits and kinetic realities. Case studies from current literature. Prerequisite: High-school chemistry.

CHEM 042 QUANTITATIVE ANALYSIS
Charles R. Mace
TuWeFr 9:30AM - 10:20AM (LEC)
TuTh 6:30PM - 9:30PM / MoWe 1:20PM - 4:20PM / MoWe 6:30PM - 9:30PM (LAB, select ONE)
Introduction to the methods and scientific basis of quantitative analysis including sampling, error & statistical analyses, data treatment & presentation, basic concepts and operation of chromatographic, electroanalytical, and spectroscopic instrumentation. For chemistry and life science majors, as well as students enrolled in environmental studies and engineering. The course will provide students in chemistry or any related discipline with the necessary foundation, understanding, and basic tools for doing good science. Two lectures, two laboratories. One and one-half courses. Requires completion of CHEM 0002 or CHEM 0012.
DR 027 PUBLIC SPEAKING
Deborah H. Cooney
MoWe 1:30PM - 2:45PM / MoWe 3:00PM - 4:15PM (LEC, select ONE)
Introductory course exploring the fundamentals of clear, confident, and effective communication in one-on-one and group settings. Development of tension management skills, good breathing habits, awareness of body language, and the ability to engage an audience through a series of practical exercises. Specific vocal work focuses on tone, variety of pitch, rate, volume, and articulation.

EC 008 PRINCIPLES OF ECONOMICS WITH ENVIRONMENTAL APPLICATIONS
Ujjayant Chakravorty
MoWe 4:30PM - 5:45PM
An introduction to the fundamentals of microeconomic and macroeconomic analysis. Covers the same concepts and tools as Economics 5 with a focus on environmental issues, examples and applications. Satisfies all major or minor requirements satisfied by EC 5. EC 5 and 8 may not both be taken for credit.

EC 013 STATISTICS
Joseph Swingle
TuFr 8:05AM - 9:20AM (LEC)
Tu 4:30PM - 5:20PM / We 7:30PM - 8:15PM / Th 4:30PM - 5:20PM / Th 6:00PM - 6:50PM / Th 7:30PM - 8:15PM / Fr 8:30AM - 9:20 AM (RECIT, select ONE)
An introduction to basic statistical techniques that are used in economic analysis. Major topics include probability, discrete random variables, continuous random variables, sampling distributions, estimation, and hypothesis testing. The course will conclude with some theory and applications of the linear regression model. Required of all economics majors. Recommendations: EC 5, MATH 30 and 14 (formerly MATH 5 and 6), or MATH 32.

EC 030 ENVIRONMENTAL ECONOMICS
Brian Roach
MoWe 4:30PM - 5:45PM
(Cross-listed as ENV 30.) An examination of the uses and limitations of economic analysis in dealing with many of the environmental concerns of our society. Public policies concerning the environment will be evaluated as to their ability to meet certain economic criteria. Recommendations: EC 5.

EC 035 ECONOMIC DEVELOPMENT
Adam Storeygard
TuTh 10:30AM - 11:45AM / TuTh 12:00PM - 1:15PM (LEC, select ONE)
Problems in the growth of underdeveloped economies. Emphasis on quantitative models of economic growth at low levels of income and on the testing of various hypotheses proposed to explain underdevelopment. Consequences of market structures, population growth, externalities, institutions, and political factors for economic development. Recommendations: EC 5.

EC 048 HEALTH ECONOMICS
Judith Bentkover
Th 10:00AM - 12:30PM
An examination of major topics in the economics of health and health care, both in the United States and abroad, using the basic theoretical and empirical tools of economics. Covers the medical and nonmedical determinants of health, markets for medical care services and health insurance, and proposed ideas for health care reform. Special topics include AIDS, aging, and obesity. Recommendations: EC 5.
EC 107 ECONOMETRIC ANALYSIS
David Garman
TuWeFr 9:30AM - 10:20AM (LEC)
Tu 7:00PM - 9:00PM (RECIT, optional)
The study of multiple regression models and their applications. Focus on the properties of estimation techniques when the classical regression assumptions hold and when they do not hold. Topics include least squares estimation, instrumental variable estimation, panel data techniques, and time-series techniques. EC 15 and 107 may not both be taken for credit. Recommendations: EC 13 or equivalent, MATH 34 (formerly MATH 12) and MATH 70 or 72 (formerly MATH 46 or 54).

