# Environmental Studies Course Guide

# Fall 2015

This guide contains a list of courses by track (and descriptions) available for Environmental Studies Majors during Fall 2015.

**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 contact Sara Gomez (sara.gomez@tufts.edu) should issues regarding a course arise**

| Number: | Cross-Listed as: | Course: | Instructor: | Notes: |
|---|---|---|---|---|
| **Cores and special listings** | | | | |
| **BIO 007** | ENV 007 | Environmental Biology | Colin Orians, Michael Reed | Biology majors may substitute BIO 142 or BIO 144 |
| **EC 005** | | Principles of Economics | George Norman | Core course |
| **ENV 195-02** | | Selected Topics: Environmental Policy & Communication | Staff | New core replacing ENV 195-02 Global Environmental Policy |
| **ENV 099** | | Environmental Internship | Colin Orians | Internship |
| **ENV 095** | | Special topics in Environmental Studies | Staff | Lunch and Learn Seminar series- does not count towards major |
| **ES 025** | ENV 025 | Environment and Technology | Anne Marie Desmarais | Core course |
| *Unlisted courses that are environmentally-themed might be taken to count towards individual tracks if approved, but not to replace core courses. Examples include: Departamental seminars, Experimental College classes, University Seminars and Advanced Independent Research courses offered by different departments.* | | | | |

| Number: | Cross-Listed as: | Course: | Instructor: | Notes: |
|---|---|---|---|---|
| **Track I: Environmental Science** | | | | |
| **BIO 051** | ENV 051 | Experiments in Ecology | George Ellmore, Jan Pechenik | |
| **BIO 132** | | Biostatistics | Sara Lewis | |
| **BIO 135** | | Ecology of Animal Movement | Elizabeth Crone | |
| **BIO 142** | | Population and Community Ecology | Frances Chew | |
| **BIO 181** | ENV 181 | Tropical Ecology and Conservation | Colin Orians | |
| **CEE 030** | | Environmental Chemistry | John Durant | |
| **CEE 054** | ENV 054 | Fundamental Epidemiology | Mark Woodin | |
| **CEE 112** | ENV 112 | Hydrology/Water Resources | Shafiqul Islam | |
| **CEE 154** | | Principles of Epidemiology | Mark Woodin | |
| **CEE 167** | ENV 167 | Environmental Toxicology | Anne Marie Desmarais | |
| **CEE 187** | | Geographic Information Systems (GIS) | Laurie Baise | |
| **EC 030** | | Environmental Economics | Brian Roach | |
| **ENV 091** | BIO 001 | Environmental Preservation and Improvement | George Ellmore | |
| **ENV 107** | GIS 101 | Introduction to Geographic Information Systems | Carl Zimmerman | |
| **ENV 199** | | Senior Honors Thesis | Colin Orians | |
| **EOS 001** | | Introduction to the Dynamic Earth w/ Lab | Jacob Benner | |
| **EOS 005** | | Introduction to Oceanography | Andrew Kemp | |
| **EOS 051** | | Global Climate Change | Andrew Kemp | |
| **EOS 131** | ENV 113 | Groundwater | Grant Garven | |
| **ES 056** | | Probability and Statistics | Wayne Chudyk | |
| **MATH 021** | | Introductory Statistics | Patricia Garmirian/Staff | |
| **NUTR 231** | | Fundamentals of GIS for Food, Agriculture, and Environment | Paul Cote | |
| **PHIL 033** | | Logic | Susan Russinoff | |
| **PHIL 038** | | Rational Choice | Stephen White | |

