

Food

Environmental
Justice

Environmental
Leadership and
Activism

Sustainable
Solutions

Environmental
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Energy and
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Water

Reference
Guide



Tufts Institute of the **ENVIRONMENT**

Undergraduate Environmental Course Guide 2013—2014

This course guide is compiled by the Tufts Institute of the Environment (TIE). The Tufts Institute of the Environment (TIE) is an interdisciplinary University-wide institute that initiates, facilitates, and promotes environmental education, research, and outreach toward a sustainable future.

TIE is located on the Medford Campus and its physical space is used by many students to study, work, and meet other students and faculty members. TIE holds and supports events for the environmental community throughout the year, offers fellowships and travel grants, and hosts guest researchers. We also support the Office of Sustainability in its efforts to improve campus sustainability.



INTRODUCTION

Over the last few decades, Tufts has won the reputation of being one of the top “green” schools in the nation. Tufts offered environmental classes in the curriculum as early as 1962, long before most other universities saw the need for such programs. We are thus extremely well prepared to meet the current demand for environmental education. In this time of great momentum and change in the global community concerning environmental and human issues, environmental literacy is becoming incorporated in even more courses, departments, and programs across the various schools of Tufts and we hope this course guide will prove a valuable tool to navigate the wealth of these offerings.

The main purpose of this guide is to give students a broad overview of the various options of environmentally related courses offered at Tufts University. The booklet provides a comprehensive listing of courses offered at Tufts’ undergraduate School of Arts and Sciences and School of Engineering. It is meant for all students interested in broadening their particular concentration to include a higher level of environmental literacy, not just those interested in earning an environmental degree. For those interested in graduate-level courses (some of which accept undergraduates with the consent of the instructor), please see our Graduate Environmental Course Guide.

This course guide includes a helpful breakdown of courses by topic. Rather than listing the courses alphabetically or by department, we divided them into 7 categories: Food, Environmental Justice, Environmental Leadership and Activism, Sustainable Solutions, Environmental Health, Energy and Climate, and Water. We hope this breakdown will allow students to more easily identify classes that they are interested in taking. Courses were placed into a category based on topic or purpose, and some courses may be listed under multiple categories.

- **Food:** includes classes about U.S. agriculture, food systems, and food policy.
- **Environmental Justice:** includes classes about populations vulnerable to climate change, conflict over natural resources, and environmental imperialism.
- **Environmental Leadership and Activism:** includes classes about environmental preservation and improvement, and sustainability. Many of the courses have an active learning component.
- **Sustainable Solutions:** includes courses that focus on ways of conserving natural resources or limiting ecological damage. Many of the courses in this section cover government actions/policies regarding the environment, or the basic science underlying environmental processes.
- **Environmental Health:** includes classes about health hazards such as air pollution and hazardous waste. Also includes classes that focus on identifying environmental health, such as environmental economics or risk assessment.
- **Energy and Climate:** topics related to energy (gas, oil, clean energy) and climate change.
- **Water:** includes classes about the mechanics and politics of water.

If you would like information regarding environmental degrees or programs, we urge you to look at the previous Environmental Course Guides, available on our website.

Questions, comments, and concerns may be directed to:

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Some course information might change after the printing of this guide. The most updated version can be found on the Tufts Institute of the Environment website.

FOOD

BIO 010 Plants and Humanity

Spring, Prerequisites: No

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.

BIO 185/CIS 201/NUTR 241 Food For All: Ecology, Biotechnology and Sustainability

Spring, Prerequisites: Introductory Biology, Introductory Chemistry or equivalent

In this interdisciplinary seminar, we will examine the pros and cons of two divergent approaches to meeting this food demand: organic farming and genetic engineering. Using contrasting crops grown in developing and industrialized countries as case studies, we will evaluate: (1) how ecological knowledge makes food production more sustainable; (2) what existing and emerging approaches can, in the face of climate change, contribute to a reliable supply of nutritious food; and (3) the political and economic drivers that shape who has access to these technologies. We will also explore stakeholder specific perspectives (growers, advocacy groups, industry, governmental agencies), as well as develop important communication skills for negotiating these different perspectives.

EXP-0026-F Introduction to Sustainable Agriculture and Food Systems

Fall, Prerequisites: No

The course aims to give students a broad but thorough foundation in the field of alternative, sustainable agriculture and food systems. We will discuss the theory and practice of alternative agricultural systems (agroecology, urban farming, CSAs etc.) as well as social and political issues within the food system including food justice, farm-worker rights, food insecurity, and social movements. The course will be complimented by hands-on learning and engagement at the Tufts campus garden, where the concepts discussed in lecture and discussion can be translated and framed through experience. Though the course stands well on its own, it aims to be the first in a two-part series, in which the follow-up course will delve deeper into the political and social justice issues.

NUTR 215/UEP 223 Fundamentals of U.S. Agriculture

Fall, Prerequisites: Instructor consent

This course covers the major social, institutional and human aspects of the American agricultural system, both as it exists today as well as its historical development. After consideration of agricultural systems in general and of the values that underlie different concepts of agriculture, it covers some of the key historical forces that have made American agriculture what it is today, and the major role of the federal government, both past and present. The next part of the course deals with the economics of American agriculture as a whole and its large-scale structure, followed by an analysis of farming on the microlevel, emphasizing types of farms and farm-scale production economics.