EC 130 TOPICS IN ENVIRONMENTAL ECONOMICS
Brooke Kelsey Jack
Tu 9:00AM - 11:30AM
Research seminar for students who wish to pursue environmental economics beyond the level of EC 30. Topics may include the design and administration of environmental excise taxes, the theory and practice of benefit-cost analysis, the economics of renewable and exhaustible resources, and the sustainability of economic growth. Recommendations: EC 11 and 30, or permission of instructor.

EC 132 ECONOMICS OF ENERGY MARKETS
Gilbert Metcalf
MoWe 10:30AM - 11:45AM
Analysis of energy markets and policy issues arising from our production and consumption of energy. Topics considered include the theory of depletable resources, measurement of energy externalities, market power in energy production, climate change and energy security. Recommendations: EC 11 and 13.

EC 191-01 INTERMEDIATE SELECTED TOPICS: URBANIZATION IN THE DEVELOPING WORLD
Anna Hardman
Th 1:30PM - 4:00PM
Lectures on intermediate topics in economics. Topics to be announced. Credit as arranged. Please see departmental website for specific details: http://ase.tufts.edu/econ/ Recommendations: EC 11, 12, or 13.

ELS 105 ENTREPRENEURIAL MARKETING
John Derby: We 1:20PM - 4:20PM
Gavin Finn: Mo 6:00PM - 9:00PM (LEC, select ONE)
This course focuses on institutional and product marketing methods used by start-up to medium-sized companies. After an overview of basic marketing principles, the course will cover the spectrum from day-to-day marketing activities of the entrepreneurial business to positioning and strategy. Students will learn to analyze, formulate, and implement marketing strategies, explore concepts for understanding customer behavior and creating entrepreneurial marketing strategy, and learn the fundamentals of market research, pricing, and reaching and selling to customers.
ENG 160 ENVIRONMENTAL JUSTICE AND WORLD LITERATURE
Modhumita Roy
TuTh 10:30AM - 11:45AM
(Cross-listed as ENV 160 and PJS 160). An examination of contemporary world literature in relation to environmental justice concerns. Works by Helena María Viramontes, Gloria Naylor, Karen Tei Yamashita, Ken Saro-Wiwa, Jamaica Kincaid, Amitava Ghosh, with particular attention to issues of environmental racism, ecofeminism, environmental imperialism, and urban ecologies. Emphasis on the role of literature and the arts in social change, including practical strategies for activism. Recommendations: ENG 1, 2 REQUIRED or Fulfillment of College Writing Requirement. Recommended that the student already have taken either ENG 20, 21, 22, or 23.

ENV 95-01 SPECIAL TOPICS IN ENVIRONMENTAL STUDIES-LUNCH & LEARN SEMINAR SERIES
Ninian Stein
Th 12:00PM - 1:15 PM
Please see department website for specific details.

ENV 99 ENVIRONMENTAL INTERNSHIP
Colin Orians
A period of service with an organization, either public or private, concerned with environmental engineering, research, protection, modification, legislation, or education. Required of all majors in the program, internship proposals must first be approved by track adviser or director. Many academic semester and summer internships are available. Adviser-approved participation in field courses and fieldwork, both at Tufts and elsewhere, may be substituted for this requirement. No credit. Completion noted on transcript.

ENV 107 INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS
Sumeeta Srinivasan
MoWe 1:30PM - 2:45PM
(Cross-listed as GIS 101). Broad foundation of Geographic Information Systems theory, capabilities, technology, and applications. Topics include GIS data discovery, data structure and management; principles of cartographic visualization; and basic spatial analysis and modeling. Assignments concentrate on applying concepts covered in lectures and class exercises to term projects in each student’s fields of interest.