| Number: | Cross-Listed as: | Course: | Instructor: | Notes: |
|---|---|---|---|---|
| **Track II: Sustainability, Policy and Equity** | | | | |
| **ANTH 126** | | Food, Nutrition and Culture | Stephen Bailey | |
| **BIO 142** | | Population and Community Ecology | Frances Chew | |
| **BIO 181** | ENV 181 | Tropical Ecology and Conservation | Colin Orians | |
| **CD 146** | | Applied Data Analysis | Staff | |
| **CEE 054** | ENV 054 | Fundamental Epidemiology | Mark Woodin | |
| **CEE 112** | ENV 112 | Hydrology/Water Resources | Shafiqul Islam | |
| **CEE 136** | | Air Pollution Control | Stephen Zemba | |
| **CEE 137** | | Public Health | David Gute | With permission from instructor |
| **CEE 138** | | Hazardous Waste Treatment Technologies | Lawrence Cohen | |
| **CEE 154** | | Principles of Epidemiology | Mark Woodin | |
| **CEE 167** | ENV 167 | Environmental Toxicology | Anne Marie Desmarais | |
| **CEE 241** | | Biology, Water & Health | David Gute | |
| **CH 001** | | Introduction to Community Health | Jennifer Allen | |
| **CH 031** | | Introduction to Statistics for Health Applications | Karen Kosinski | |
| **CH 106** | | Health, Ethics, and Policy | Keren Ladin | |
| **CH 109** | | Community Action and Social Movements in Public Health | Cora Roelofs | |
| **CH 184** | | Globalization & Health | Cora Roelofs | |
| **EC 030** | | Environmental Economics | Brian Roach | |
| **EC 107** | | Econometric Analysis | Jeffrey Zabel | |
| **ED 164** | | Education for Peace and Justice | Deborah Donahue-Keegan | |
| **ENV 091** | BIO 001 | Environmental Preservation and Improvement | George Ellmore | |
| **ENV 107** | GIS 101 | Intro to Geographic Information Systems | Carl Zimmerman | |
| **ENV 151** | | Environmental Action | Tina Woolston | |
| **ENV 195-01** | | Mapping Stories of the City | Lai Ying Yu | |
| **ENV 199** | | Senior Honors Thesis | Colin Orians | |
| **EOS 005** | | Introduction to Oceanography | Andrew Kemp | |
| **ES 056** | | Probability and Statistics | Wayne Chudyk | |
| **NUTR 215** | UEP 223 | Fundamentals of US Agriculture | Timothy Griffin | |
| **NUTR 229** | | Humanitarian Action in Complex Emergencies | Daniel Maxwell | Seniors with permission from the instructor |
| **PHIL 024** | | Introduction to Ethics | Monica Wong Link/Staff | |
| **PHIL 038** | | Rational Choice | Stephen White | |
| **PSY 031** | | Statistics for Behavioral Science | Staff | |
| **PSY 032** | | Experimental Psychology | Sam Sommers | |
| **SOC 101** | | Quantitative Research Methods in Sociology | Orly Clerge | |
| **SOC 135** | | Social Movements | Brett Nava-Coulter | |
| **UEP 113** | UEP 213 | Housing Policy | Rosalind Greenstein | |
| **UEP 200** | ENV 200 | Land Use Planning | Jon Witten | With permission from Maria Nicolau, limited seats |
| **UEP 264** | | Green Urban Design | Christine Cousineau | |
| **UEP 265** | CEE 265 | Corporate Management of Environmental Issues | Ann Rappaport | With permission from Maria Nicolau, limited seats |

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|---|---|---|---|---|
| **Track II: Sustainability, Policy and Equity (continued)** | | | | |
| **UEP 271** | | Community Economic Development | Margaret Barringer | |
| **UEP 275** | | Policy Implementation and Innovation | Laurie Goldman | With permission from instructor |
| **UEP 279** | | Water Resources Policy and Planning and Watershed Management | Scott Horsley | With permission from Maria Nicolau, limited seats |
| **UEP 293-03** | | Special topics: Retrofitting Suburbs | Christine Cousineau | 0.5 credits; first half of semester only |