ENVIRONMENTAL JUSTICE

EXP-0021-F Rising Tide Climate Change, Vulnerability, and Adaptation

Fall, Prerequisites: No

What makes a person or a community vulnerable to the impacts of climate change? And what are the challenges to governments responding to those vulnerabilities? While climate change adaptation is often viewed as an environmental problem with technological solutions, this course explores a people-centered approach. The conceptual underpinnings of vulnerability and resilience will be followed by real-world lessons from adaptation and disaster risk-reduction initiatives. The course will bridge global policy and local practice, using developing country planning documents, a statewide adaptation plan, and a local Boston neighborhood as case studies. The methodology of the course is highly interactive and experimental, including a seminar-style class format, practitioners as guest speakers, “policy” and “practice” field trips, group learning, and role-playing simulation.

EXP 023-F Fracked Out: Understanding the New Gas Rush

Fall, Prerequisites: No

Thanks in part to the advent of hydraulic fracturing (“fracking”), our nation is now experiencing an unprecedented boom in natural gas drilling. This new gas rush is resulting in a wide range of environmental and health impacts - including spills of toxic laced fluid, wellhead explosions, millions of gallons of contaminated wastewater, tons of smog-forming air pollution, and landscapes marred by clearcuts, compressors, and waste pits. Yet the oil and gas industry and its defenders are using their considerable resources to persuade the public that natural gas extraction is a vital boost to the economy, an important part of our nation’s energy strategy, and can even help solve global warming. How can students and other citizens engage in the issue and make a difference?

EXP 027-F “When the Snow is Not Frozen”: Damage and Resilience in the Arctic

Fall, Prerequisites: No

Climate-induced changes in the Arctic can’t be overstated. The Arctic is currently experiencing extreme changes in temperature, sea ice extent, sea level rise, and animal species shifts. Local Inuit populations are negotiating changing hunting grounds, novel sea ice conditions and altered food-sharing culture critical for annual subsistence. Diminishing ice extent is spurring international resource interest in previously inaccessible ice-covered areas: the Northwest Passage and oil exploration are contentious topics. This class will examine these issues in order to better understand their complexities and to relate them to notions of resilience, or capacity to withstand changes. The goal of this course is to have students gain understanding and foster critical thinking skills about change and resilience in the Arctic. The first half of the class will examine the conditions of change in the Arctic, spanning ecological, social and political-economic contexts. The second half of the class will examine the notion of resilience, looking specifically at how it relates to our discussions on a changing Arctic, and what its contributions and potential limitations are.

ENG 160/ENV 160/PJS 150 Environmental Justice and World Literature

Spring, Prerequisites: No

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.

PHIL 195/UEP 286 Environmental Ethics

Spring, Prerequisites: No

The course explores the values, rights, responsibilities and status of entities underlying alternative ethical approaches to environmental issues. Subjects include: anthropocentric vs. biocentric frameworks to natural resource protection; precautionary principle; ethics of cost-benefit analysis; equity and risk management; status of “rights” of non-human species and future generations; ethical considerations of sustainable development & energy use; genetically modified crops; transgenic animals; deep vs. narrow ecology; economic and non-economic value of wilderness & sacred lands.

PS 138-03 Topics in Comparative Politics: Culture, Politics and the Environment

Spring, Prerequisites: No

This political science course covers a broad range of social and cultural factors which can affect environmental sustainability around the world. The political ecology of many different societies will be explored. Student will learn key terminology and explore how indigenous populations and states have both attempted to manage their natural surroundings. The politics and policy that have emerged from these challenges will be reviewed with the contact of human demographics, temporal perspective, corruption perceptions, and state intervention practices.

PS 138-08 Conflict and Natural Resources

Fall, Prerequisites: No

This course examines the role of natural resource endowments and scarcity in national and international conflicts. Students will explore not only conflict theory but also technical aspects of global environmental change and civil conflict. The course begins with a study of the various causes of conflict at the state, society and individual levels such as structural violence, politics, religion and humiliation. We then explore how constraints on natural resources such as water and fertile soil increase the likelihood of environmentally related violence as compared to other causes of conflict. Finally, the class will explore potential conflict resolution approaches as they relate to resource scarcity and environmental change. Case studies include the Sudan Conflict, Somalia’ Pirate Conflicts, and Ache Indonesia’s struggle with violence.

PS 195 Seminar: Politics of Sustainable Communities

Spring, Prerequisites: Sophomore standing or consent of instructor

Theories and practice of sustainability applied to cities and communities in the U.S. Comparison of specific cities’ programs and policies. Patterns of variation in cities’ operational definitions of sustainability, and specific local programs and policies that represent local sustainability initiatives. Political conditions conducive to local communities’ pursuit of sustainability policies.