ENV 150 ENVIRONMENT, COMMUNICATION AND CULTURE
Ninian Stein
Mon 1:30 PM - 4:00 PM
Explore the intersection of environmental issues, communication, and cultures. Examination of where our beliefs about environmental issues come from, how news and entertainment media cover environmental challenges, and why good coverage of critical issues is so rare. Exploration of green marketing and the relationship among politics, environmental issues, and the media, and discuss how media can be used by individuals and advocacy groups to effect social change.
ENV 196-1 RESEARCH, ANALYSIS, COMMUNICATION
Ninian Stein
Tue 1:30 PM - 4:00 PM (LEC)
Th 4:30 PM - 5:20 PM (RECIT)
Starting with contemporary environmental challenges, in this course we will explore how to gather, analyze and communicate data drawing on methods and techniques from the natural and social sciences. We will collect data from a range of contexts including fieldwork, databases, archival sources, maps, surveys, and interviews. One laboratory session per week plus one discussion period. During the laboratory block, students will use a variety of methods to gather and analyze different types of environmental data (e.g., quantitative, qualitative, spatial). Suggested (not mandatory) background: one semester of statistics.

ENV 197 ADVANCED GIS
Sumeeta Srinivasan
Tu 6:00PM - 9:00PM
(Cross-listed as GIS 102). Design and use of spatial information systems to support analytical modeling in research and practice. Topics include the structure and integration of large data sets, relational database management, development of spatial data, integration of data into models and geoprocessing techniques, and basic scripting to support geospatial modeling. Recommendations: GIS (CIS) 101 or equivalent.

ENV 199 SENIOR HONORS THESIS
Colin Orians
See Thesis Honors Program for details. Please see department website for specific details.

EOS 002 ENVIRONMENTAL GEOLOGY WITH LAB
John C Ridge
TuWeFr 9:30AM - 10:20AM / MoWeFr 10:30AM - 11:20AM (LEC, select ONE)
Mo / Tu / We / Th / Fr 1:20PM - 4:20PM (LAB, select ONE)
(Formerly GEO 2). Geologic processes at the earth's surface. Groundwater, the development of erosional and depositional landforms, glaciation and climate, and sea level change. Modern geologic environments as analogs for past environments and climate. Geologic processes and humans. Field trips illustrating glacial and coastal environments. Three lectures, one field trip or laboratory.

EOS 104 GEOLOGICAL APPLICATIONS OF GIS
Jacob S. Benner
TuTh 12:00PM - 1:15PM
(Formerly GEO 104). Basic Geographic Information Systems (GIS) theory and application in the geological sciences. A series of self-directed tutorials in basic GIS skills complemented by a weekly lecture and geological extension exercise. A final independent project focused on a geological application of GIS will reinforce and extend basic skills. Final project to be presented in lieu of final exam. One half course credit. Recommendations: EOS 1 and 2 (formerly GEO 1 and 2), and permission of the instructor.
EOS 133 FIELD HYDROGEOLOGY
Grant Garven
Th 1:20PM - 4:20PM
(Formerly GEO 133). (Cross-listed as CEE 114). Field aspects of hydrogeology, groundwater mapping and sampling, aquifer testing, well drilling, monitoring, and instrumentation of boreholes. Lecture and basic field methods to understand how monitoring and production wells are planned and drilled, and what types of geologic, geophysical, and geochemical data can be gathered for subsurface flow systems. A network of boreholes on the Tufts campus will be used as field sites to characterize subsurface parameters in the unsaturated and saturated zones, and study regional flow in an urban watershed. Field trips, quantitative analysis of hydrogeologic data. Recommendations: EOS 002 (formerly GEO 002) and PHY 011 or equivalent.

EOS 288 GROUNDWATER MODELLING
Grant Garven
MoWe 4:30PM - 5:45PM
(Formerly GEO 288). Numerical analysis of groundwater flow, with applications. Topics include: numerical formulation of the governing equations using finite difference, finite element, integrated finite difference, particle tracking, boundary element, and discrete element techniques; matrix and iterative solutions; algorithms for 1-D, 2-D, and 3-D flow; stability and accuracy; applications using popular USGS software in the public domain. Students will be expected to apply existing Fortran programs for 1-D, 2-D, and 3-D solutions as part of computational laboratory modeling assignments.