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|---|---|---|---|---|
| **Track III: Environmental Communication** | | | | |
| **BIO 051** | ENV 051 | Experiments in Ecology | George Ellmore, Jan Pechenik | |
| **CD 146** | | Applied Data Analysis | Staff | |
| **CH 031** | | Introduction to Statistics for Health Applications | Karen Kosinski | |
| **DR 027** | | Public Speaking | Deborah Cooney | |
| **EC 030** | | Environmental Economics | Brian Roach | |
| **EC 107** | | Econometric Analysis | Jeffrey Zabel | |
| **ED 164** | | Education for Peace and Justice | Deborah Donahue-Keegan | |
| **ELS 105-01 and 02** | | Entrepreneurial Marketing | John Derby/Gavin Finn | |
| **ENV 091** | BIO 001 | Environmental Preservation and Improvement | George Ellmore | |
| **ENV 107** | GIS 101 | Intro to Geographic Information Systems | Carl Zimmerman | |
| **ENV 151** | | Environmental Action | Tina Woolston | |
| **ENV 195-01** | | Mapping Stories of the City | Lai Ying Yu | |
| **ENV 199** | | Senior Honors Thesis | Colin Orians | |
| **ES 056** | | Probability and Statistics | Wayne Chudyk | |
| **EXP 051** | | Narrative and Documentary Practice | Samuel James | Check current Ex-College listings |
| **EXP 052** | | Public Relations and Marketing: Unraveling the Spin | Gail Bambrick | Check current Ex-College listings |
| **EXP 053** | | Producing Films for Social Change | Dacia Antunes | Check current Ex-College listings |
| **EXP 101** | | Advanced Filmmaking | Woolf/Gittleman | Check current Ex-College listings |
| **FAM 064** | | Photography Foundations | Mike Mandel/Dore Gardner | |
| **FAM 065** | | Photography and Computer | Tom Macintyre | |
| **NUTR 220** | | Introduction to Writing about Nutrition and Health | Christine Smith | With permission from instructor |
| **PHIL 024** | | Introduction to Ethics | Monica Wong Link/Staff | |
| **PHIL 038** | | Rational Choice | Stephen White | |
| **PSY 031** | | Statistics for Behavioral Science | Staff | |
| **PSY 032** | | Experimental Psychology | Sam Sommers | |
| **SOC 101** | | Quantitative Research Methods | Orly Clerge | |
| **SOC 135** | | Social Movements | Brett Nava-Coulter | |
| **UEP 200** | ENV 200 | Land Use Planning | Jon Witten | With permission from Maria Nicolau, limited seats |

| Number: | Cross-Listed as: | Course: | Instructor: | Notes: |
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| **Track IV: Food Systems and the Environment** | | | | |
| **ANTH 126** | | Food, Nutrition and Culture | Stephen Bailey | |
| **BIO 132** | | Biostatistics | Sara Lewis | |
| **BIO 181** | ENV 181 | Tropical Ecology and Conservation | Colin Orians | |
| **CD 146** | | Applied Data Analysis | Staff | |
| **CEE 054** | ENV 054 | Fundamental Epidemiology | Mark Woodin | |
| **CH 001** | | Introduction to Community Health | Jennifer Allen | |
| **CH 031** | | Introduction to Statistics for Health Applications | Karen Kosinski | |
| **CH 184** | | Globalization & Health | Cora Roelofs | |
| **EC 013** | | Statistics | Staff | |
| **EC 030** | | Environmental Economics | Brian Roach | |
| **EC 035** | | Economic Development | Adam Storeygard/Kyle Emerick | |
| **EC 048** | | Health Economics | Judith Bentkover | |
| **ENV 091** | BIO 001 | Environmental Preservation and Improvement | George Ellmore | |
| **ENV 107** | GIS 101 | Intro to Geographic Information Systems | Carl Zimmerman | |
| **ENV 199** | | Senior Honors Thesis | Colin Orians | |
| **ES 056** | | Probability and Statistics | Wayne Chudyk | |
| **EXP 015** | | Food, Law, and Policy | Sarah Downer | Check current Ex-College listings |
| **HIST 005** | | History of Consumption | Ina Baghdiantz-McCabe | |
| **NUTR 215** | UEP 223 | Fundamentals of US Agriculture | Timothy Griffin | |
| **PHIL 038** | | Rational Choice | Stephen White | |
| **PS 103** | | Political Science Research Methods | Deborah Schildkraut Russell | |
| **PSY 025** | | Physiological Psychology | Joseph DeBold | |
| **PSY 031** | | Statistics for Behavioral Science | Staff | |
| **PSY 127** | | Behavioral Endocrinology | Joseph DeBold | |
| **PSY 128** | | Nutrition and Behavior | Marcy Goldsmith | Only for Biology and Biopsychology majors |
| **SOC 101** | | Quantitative Research Methods | Orly Clerge | |
| **SOC 102** | | Qualitative Research Methods | Helen Marrow | |
| **UEP 232** | ENV 193 | Intro to GIS | Staff | |