ENVIRONMENTAL LEADERSHIP AND ACTIVISM

ENG 002-05/002-11 Freshman Writing Seminar: Nature and Writing

Fall, Prerequisites: No

Beginning by reading and discussing a wide variety of texts, we will write critically and imaginatively about urgent social and political issues such as global climate change; energy production and use; city and land use planning; food production and consumption; air, water, and soil pollution; conservation and wilderness preservation; environmental justice. While our primary goal is to improve our writing, we will also expand our understanding of the natural world and deepen our ability to explore ideas.

ENV 091/BIO 001 Environmental Preservation and Improvement

Fall, Prerequisites: No

Seminar based on current readings from environmental journals that provide insight into environmental science for use by scientists, science media, business leaders, and political decision makers. Topic areas include biodiversity and wildlife, alternative energy, ocean protection, climate shift, urban ecology, sustainable agriculture, GIS and remote imagery.

ENV 099 Environmental Internship

Fall/Spring, Prerequisites: No

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.

EXP-0046-F Environmental Action: Shifting from saying to doing

Fall, Prerequisites: None

This course is designed for students who want a refreshing way to examine the story behind the environmental concerns in the news. Through the lens of psychology, social marketing, and critical thinking, we will examine the current environmental issues impacting our world. As students become environmentally literate they will also be given tools to examine their and their peers' personal behavior and learn how to create behavior change. This course aims to empower students to find their voice as they become leaders in environmental action; learning practical skills in communication, social marketing campaigns, and event planning. Activities during the semester will include critical thinking research examining current environmental issues, personal challenges, campus social marketing group projects, and social psychology. By the end of the semester students will leave this class with a new perspective on themselves, society and the environment.

EXP 059/ENV 059 Environment, Communication and Culture

Spring, Prerequisites: No

Course description not available.

SUSTAINABLE SOLUTIONS

BIO 007/ENV 007 Environmental Biology

Fall, Prerequisites: No

An examination of major natural and created ecosystems and human influences on them. Biological bases for species distributions, human population size, and conservation. Ecological bases for sound land use and pollution abatement

BIO 010/ENV 0510 Plants and Humanity

Spring, Prerequisites: No

Structure, activities, human and ecological significance of plants, including an overview of plant diversity. 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 nutritional sources from seaweeds and mushrooms to mangos and durians. Primarily for non-majors.

BIO 051/ENV 051 Experiments in Ecology

Fall, Prerequisites: Sophomore standing and BIO 14 or equivalent

Introduction to ecological research. Emphasis on acquiring skills in taxonomic identification, sampling techniques, hypothesis testing and experimental design, data analysis and interpretation, oral and written communication. Opportunity for student-designed group research projects on ecological questions. One laboratory session per week plus one discussion period.

BIO 132 Biostatistics

Fall, Prerequisites: BIO 14 and 15 or equivalent and one additional biology course

Learning how to describe and interpret experimental results and observations is a critical skill in many disciplines. In this course, students will learn statistical methods for summarizing and analyzing biological data. Topics include descriptive statistics, experimental design, probability, parameter estimation, inference, correlation, regression, analysis of variance, and nonparametric methods.

BIO 144 Principles of Conservation Biology

Spring, Prerequisites: BIO 14 or equivalent

Learning and application of principles from population ecology, population genetics, and community ecology to the conservation of species and ecosystems. Focus will be on rare and endangered species, as well as threatened ecosystems. Also includes applications from animal behavior, captive breeding, and wildlife management.

CEE 194 Field Methods for Global Health

Fall, Prerequisites: Junior standing

In this course, students will select a real-world development program, and then work throughout the term to develop a protocol for program evaluation. The course is ideal for students working with, or interested in, international development programs, and its main goal will be to teach students the research skills to rigorously evaluate such programs. Topics covered will include ethics approval, sample size calculation, survey development & implementation, focus groups & key informant interviews, spatial analysis, data entry and analysis, water and air quality testing, anthropometrics, field work examples, and interpretation & dissemination of results.

CHBE 173 Clean Energy Technologies and Policy Issues

Spring, Prerequisites: No

This course considers current issues in power generation, identifying the technologies used to meet Clean Air Act regulations by the electric utilities and automobile manufacturers. Topics include the electric utility deregulation, distributed power sources, new energy markets, fuel efficiency, and global effects of fossil fuel use. Alternative fuels and engines will be examined from the point of view of technology readiness and global market penetration to curb air pollution and decrease carbon emissions. The costs of energy technologies and the global impacts of present policies in the U. S. and abroad will be evaluated.

CHEM 008 Environmental Chemistry

Spring, Prerequisites: No

An introductory course designed primarily to give nonscience 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.

CEE 030 Environmental Chemistry

Fall, Prerequisites: CHEM 2 and CEE 32 or equivalent

Basic principles of environmental chemistry related to environmental engineering. Thermodynamics, equilibrium, kinetics, mass balance, chemical partitioning, and reactions for predicting behavior of pollutants in air, water, and soil. Techniques for measuring dissolved oxygen, biochemical oxygen demand, nutrients, sewage indicator bacteria, airborne particles and hydrocarbons, and other pollutants. Applications to environmental processes. With laboratory.