ES 027 PUBLIC HEALTH ENGINEERING
Daniele Susan Lantagne
MoWe 1:30PM - 2:45PM
(Cross-listed as ENV 0027). An introduction to public health engineering. Elements of waterborne disease control, hazardous materials management, occupational health and safety, and environmental interventions. Applications to environmental engineering and environmental engineering science.

ES 056 PROBABILITY AND STATISTICS
Wayne A Chudyk
MoWe 10:30AM - 11:45AM (LEC)
Fr 10:30AM - 11:45AM (RECIT)
Application of the concepts of probability and statistics to problem solving in engineering systems. Topics include data reduction techniques, probability, probability distribution functions, error propagation, sampling distributions, estimation, hypothesis testing, simple comparative experiments, and linear regression. Examples are drawn from a variety of disciplines, including the environment, materials, manufacturing, computing, and process design. Recommendations: MATH 42 (formerly MATH 13)

EXP 58 SOCIAL MARKETING
Gail Bambrick
Mo 6:00PM - 8:30PM
See Ex-College website for current course offerings.
FAM 064 PHOTOGRAPHY FOUNDATIONS
Sarah K. Pollman: MoWe 1:30PM - 4:30PM
Dore Gardner: TuTh 1:30PM - 4:30PM
Mike Mandel: TuTh 7:00PM - 10:00PM
These foundation courses will cover fundamental aspects of photography as a means of personal expression: craft, seeing/perception, design, critiquing, history and hard work. The acquisition of basic skills in the craft of photography necessary to make technically good black and white prints will be emphasized along with the development of a photographic aesthetic. Critiques will be held to assist students in judging their work. The course will also give basic historical information to provide a context in which the students will be working. Students will be introduced to electronic imaging if time permits. Students must have a manually adjustable (non-automatic) 35mm camera with a 50mm lens and provide film and printing paper. The school will provide chemicals and darkroom facilities. Approximate cost of supplies will be $150. Three to six hours per week of lab time outside of class will be required.

FAM 065 PHOTOGRAPHY AND COMPUTER
Thomas Michael MacIntyre
TuTh 4:00PM - 6:45PM
This course is an introduction to the techniques of electronic imaging as they relate to the practice of photography. Students will learn the basics of digitizing, image editing, and manipulation with Adobe Photoshop. In addition to regular assignments and critiques, there will be frequent class discussions of critical and historical issues raised by the introduction of the computer into the practice of photography. Some familiarity with computers is desirable, but not absolutely necessary.

INTR 092 QUANTITATIVE METHODS IN INTERNATIONAL RELATIONS
Elizabeth Remick-Yamamoto and Drusilla Brown
Th 3:00PM - 4:15PM
An interdisciplinary exploration of quantitative research methods commonly used in International Relations. Students learn quantitative methods in International Relations, pose significant questions, obtain and evaluate complex data and organize and articulate their findings. Topics may include, but are not limited to, IRB certification, Excel for data analysis, GIS, statistical analysis, case study methodology, and program evaluation.

MATH 021 INTRODUCTORY STATISTICS
Patricia M. Garmirian
MoWe 10:30AM - 11:45AM
TuThFr 8:30AM - 9:20AM
Descriptive data analysis, sampling and experimentation, basic probability rules, binomial and normal distributions, estimation, regression analysis, one and two sample hypothesis tests for means and proportions. The course may also include contingency table analysis, and nonparametric estimation. Applications from a wide range of disciplines. Recommendations: High school algebra and geometry.