# COURSE DESCRIPTIONS

### ANTH 126 FOOD, NUTRITION AND CULTURE
**Stephen Bailey**

Interplay of the act of eating with its biological and cultural correlates. Topics include subsistence strategies, sex differentials in food intake, and the nutritional impact of modernization; hunger and malnutrition in the developing world; historical and symbolic attributes of food, including taboo, valences, and national cuisines; and the relation of normal and abnormal eating behavior to gender and cultural norms of attractiveness Recommendations: One lower-level anthropology course or permission of instructor.

### BIO 007/ENV 007 ENVIRONMENTAL BIOLOGY
**Reed/Orians**

An examination of major natural and created ecosystems and human influences on them. Ecological bases for sound land use and pollution abatement.

### BIO 051/ENV051 EXPERIMENTS IN ECOLOGY
**Ellmore/Pechenik/Lewis**

An introduction to field research in different habitats. Emphasis on acquiring skills in taxonomic identification, sampling techniques, hypothesis testing and experimental design, data analysis and interpretation, as well as oral and written communication. Opportunity for student-designed group research projects on ecological questions. One laboratory session per week plus one discussion period. Prerequisites: sophomore standing and Biology 14 or equivalent.

### BIO 132 BIOSTATISTICS
**Sara Lewis**

An examination of statistical methods for designing, analyzing, and interpreting biological experiments and observations. Topics include probability, parameter estimation, inference, correlation, regression, analysis of variance, and nonparametric methods. Prerequisites: Biology 13 and 14, or equivalent, plus one additional biology course.

### BIO 135 ECOLOGY OF ANIMAL MOVEMENT
**Elizabeth Crone**

Behavioral mechanisms and ecological consequences of movement by animals and plants. Introduction to theoretical models of movement and dispersal, field methods for monitoring movement, and statistics used to analyze movement data. 3 required field trips. Prerequisites: BIO 14 and Calculus or BIO 117 (Biomechanics).

### BIO 142/ENV 142 POPULATION AND COMMUNITY ECOLOGY
**Frances Chew**

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). Prerequisites: Biology 13 and 14 or equivalent, or permission of instructor.

## BIO 181 TROPICAL ECOLOGY AND CONSERVATION

**Colin Orians**

This seminar and field trip is designed to provide students with an in depth understanding of tropical ecology and first-hand experience in tropical Central America. Topics to be covered include 1) community ecology, 2) ecosystem ecology, 3) physiological ecology, 4) plant-animal interactions, and 5) conservation biology. In addition to weekly readings, discussions, and writing assignments, students will write a grant proposal and present it to the class. Over winter break we will travel to Costa Rica for an intensive two-week field experience. We will gain hands-on research experience in contrasting habitats and learn about conservation efforts in Costa Rica. A typical 2-day schedule will be a morning orientation hike followed by meetings to design experiments, data collection in the afternoon, an evening lecture or discussion, data collection the next day, and data analysis in the evening. Although the conditions will often be uncomfortable (hot and humid), this is an excellent opportunity to gain first hand research experience in the tropics. Estimated cost of this trip is $1,200 (financial aid is available). This is a HIGH DEMAND course. Fall 2015 and alternate years. (Group C) Prerequisites: Bio 14 or equivalent and permission of instructor. A completed application and supporting materials must be submitted to Dr. Orians by April 15.

## BIO 183 SEMINAR IN DARWINIAN MEDICINE

**Phillip Starks**

The mechanistic vs. evolutionary causes of diseases and modern medical practice. Focus on the evolutionary causes of disease as a means of sharpening research skills, and the understanding and application of Darwinian thought. Evolutionary hypothesis creation and testing in the form of both oral and manuscript form. Rationale: As evolution is relevant to virtually every aspect of biology, students should learn how to take a Darwinian approach to disease. Prerequisite: Bio 130.