CEE 032 Environmental Engineering Principles

Spring, Prerequisites: ES 2, MATH 34, CHEM 1 or 11 or 16, and PHY 11

Water quantity and quality, air quality, energy utilization, climate change, and sustainability. Material and energy balance. Chemical and biological transformations. Elementary transport and fate modeling. Quantitative description of natural and engineered processes affecting environmental sustainability at local, regional, and global scales.

CEE 133 Wastewater Plant Design

Spring, Prerequisites: CEE 32 or consent of instructor

Design of facilities for municipal drinking water and wastewater treatment. Synthesis of unit processes and operations into integrated treatment plant. Emphasis on conventional treatment processes. Additional topics include liquid and solids streams, hydraulics, chemical feed and control systems, costs, and performance requirements. Design projects and field trips.

CEE 194A/ENV 196R Introduction to Remote Sensing

Spring, Prerequisites: No

Introduces students to the use of satellite imagery and other remotely sensed data for urban and environmental analysis. The course will emphasize practical applications of remote sensing for understanding human-environment dynamics. Students will get a thorough overview of remote sensing data sources and understand which sources are appropriate for which applications. Lectures and labs will cover the workflow of processing sensing data for environmental analysis, starting with data acquisition and moving on to image georeferencing, image enhancement and filtering, image classification and basic image analysis.

CEE 194H Global Environmental Datasets

Fall, Prerequisites: No

This new introductory-level course focuses on geospatial data concepts, methods and tools used for the study of global environmental change. Growing concern about human impact on the environment has led to the development of new observation and analysis tools to tackle and monitor types, magnitudes and rates of environmental changes. Timely observations by Earth Observation (EO) satellite systems and improved mapping and analysis tools are enabling a better understanding of the ecological interactions that underlie our Earth systems which is critical for developing sustainable solutions. This course will enable students to search and use satellite imagery (higher level products) in the context of a number of disciplines including climatology, ecology, geology, hydrology, and public health. Students will learn the fundamentals of the EO systems and the tools (geo-portals, web based tools, open source software) to observe, monitor and assess the changes occurring on or near the Earth surface.

CEE 202/ENV 202 Environmental Statistics

Spring, Prerequisites: ES 56 or equivalent

Methods for analyzing environmental data, which is often censored, skewed, and correlated in space and time. Topics include exploratory data analysis, nonparametric methods, hypothesis testing, multivariate statistics, frequency analysis, uncertainty analysis, experimental design, and model building.

EC 130 Topics in Environmental Economics

Fall/Spring, Prerequisites: EC 5

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.

ENV 091 Environmental Preservation and Improvement

Fall, Prerequisites: No

Seminar based on current readings from environmental journals that provide insight into environmental science for use by scientists, science media, business leaders, and political decision makers. Topic areas include biodiversity and wildlife, alternative energy, ocean protection, climate shift, urban ecology, sustainable agriculture, GIS and remote imagery.

EOS 2 Environmental Geology

Spring, Prerequisites: No

Specific topics covered in environmental geology include an overview of earth materials, groundwater, and processes of the hydrologic cycle. Also considered from a geological and human perspective are weathering and erosion, landslides, river systems, shorelines, marine sedimentary environments, glacial systems, and climatic environments ranging from arid to periglacial (cold climate). The past history of Earth is deciphered in terms of the evolution of the world ocean, climate, and sea level change over geologic time, and the activity of modern and ancient glaciers.

ES/ENV 025 Environment and Technology

Fall, Prerequisites: No

The impact and interaction of technology and the environment will be evaluated using historical examples. Environmental problems and their solutions will be evaluated from an engineering viewpoint. This course is a core requirement of the Environmental Studies program.

ENV 094/UEP 094 Environmental Policy Planning and Politics

Spring, Prerequisites: No

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).

ENV 193-02/UEP 232 Introduction to GIS

Fall, Prerequisites: No

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.

ENV 196R/CEE 194A Introduction to Remote Sensing

Spring, Prerequisites: No

Satellite remote sensing is part of a suite of geospatial technologies that provide the tools for making informed decisions for better managing, protecting and possibly restoring the environment. The purpose of this course is to give an overview of the use of remote sensing (RS) technology and its applications in a variety of fields, including urban/land use planning, public health and environmental sciences.

PS 188-06 Global Environmental Politics

Fall, Prerequisites: No

This course seeks to highlight effective responses to global environmental problems in the international treaty making arena. Students will explore the negotiation process, the structure of the United Nations treaty making system, the convention-protocol approach and the politics of the north v. south divide. Topics will include the weaknesses of the international environmental negotiation process, the importance of non-state actors, and potential solutions for the system.

PS 188-20 Politics of International Environmental Negotiation

Fall, Prerequisites: No

This course seeks to highlight effective responses to global environmental problems in the international treaty making arena. Students will explore the negotiation process, the structure of the United Nations treaty making system, the convention-protocol approach and the politics of the north v. south divide. Topics will include the weaknesses of the international environmental negotiation process, the importance of non-state actors, and potential solutions for the system

PS 194 Politics of Environmental Policy in the U.S.