NU 101 Introductory Human Nutrition
Diane L. McKay
Time TBA
To provide an understanding of basic nutrition science to non-science majors and students with a limited scientific background. Students will become familiar with: the principles of diet planning, government standards, and food labeling; the biological functions and food sources of each nutrient; energy balance, weight management, and physical activity; the role of nutrition in chronic disease development; nutrition throughout the life cycle; food safety issues; and current nutrition-related controversies. This course meets the science requirement for undergraduate non-science majors. It is not acceptable for biology credit for biology majors.
NUTR 221 Global Food Business
James Tillotson
TuTh 11:00AM -12:30PM
The purpose of this course is to introduce the student to the field of international food and agribusiness. Today, international trade in agricultural commodities and foods is a major segment of the world's business. This business continues to grow yearly, motivated by new and potential international trade agreements (GATT, NAFTA), expansion by both established and new multinational companies, and export policies by countries seeking new markets for their growing food and agricultural production. The focus of this course will be to develop in each student a conceptual knowledge of the analytical skills in administration, marketing, business strategy, research, governmental policies and technology that international food business requires today. The course also attempts to analyze the global food business from a transnational perspective, rather than any single nationalistic viewpoint of food and agribusiness. It is designed to meet the requirements of students aiming to enter the international food business world, as well as for students who in their professional careers (e.g., government, legal) will deal with this important sector of international business.

NUTR 227 INTERNATIONAL NUTRITION PROGRAMS
Erin Michele Boyd
Mo 9:00AM - 12:00PM
This intensive course provides presentations, readings, and exercises relating to the broad range of nutrition interventions utilized in international programs: growth monitoring and promotion, nutrition counseling and IEC, supplementary feedings and food-based income transfers, household food security and agricultural-based interventions, micronutrient activities, and breast-feeding. The course also covers malnutrition causality, nutrition and structural adjustment, social funds, economic and food aid, active learning capacity and the nutrition transition. Finally students become well versed in program design and appraisal techniques including dynamic models and program constraint assessments, and are responsible for major exercises relating to existing programs in Asia, Africa and Latin America.

NUTR 233 AGRICULTURAL SCIENCE AND POLITICS I
Christian Peters and Timothy Griffin
TuTh 10:30AM – 12:00PM
First part of a two-semester sequence required of AFE students. This course covers the major biological, chemical and physical components of agricultural systems. Each is discussed from the viewpoints of both the underlying natural processes and principles, and their significance for major agricultural, food safety, and environmental policy issues in the US today. In the first semester, the topics covered are soils, water, nutrients, and genetic resources.

NUTR 238 ECONOMICS FOR FOOD POLICY ANALYSIS
William Masters
TuTh 3:30PM - 5:00PM
This course equips students with the economic principles used for food policy analysis, applying the methods of economics to the major food and nutrition policy problems of the United States and the world. Students will gain familiarity with the data sources and analytical methods needed to explain and predict consumption, production and trade in agriculture and food markets; evaluate the social welfare consequences of market failure and government policies; and analyze changes in poverty and inequality including both fluctuations and trends in incomes, employment and economic development.
NUTR 327 FOOD SYSTEMS
Hugh Joseph
We 9:00AM - 12:00PM
Food Systems represents a form of capstone course with a discussion format. Students will provide input into selection of topics that they will focus and present on. The course primarily addresses food system structures and components, with an emphasis on sustainability spanning agriculture, environment, power and economics, values and ethics, food security, food sovereignty, and food choices. Topics of concentration may cover contemporary issues and can include food miles and 'foodprints'; climate change; greening vs. greenwashing; ethics of eating meat and using bottled water; and eating sustainably. We will also examine the global political economy of the food system, and approaches to understanding and influencing food system change. Common terminology used in food systems and sustainability discourses are clarified. Classes will emphasize student presentations on components of the food system; student-led discussions of readings; and group exercises/debates. Assignments will include research-based projects focusing on food system change. This class is suitable for second year students, or for first year students with grounding in food systems literature and/or relevant experience (to be approved by the instructor).

PHIL 033 LOGIC
Susan Russinoff
Mo 4:30PM - 5:20PM & TuTh 3:00PM - 3:50PM
Cross-listed as (LING 33). An introduction to fundamental concepts of modern formal logic, including sentence logic, quantification theory, and identity. Emphasis on the application of formal methods to reasoning in philosophy, mathematics, and everyday affairs. Please note: only one of PHIL, LING 33 and 103 may be taken for credit.