## CD 146 APPLIED DATA ANALYSIS

**Staff**

As a second course in statistics, the focus will be on methods of exploratory data analysis, general linear model techniques (regression, correlation, and ANOVA), and analysis of categorical data (contingency table analysis). Students will learn by doing through hands-on work using Excel and SPSS software with real data from the social and behavioral sciences. Skills in interpreting research findings will also be developed. Prerequisite: Intro stats course w/ a social and behavioral science focus.

## CEE 030 ENVIRONMENTAL CHEMISTRY

**John Durant**

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. Recommendations: CHEM 2; CEE 32 or equivalent.

## CEE 054/ENV 054 FUNDAMENTAL EPIDEMIOLOGY

**Mark Woodin**

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 112/ENV 112 HYDROLOGY/WATER RESOURCES
**Shafiqul Islam**

An introduction to the science of hydrology and to the design of water resource systems. Basic hydrologic processes such as precipitation, infiltration, groundwater flow, evaporation, and streamflow are discussed. Applications of hydrology to water supply, flood control and watershed modeling are emphasized. Students develop their own hydrologic models using computer software. Recommendations: CEE12

### CEE 136 AIR POLLUTION CONTROL
**Stephen Zemba**

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. Recommendations: Junior standing

### CEE 137 PUBLIC HEALTH
**David Gute**

An introduction to the public health approach is provided. The epidemiological model of the disease process is used to study a variety of infectious and noninfectious diseases. The wide variety of nonmedical approaches to disease control is emphasized. The public health aspects of vital statistics, evaluation, and administrative decision making are introduced and applied to current problems in public health. Recommendations: Consent of instructor.

### CEE 138 HAZARDOUS WASTE TREATMENT TECHNOLOGIES
**Lawrence Cohen**

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. Recommendations: Senior standing or consent of instructor.

### CEE 154 PRINCIPLES OF EPIDEMIOLOGY
**Mark Woodin**

Methods that quantify disease processes in human populations. Topics include study design, sources of inaccuracy in experimental and observational studies, the methodology of data collection, and an introduction to the statistical evaluation of epidemiological data. Recommendations: Consent of instructor.

### CEE 167/ENV 167 ENVIRONMENTAL TOXICOLOGY
**Anne Marie Desmarais**

This course is designed to present the basic scientific principles of toxicology and the relationship of toxicology to health-based risk assessment and hazardous materials management. The toxic effects of hazardous substances on specific organ systems are described, as well as the mechanisms of action of some frequently encountered environmental contaminants. Specialized topics related to the field of toxicology are also discussed, including animal to human extrapolation of data, mutagenicity/carcinogenicity, and teratogenesis. Recommendations: Senior standing or consent of instructor.

### CEE 187 GEOGRAPHIC INFORMATION SYSTEMS
**Laurie Baise**
Spatial analysis with Geographic Information Systems (GIS), including their use for engineering applications. GIS data structure and management, techniques for spatial analysis. Applications including seismic hazard, water resources, and environmental health. Laboratory exercises in GIS.Recommendations: ES 56.

### CEE 241 BIOLOGY, WATER & HEALTH
**David Gute**
Contact instructor for course description and permission.

### CH 001 INTRODUCTION TO COMMUNITY HEALTH
**Jennifer Allen**
Examines the relationship between health, health care, and community. Considers the determinants of health and illness in contemporary society. Major emphasis on how communities define and try to resolve health-related problems explored through case studies.

### CH 031 INTRODUCTION TO STATISTICS FOR HEALTH APPLICATIONS
**Karen Kosinski**
Statistics as it relates to community health, public health, and research in the health fields. Introductory level course, does not require calculus and emphasizes applications of statistics in the health field rather than mathematical derivations of statistical equations. Student will learn to use the computer program SPSS.

### CH 106 HEALTH, ETHICS, AND POLICY
**Keren Ladin**
Critical exploration of the ethical dimensions of public health policy and practice. Ethical analyses of health promotion, epidemiological research, surveillance, and health care services in dealing with particular health concerns (e.g., smoking, violence, HIV/AIDS, and managed care).