Fall, Prerequisites: No

Examines the recent history and contemporary political debates surrounding governmental decisions affecting the environment. Environmental policy making in the general context of U.S. policy-making processes and institutions, emphasizing the roles of federal, state, and local actors, including the president, executive and regulatory agencies (especially the Environmental Protection Agency), the legislature, and the courts, as well as their state and local counterparts, in defining environmental policy. Addresses such issues as policies toward air pollution, water pollution, hazardous waste management, environmental justice, sustainability, and public opinion toward the environment.

UEP 094 Environmental Policy, Planning and Politics

Spring, Prerequisites: No

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).

UEP 173 Transportation Planning

Spring, Prerequisites: No

Course looks at major passenger transportation modes including walking, bicycling, transit and automobiles. Focus on the skills and tools needed to effectively plan transportation projects—both directly through planning skills and indirectly through managing consultants. Course is presented within the context of how transportation intersects with communities, including how transportation impacts neighborhoods, the elderly and disabled, the price of affordable housing, economic development and overall quality of life. “Hands-on” approach with many guest speakers and a final project that will integrate course-work with student’s professional interests.

UEP 200/ENV 200 Land Use Planning

Fall, Prerequisites: No

Covers the workings of American urban governments. Examines the extent to which cities are empowered to control their futures and analyzes the techniques used to plan and protect the public health, safety, and welfare of urban residents.

UEP 201/CEE 201/ENV 201 Land Use Planning II

Spring, Prerequisites: Yes

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 205 Urban Planning and Design

Fall, Prerequisites: No

Historical roots and contemporary debates of American planning: reform movements, government programs, architectural and planning fashions, urban renewal, suburban sprawl, new urbanism and growth management. Boston and its region provide a rich context in which to examine the building blocks of the planning profession: housing, open space, zoning, urban design, transportation, community development, historic preservation, and resource conservation. Examination of how these issues emerged in the past and how they are addressed today.

UEP 250 Foundations of Public Policy and Planning

Fall, Prerequisites: No

Required core course for students in M.A. program. A conceptual and critical overview of public policy and planning theory, process, and practice. Provides an introduction to basic elements of public policy formation and application involving a range of environmental, social policy, and planning issues. This includes methods for analyzing policy and planning decisions, strategies for developing alternatives, examination of the role of values and empirical knowledge in setting policy agendas, and implementation.

UEP 265/CEE 265 Corporate Management of Environmental Issues

Fall, Prerequisites: No

Explores companies' responses to pressure from stockholders, regulatory agencies, community and nongovernmental organizations to exercise greater responsibility toward the environment. Topics include strategy, staffing and organization, decision making, codes of conduct, resources, program development, product responsibility, pollution prevention, trade associations, and foreign operations.

UEP 284 Developing Sustainable Communities

Spring, Prerequisites: No

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.

ENVIRONMENTAL HEALTH

BIO 142/ENV 142 Population and Community Ecology

Fall, Prerequisites: BIO 13 and 14 or equivalent, or consent of instructor

Introduction to population dynamics (population structure and growth), species interactions (predator-prey, competition, mutualism), and community structure, adaptations to the physical environment, patterns and processes governing the world's biomes.

EC 030/ENV 030 Environmental Economics

Fall and Spring, Prerequisites: EC 5

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.

CEE 136/CHBE 136 Air Pollution Control

Fall, Prerequisites: Junior standing

A study of health and environmental effects from air pollution, dispersion modeling, air pollution laws and regulations, fate and transport of air pollution, and design of pollution control equipment and processes. Prerequisites: differential equations, physics, chemistry, fluid/thermal sciences; or advanced undergraduate standing.

CEE 158 Occupational and Environmental Health

Spring, Prerequisites: No

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

CEE 173 Health Effects and Risk Assessment

Fall, Prerequisites: No

A study of chronic and acute human health effects of exposure to hazardous materials. Principles of toxicology and pharmacokinetics of toxic substances. Standards for environmental quality, risk assessment methodologies, and risk communication strategies.

CHBE 138/CEE 138 Hazardous Waste Treatment Technologies

Spring, Prerequisites: Senior standing or consent of instructor

Hazardous waste treatment options based on physical, chemical, biological, and thermal processing technologies. Brief review of definitions and appropriate hazardous waste legislation. Introduction to pollution prevention. Traditional end-of-pipe treatment technologies. Applications to include solvent recovery, chemical fixation, land disposal, biodegradation, and special wastes. Incineration and associated environmental discharges constitute a major portion of course. Emerging technologies and evaluation of technical/economic process viability.

ENG 160/ENV 160/PJS 150 Environmental Justice and U.S. Literature

Spring, Prerequisites: No

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.

PS 138-03 Topics in Comparative Politics Culture, Politics, and Environment

Spring, Prerequisites: No

This political science course covers a broad range of social and cultural factors which can affect environmental sustainability around the world. The political ecology of many different societies will be explored. Student will learn key terminology and explore how indigenous populations and states have both attempted to manage their natural surroundings. The politics and policy that have emerged from these challenges will be reviewed with the contact of human demographics, temporal perspective, corruption perceptions, and state intervention practices.

UEP 294-16 Environmental Health for Policy and Planning

Fall and Spring, Prerequisites: No

Introduction to environmental health from a policy and planning perspective, with a focus on urban health issues relevant to US cities. This course will investigate the broad range of elements needed to foster healthy places; topics include the built environment and obesity, transportation and air quality, land use and water quality, food insecurity, and health disparities, among others.