PHIL 124 BIOETHICS
Valentina Maria Urbanek
TuTh 3:00PM - 4:15PM
A survey of major ethical problems of interest to the public and the medical profession, including life-and-death issues (abortion, euthanasia) as well as issues raised by medical research and technology (organ transplants, cloning, genetic engineering, psychosurgery, human experimentation) and the delivery of health services. The implications of ethical theories for the particular problem issues. Spring. Recommendations: Junior standing.

PS 103 POLITICAL SCIENCE RESEARCH METHODS
Nimah Mazaheri
TuTh 4:30PM - 5:45PM
The study of quantitative methods for investigating political issues and policy controversies. Focuses on collecting, analyzing, and presenting data. Emphasizes hands-on training that provides useful skills for academic and professional settings. Topics covered include: measurement, hypothesis development, survey design, experiments, content analysis, significance tests, correlation, and regression. No prior statistics background necessary. Coursework includes problem sets and a final team project. Recommendations: PS 11, 21, 45, 46, or 61. A methodologically focused course.

PSY 013 SOCIAL PSYCHOLOGY
Jessica D. Remedios
MoWe 3:00PM - 4:15PM
How situations and the people around us influence our thoughts, feelings, and behavior. Aggression, attitudes, attraction, attribution, conformity, group processes, helping behavior, non-verbal behavior, self-knowledge, social cognition, social influence, and stereotypes and prejudice. Applications of social psychological concepts to topics such as health, intergroup relations, and law. Recommendations: PSY 1 or junior or senior standing.
PSY 031 STATISTICS FOR BEHAVIORAL SCIENCES
Alexander H. Queen
MoWe 1:30PM - 2:45PM (LEC)
We 6:30PM - 9:00PM / Th 9:00AM - 11:30AM / Th 1:30PM - 4:00PM / Th 6:30PM - 9:00PM / Fr 9:00AM - 11:30AM / Fr 1:30PM - 4:00PM (LAB, select ONE)
Statistical methods for the treatment of data in the behavioral sciences. Descriptive and inferential methods will be considered. Computers will be used to explore conceptual issues and analyze data. One laboratory period in addition to lectures. Requires completion of PSY 0001 or PSY 0009 or CD 0001 or equivalent.

PSY 032 EXPERIMENTAL PSYCHOLOGY
Heather L. Urry
MoWe 10:30AM - 11:45AM (LEC)
Mo 6:30PM - 9:00PM / Tu 9:00AM - 11:30AM / Tu 4:00PM - 6:30PM / Tu 6:30PM - 9:00PM (LAB, select ONE)
A laboratory based on individual and group experiments designed to familiarize students with research methods in psychological investigations. Required for psychology majors. Lectures and one laboratory period. Requires completion of PSY 0031 or BIO 0132 or EC 0013 or MATH 162.

PSY 036 EXPERIMENTAL SOCIAL PSYCHOLOGY
Jessica D. Remedios: Tu 1:30PM - 4:00PM
Keith B. Maddox: We 1:30PM - 4:00PM
(LEC, select ONE)
Laboratory and field approaches to the experimental study of social behavior. Attention will be directed to both classical research and recent innovation in social psychology. Lectures and laboratory. Requires completion of PSY 0013 and PSY 0032.

SOC 040 MEDIA & SOCIETY
Sarah Sobieraj
MoWe 3:00PM - 4:15PM
Social and economic organization of the mass media of communication. Effects on content. Themes of mass culture. Social composition of the audience. Effects of the media on the audience. Topics such as television, films, the press, books, magazines, and advertising.

SOC 102 QUALITATIVE RESEARCH METHODS
Sarah Sobieraj
We 4:30PM - 7:00PM
Epistemological foundations of qualitative methods and related ethical issues. Development and carrying out of a research project, including formulation of a researchable sociological question, review of sociological literature, identification of a research site, conduct of systematic observations, taking and coding of field notes, qualitative interviews, analysis of data, drawing of conclusions, and development of a sociological argument. Recommendations: At least one Sociology course or permission of instructor.