### CH 109 COMMUNITY ACTION AND SOCIAL MOVEMENTS IN PUBLIC HEALTH
**Cora Roelofs**
Examines forms of social actions intended to alter the determinants of health. Theories and research of community action and social movements are applied to understand how groups organize around issues of identity or health conditions to shape health-related policies, practices and resource distribution. Topics covered include women's health, immigrant health, HIV/AIDS, contested illnesses, community health centers, and health care policy.

### CH 184 GLOBALIZATION AND HEALTH
**Cora Roelofs**

This class will explore public health issues in the global economy with a focus on economic development and the social determinants of health as defined by the World Health Organization. The guiding question for this seminar is: What determines the social determinants of health? Global economic phenomena such as trade, debt, investment, financial crises, migration, resource exploitation, and industrial development have profound impacts on global health and countries' abilities to meet the basic human needs of their populations. Countries experiencing rapid economic transitions, such as China and Mexico, are also experiencing profound transitions in health related to changes in nutrition and the environment. Through examples from a diverse set of countries, we will investigate the health impacts of globalization, neoliberalism, and economic development projects and look at opportunities to mitigate negative effects through social standards, Health in All Policies initiatives, corporate responsibility, treaties, and sustainable development. Topics will include global supply chains in manufacturing; land, water and resource exploitation; transnational trade agreements; migration and domestic work; spread and adoption of Western cultural beliefs and practices related to health; environmental security and climate change; and policies related to food, tobacco and agriculture. The roles of governments, non-governmental organizations, international trade and development agencies, global corporations and social movements in challenging or promoting health in the global economy will also be highlighted. Pre-requisites: Junior or Senior standing, or consent.

### DR 027 PUBLIC SPEAKING
**Deborah Cooney**

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. Satisfies Humanities Requirement Fall 2006 and beyond.

### EC 005 PRINCIPLES OF ECONOMICS
**George Norman**

An introduction to the fundamentals of microeconomic and macroeconomic analysis. Topics covered in microeconomics include 1) how markets determine composition and pricing of outputs and inputs, and 2) the behavior of individual consumers and businesses in response to market forces. Topics covered in macroeconomics include 1) the determinants of economic growth, and 2) the effects of fiscal and monetary policy on unemployment, inflation, and capacity utilization.

### EC 013 STATISTICS
**Staff**

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 (formerly MATH 11).

### EC 030/ENV 030 Environmental Economics
**Brian Roach**

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**
**Storeygard/Emerick**
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 005.

**EC 048 HEALTH ECONOMICS**
**Judith Bentkover**
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**
**Jeffrey Zabel**
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).

**ED 164 EDUCATION FOR PEACE AND JUSTICE**
**Deborah Donahue-Keegan**
Past and present efforts to use education for building a just and peaceful society. The advocacy of education in democratic societies, emphasizing the works of contemporary critical, antiracist, and feminist theorists. Peace pedagogies, curricula, and programs focused on social justice. Participation in a "mini-internship" focused on peace and social justice issues in an educational program.

**ELS 105-01 AND 02 ENTREPRENEURIAL MARKETING**
**Derby/Finn**
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.

**ENV 091/BIO 001 ENVIRONMENTAL PRESERVATION AND IMPROVEMENT**
**George Ellmore**
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 095 SPECIAL TOPICS IN ENVIRONMENTAL STUDIES**
**Staff**
Lunch and Learn Seminar Series - does not count towards major

### ENV 099 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 the ENVS Program Administrator. Many academic semester and summer internships are available. No credit. Completion noted on transcript. For more information visit http://as.tufts.edu/environmentalStudies/internships/

### ENV 107/GIS 101 INTRO TO GEOGRAPHIC INFORMATION SYSTEMS
**Carl Zimmerman**

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 151 ENVIRONMENTAL ACTION
**Tina Woolston**

This is a hands-on, experiential class where students will explore the human behavior-environment nexus and practice acting as a change agent on campus. Students will develop, deploy and evaluate campaigns designed to reduce energy use among building occupants at select on-campus locations. Topics covered include: human behavior, community based social marketing, energy, climate change, sustainability efforts at Tufts, culture change, survey techniques, effective communication, program evaluation and the social dimension of sustainability. Prerequisites: ENV 091 or BIO 007 or permission of instructor.