ENERGY AND CLIMATE

CHBE 173 Clean Energy Technologies and Policy Issues

Spring, Prerequisites: No

This course considers current issues in power generation, identifying the technologies used to meet Clean Air Act regulations by the electric utilities and automobile manufacturers. Topics include the electric utility deregulation, distributed power sources, new energy markets, fuel efficiency, and global effects of fossil fuel use. Alternative fuels and engines will be examined from the point of view of technology readiness and global market penetration to curb air pollution and decrease carbon emissions. The costs of energy technologies and the global impacts of present policies in the U. S. and abroad will be evaluated.

ENVS 095B Telling the Climate Justice Story

Spring, Prerequisites: None

This course will include lectures by experts in their field and discussions during which the entire interdisciplinary team participates, along with students. To demonstrate student learning their will be required journal entries throughout the course. Major assignments will also include creation of a climate justice mini story, participation in a model negotiation and a final project consisting of student teams telling a compelling climate justice story through various types of media.

EXP-0021-F Rising Tide Climate Change, Vulnerability, and Adaptation

Fall, Prerequisites: No

What makes a person or a community vulnerable to the impacts of climate change? And what are the challenges to governments responding to those vulnerabilities? While climate change adaptation is often viewed as an environmental problem with technological solutions, this course explores a people-centered approach. The conceptual underpinnings of vulnerability and resilience will be followed by real-world lessons from adaptation and disaster risk-reduction initiatives. The course will bridge global policy and local practice, using developing country planning documents, a statewide adaptation plan, and a local Boston neighborhood as case studies. The methodology of the course is highly interactive and experimental, including a seminar-style class format, practitioners as guest speakers, “policy” and “practice” field trips, group learning, and role-playing simulation.

EXP-0023 Fracked Out: Understanding the New Gas Rush

Fall, Prerequisites: No

Thanks in part to the advent of hydraulic fracturing (“fracking”), our nation is now experiencing an unprecedented boom in natural gas drilling. This new gas rush is resulting in a wide range of environmental and health impacts - including spills of toxic laced fluid, wellhead explosions, millions of gallons of contaminated wastewater, tons of smog-forming air pollution, and landscapes marred by clearcuts, compressors, and waste pits. Yet the oil and gas industry and its defenders are using their considerable resources to persuade the public that natural gas extraction is a vital boost to the economy, an important part of our nation’s energy strategy, and can even help solve global warming. How can students and other citizens engage in the issue and make a difference?

EXP-0027-F “When the Snow has not Frozen”: Change and Resilience in the Arctic

Fall, Prerequisites: No

Climate-induced changes in the Arctic can’t be overstated. The Arctic is currently experiencing extreme changes in temperature, sea ice extent, sea level rise, and animal species shifts. Local Inuit populations are negotiating changing hunting grounds, novel sea ice conditions

and altered food-sharing culture critical for annual subsistence. Diminishing ice extent is spurring international resource interest in previously inaccessible ice-covered areas: the Northwest Passage and oil exploration are contentious topics. This class will examine these issues in order to better understand their complexities and to relate them to notions of resilience, or capacity to withstand changes. The goal of this course is to have students gain understanding and foster critical thinking skills about change and resilience in the Arctic.

ME 011 Thermodynamics of Sustainable Energy

Fall, Prerequisites: ES 7 or consent of instructor

Concepts of thermodynamics applied to a variety of energy conservation processes based on thermo-chemical and thermo-mechanical mechanisms. Engineering analysis, economics, sustainability, and environmental justice aspects of conventional and alternative electrical and motive power production systems are also discussed.

PHIL 091 Climate Change Ethics

Spring, Prerequisites: No

This course will review the growing literature on climate change ethics, focusing on two questions: (1) Who ought to bear the responsibility for any harms that do occur in the future?; and (2) What obligations do we presently have either to obviate those risks or to provide means for compensating those who, beyond their capacity to prevent it, suffer harm? Not too far in the background throughout the course will be the more sweeping question whether it is morally permissible at all to impose a risk on others of such a scale.

PS 138-10 Politics of Oil and Energy

Fall, Prerequisites: No

This course examines how oil, energy, and other natural resources have shaped economic and political outcomes in countries around the world. It begins by exploring research on how oil and natural resources affect political regimes and the risk of civil war and international conflict. The economic effects of oil and natural resources are then considered through an analysis of the “resource curse” hypothesis. We will evaluate this hypothesis by investigating the experiences of countries in the Middle East, Latin America, Africa, and North America. The final part of the class takes a public policy focus by looking at how governments design and implement policy related to oil and energy, how oil and energy industries respond to this policy, and how this affects consumers and the public as a whole. We examine topics such as the role of OPEC, regulation, and energy policy in the United States.

PS 188-20 Politics of International Environmental Negotiation

Spring, Prerequisites: No

This course seeks to highlight effective responses to global environmental problems in the international treaty making arena. Students will explore the negotiation process, the structure of the United Nations treaty making system, the convention-protocol approach and the politics of the north v. south divide. Topics will include the weaknesses of the international environmental negotiation process, the importance of non-state actors, and potential solutions for the system.