SOC 113 URBAN SOCIOLOGY
Orly Clerge
MoWe 1:30PM - 2:45PM
Sociology Cities as global phenomena, studied with classic texts on U.S. urban social life and transnational comparisons. Analysis of economic globalization, redevelopment, and landscape formation in cities. Case studies of local politics and planning, socioeconomic inequality, urban cultural change, and citizenship struggles. Recommendations: SOC 1 or 10 or consent.
UEP 094 ENVIRONMENTAL POLICY, PLANNING, AND POLITICS
Ann Barclay Rappaport
Th 1:30PM - 4:00PM
(Cross-listed as ENV 94.) Open only to undergraduates, course introduces students to the concepts and techniques central to environmental policy, including the important roles played by politics and planning. Serves as a foundation for further work in Environmental Studies or as a broad overview of the issues key in the field. Structured around four varied case studies involving simulated environmental conflicts, each culminating in a “policy forum” consisting of presentations by student teams who represent specific interests (e.g., environmental advocates, legislators, agencies and corporations). Course also features guest presentations by other faculty from the graduate Department of Urban and Environmental policy and Planning.

UEP 101 Land Use Planning
Jon Witten
Mo 6:30PM - 9:00PM
Overview of land use planning methods, growth dynamics, and land development controls. Comparison of different approaches to land use planning and decision making. Impact of recent environmental legislation on land use. Techniques of mapping, site analysis, subdivision regulation, development controls, and fiscal incentives.

UEP 221 CLIMATE CHANGE POLICY, PLANNING, AND ACTION
Ann Barclay Rappaport
Tu 1:30PM - 4:00PM
Examination of climate change problem from perspective of scientific evidence, policy responses and media coverage. Sources of greenhouse gas emissions and a wide range of mitigation and adaptation measures are explored and assessed. Overview of climate change solutions being taken or planned by governments, communities, and institutions (both for profit and non-profit) and for major systems, e.g. transportation, buildings, and energy.

UEP 230 NEGOTIATION, MEDIATION, AND CONFLICT RESOLUTION
Robert Burdick
Th 6:00PM - 9:00PM
Techniques of negotiation and mediation applied to a broad range of conflict situations from interpersonal differences to labor relations, environmental disputes, and international relations. Combines practice in basic methods with theoretical and applied aspects of conflict resolution.

UEP 232 INTRO TO GIS
Barbara M Parmenter
TuTh 12:00PM - 1:15PM
Broad foundation of GIS theory, capabilities, technology, and applications. Topics include GIS data structure and management, geodesy and map projections, and various techniques for raster and vector spatial data analysis. Laboratory exercises concentrate on applying concepts presented in the lectures using Idrisi and ArcGIS.

UEP 281 TOXIC CHEMICALS & HUMAN ECOLOGY
Sheldon Krimsky
We 1:30PM - 4:00PM
(Cross-listed as ENV 281.) Focuses on environmental endocrine disruptors, chemicals that mimic or interfere with the hormones of humans and wildlife. Investigates various aspects of the “environmental endocrine hypothesis,” including the scientific evidence for health effects, policy response to the claims that chemicals are interfering with the reproductive health of wildlife and humans, international perspectives, and the role of the hypothesis in environmental advocacy movements.
UEP 284 DEVELOPING SUSTAINABLE COMMUNITIES
Julian Agyeman
Th 1:30PM - 4:00PM
(Cross-listed as ENV 284.) Explores the many challenges of achieving sustainable development at local, regional, national and international levels. Focuses on improving the quality of people's lives, on disinvested communities, and on the inequitable distribution of income, wealth, and environmental hazards. Investigates the theory of sustainable development, as well as the tools, strategies, and the contexts needed to move towards the ecological integrity, economic security, empowerment, responsibility, and social well-being characteristic of sustainable communities. Case studies drawn from the U.S. and overseas.