UEP 221 Climate Change Policy, Planning and Action

Spring, Prerequisites: No

Examination of the climate change problem from the 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 nonprofit) and for major systems, e.g., transportation, buildings, and energy.

WATER

BIO 164/ENV 164 Marine Biology

Spring, Prerequisites: BIO 13 and 14 or equivalent

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.

CEE 133 Wastewater Plant Design

Spring, Prerequisites: CEE 32 or consent of instructor

Design of facilities for municipal drinking water and wastewater treatment. Synthesis of unit processes and operations into integrated treatment plant. Emphasis on conventional treatment processes. Additional topics include liquid and solids streams, hydraulics, chemical feed and control systems, costs, and performance requirements. Design projects and field trips.

CEE 214 Environmental and Water Resource Systems

Spring, Prerequisites: No

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.

PS 118-03 Water Diplomacy II Politics and Economics of Water Policies

Fall, Prerequisites: No

The second of three courses designed primarily for students in the Water Diplomacy graduate program, this course serves as a survey of research on public policy making and natural resource economics as applied specifically to issues of water with designated case studies. Topics include: policymaking process frameworks; theoretical models of policymaking with special focus on Ostrom's Institutional Analysis and Development approach; implementation processes associated with integrated water resource management; collaborative watershed management; private versus public water management; estimating water supply and price elasticity of demand; welfare analysis of water benefits; externality analysis of water pollution; economic valuation of water resources; and cost-benefit approaches to evaluating alternative water projects.

PS 138-08 Conflict and Natural Resources

Fall, Prerequisites: No

This course examines the role of natural resource endowments and scarcity in national and international conflicts. Students will explore not only conflict theory but also technical aspects of global environmental change and civil conflict. The course begins with a study of the various causes of conflict at the state, society and individual levels such as structural violence, politics, religion and humiliation. We then explore how constraints on natural resources such as water and fertile soil increase the likelihood of environmentally related violence as compared to other causes of conflict. Finally, the class will explore potential conflict resolution approaches as they relate to resource scarcity and environmental change. Case studies include the Sudan Conflict, Somalia' Pirate Conflicts, and Ache Indonesia's struggle with violence.

UEP 279 Water Resources Policy and Planning and Watershed Management

Fall, Prerequisites: No

Presents a comprehensive approach to water resources management through the integration of environmental science and policy. Course examines groundwater, lake, riverine, wetland and coastal management issues and relies heavily on practical case studies to illustrate successful methods.

REFERENCE GUIDE

Undergraduate Environmental Courses by Department:

BIO 001	Environmental Preservation and Improvement	Fall 2013	Prerequisites: NO
BIO 007	Environmental Biology	Fall 2013	Prerequisites: NO
BIO 010	Plants and Humanity	Spring 2014	Prerequisites: NO
BIO 051	Experiments in Ecology	Fall 2013	Prerequisites: YES
BIO 132	Biostatistics	Fall 2013	Prerequisites: YES
BIO 142	Population and Community Ecology	Fall 2013	Prerequisites: YES
BIO 144	Principles of Conservation Biology	Spring 2014	Prerequisites: YES
BIO 164	Marine Biology	Spring 2014	Prerequisites: YES
BIO 185/CIS 201/NUTR 241	Food For All: Ecology, Biotechnology, and Sustainability	Spring 2014	Prerequisites: YES

CEE 030	Environmental Chemistry	Fall 2013	Prerequisites: YES
CEE 032	Environmental Engineering Principles	Spring 2014	Prerequisites: YES
CEE 133	Wastewater Plant Design	Spring 2014	Prerequisites: YES
CEE 136	Air Pollution Control	Fall 2013	Prerequisites: YES
CEE 138	Hazardous Waste Treatment Technologies	Spring 2014	Prerequisites: YES
CEE 158	Occupational and Environmental Engineering	Spring 2014	Prerequisites: NO
CEE 194	Field Methods for Global Health	Fall 2013	Prerequisites: Junior standing
CEE 194A/ ENV 196R	Introduction to Remote Sensing	Spring 2014	Prerequisites: NO
CEE 194H	Global Environmental Datasets	Fall 2013	Prerequisites: NO
CEE 201	Land Use Planning II	Spring 2014	Prerequisites: YES
CEE 202	Environmental Statistics	Spring 2014	Prerequisites: YES
CEE 214	Environmental and Water Resource Systems	Spring 2014	Prerequisites: NO
CEE 265/ UEP 265	Corporate Management of Environmental Issues	Fall 2013	Prerequisites: NO
CHBE 136	Air Pollution Control	Fall 2013	Prerequisites: YES
CHBE 138	Hazardous Waste Treatment Technologies	Spring 2014	Prerequisites: YES
CHBE 173	Clean Energy Technologies and Policy Issues	Spring 2014	Prerequisites: NO
CHEM 008	Environmental Chemistry	Spring 2014	Prerequisites: NO
CIS 201	Food For All: Ecology, Biotechnology, and Sustainability	Spring 2014	Prerequisites: YES
EC 030/ ENV 030	Environmental Economics	Fall 2013/ Spring 2014	Prerequisites: YES
EC 130	Topics in Environmental Economics	Fall 2013/ Spring 2014	Prerequisites: YES
ENG 002- 05/002-11	Freshman Writing Seminar: Nature and Writing	Fall 2013	Prerequisites: NO
ENG 160	Environmental Justice and U.S. Literature	Spring 2014	Prerequisites: NO

ENV 010	Plants and Humanity	Spring 2014	Prerequisites: NO
ENV 025	Environment and Technology	Fall, 2013	Prerequisites: NO
ENV 051	Experiments in Ecology	Fall 2013	Prerequisites: YES
ENV 059	Environment, Communication, and Culture	Spring 2014	Prerequisites: NO
ENV 091	Environmental Preservation and Improvement	Fall 2013	Prerequisites: NO
ENV 094	Environmental Policy Planning and Politics	Spring 2014	Prerequisites: YES
ENVS 095B	Telling the Climate Justice Story	Spring 2014	Prerequisites: NO
ENV 099	Environmental Internship	Fall 2013/ Spring 2014	Prerequisites: NO
ENV 142	Population and Community Ecology	Fall 2013	Prerequisites: YES
ENV 160	Environmental Justice and U.S. Literature	Spring 2014	Prerequisites: NO
ENV 164	Marine Biology	Spring 2014	Prerequisites: YES
ENV 193-02	Introduction to GIS	Fall 2013	Prerequisites: NO
ENV 196R/ CEE 194A	Introduction to Remote Sensing	Spring 2014	Prerequisites: NO
ENV 200/ UEP 200	Land Use Planning	Fall 2013	Prerequisites: NO
ENV 201	Land Use Planning II	Spring 2014	Prerequisites: YES
EOS 2	Environmental Geology	Spring 2014	Prerequisites: NO
EXP-0021-F	Rising Tide Climate Change, Vulnerability, and Adaptation	Fall 2013	Prerequisites: NO
EXP-0023-F	Fracked Out: Understanding the New Gas Rush	Fall 2013	Prerequisites: NO
EXP-0026-F	Introduction to Sustainable Agriculture and Food Systems	Fall 2013	Prerequisites: NO
EXP-027-F	“When the Snow is Not Frozen”: Damage and Resilience in the Arctic	Fall 2013	Prerequisites: NO
EXP-0046-F	Environmental Action: Shifting from Saying to Doing	Fall 2013	Prerequisites: NO
EXP 059	Environment, Communication, and Culture	Spring 2014	Prerequisites: NO

PHIL 091	Climate Change Ethics	Spring 2014	Prerequisites: NO
PJS 160	Environmental Justice and U.S. Literature	Spring 2014	Prerequisites: NO
PS 118-03	Water Diplomacy II: Politics and Economics of Water Policies	Fall, 2013	Prerequisites: NO
PS 138-03	Topics in Comparative Politics: Culture, Politics, and the Environment	Spring 2014	Prerequisites: NO
PS 138-08	Conflict and Natural Resources	Fall 2013	Prerequisites: NO
PS 138-10	Politics of Oil and Energy	Fall 2013	Prerequisites: NO
PS 188-06	Global Environmental Politics	Fall 2013	Prerequisites: NO
PS 188-20	International Environmental Negotiation	Fall 2013	Prerequisites: NO
PS 194	Politics of Environmental Policy in the U.S.	Fall 2013	Prerequisites: NO
PS 195	Seminar: Politics of Sustainable Communities	Spring 2014	Prerequisites: YES
ME 011	Thermodynamics Applied to Sustainable Energy	Fall 2013	Prerequisites: YES
NUTR 215	Fundamentals of U.S. Agriculture	Fall 2013	Prerequisites: Consent of instructor
NUTR 241	Food For All: Ecology, Biotechnology, and Sustainability	Spring 2014	Prerequisites: YES
UEP 094	Environmental Policy, Planning, and Politics	Spring 2014	Prerequisites: NO
UEP 173	Transportation Planning	Spring 2014	Prerequisites: NO
UEP 200	Land Use Planning	Fall 2013	Prerequisites: NO
UEP 201	Land Use Planning II	Spring 2014	Prerequisites: YES
UEP 205	Urban Planning and Design	Fall 2013	Prerequisites: NO
UEP 221	Climate Change Policy, Planning, and Action	Spring 2014	Prerequisites: NO
UEP 223	Fundamentals of U.S. Agriculture	Fall 2013	Prerequisites: Consent of instructor
UEP 232	Introduction to GIS	Fall 2013	Prerequisites: NO
UEP 250	Foundations of Public Policy and Planning	Fall 2013	Prerequisites: NO

UEP 265	Corporate Management of Environmental Issues	Fall 2013	Prerequisites: NO
UEP 279	Water Resources Policy and Planning and Watershed Management	Fall 2013	Prerequisites: NO
UEP 284	Developing Sustainable Communities	Spring 2014	Prerequisites: NO
UEP 286	Environmental Ethics	Spring 2014	Prerequisites: NO
UEP 294-16	Environmental Health for Policy and Planning	Fall 2013/ Spring 2014	Prerequisites: NO