### ENV 195-02 SELECTED TOPICS: ENVIRONMENTAL POLICY AND COMMUNICATION
**Staff**

Core course replacing ENV 195-02 Global Environmental Policy. Course description TBD.

### ENV 199 SENIOR HONORS THESIS
**Colin Orians**

See Thesis Honors Program and departamental website for details.

### EOS 001 INTRODUCTION TO THE DYNAMIC OF EARTH
**Jacob Benner**

Origin and occurrence of rocks and minerals of the earth's crust. Dynamic processes which form mountains, canyons, and ocean basins. Topics include volcanic eruptions, earthquakes, rock deformation, energy and mineral resources, plate tectonics, geologic time, and the geology of selected national parks. Three lectures, one field trip or laboratory.

### EOS 005 INTRODUCTION TO OCEANOGRAPHY
**Andrew Kemp**

Physical, geological, biological, and chemical aspects of the world ocean. Origin of ocean basins, currents, tides, waves, biological productivity, and marine sedimentation in the shallow to deep realm. Influence of human activity along coasts. Three lectures. Recommendations:  High School Chemistry.

**EOS 051 GLOBAL CLIMATE CHANGE**
**Andrew Kemp**
Introduction to Earth's climate system to better understand causes of present and future climate change. Emphasis placed on processes that control Earth's modern climate, such as global energy budgets, the behavior of greenhouse gases, and features of global and regional climate systems such as El Nino South Oscillation. Lectures and problem-based classroom exercises. Prerequisite: EOS 1, 2 or 5. May be taken by grad students as EOS 151 with extra assignments.

**EOS 131/ENV 113 GROUNDWATER**
**Grant Garven**
The geology and hydrology of groundwater. Topics include: hydraulic properties of soils, sediments, and rocks; physics of groundwater flow; flow nets, modeling groundwater systems; geology of regional flow; aquifer exploration and water well construction methods; well hydraulics and aquifer testing; applications in the geosciences and in civil/geotechnical/environmental engineering. Recommendations: EOS 1 or 2 (formerly GEO 1 or GEO 2), and MATH 32 (formerly MATH 11).

**ES 025/ENV 025 ENVIRONMENT & TECHNOLOGY**
**Anne Marie Desmarais**
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. Recommendations: CHEM 1 or 16 and sophomore standing

**ES 056 PROBABILITY AND STATISTICS**
**Wayne Chudyk**
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 015 FOOD, LAW, AND POLICY**
**Sarah Downer**
This class will introduce students to the U.S. food system: how laws and policies shape the ways that the food we eat is produced, distributed, marketed, and made available to different populations. Students will begin by learning about the difference between programs and policies and examining food policy-making at the federal, state, and local levels. They will then engage with the most controversial and complex topics in food policy. From industrial agriculture to the health implications of our food system to alternative food movements, students will become familiar with the foundational legal context of each topic. After extensive discussion, they will be asked to take positions and form arguments to support existing or creative new policies. Through debates, role-plays, and oral presentations, students will emerge from this course with a deep understanding of the ongoing legal and policy dialogue about our domestic food system. Note: Please use SIS and the Ex-College website to check the availability of this course, as courses offered through the Experimental College change regularly.

### EXP 051 NARRATIVE AND DOCUMENTARY PRACTICE
**Samuel James**

As we venture into an era where digitally delivered media and 24-hour news cycles bombard us with a deluge of facts, minutiae, perspective, and hyperbole, the role of narrative storytelling is increasingly useful as a means to present information that is immersive, substantive and accessible. Narrative storytelling elaborates beyond the reporting of facts; it can take something specific – an experience, a voice, a place – and use it to illuminate a larger societal issue. This course serves as a foundation for preparing students to seek out and understand important global, national and local issues and to explain them in a compelling way using visual, written, and oral narrative techniques. It will equip students with a broad practical and theoretical understanding of how to tell stories about the world in which we live, doing so through a variety of immersive exercises, technical workshops, class discussions, guest lectures, and group and individual critiques. Note: Please use SIS and the Ex-College website to check the availability of this course, as courses offered through the Experimental College change regularly.

### EXP 052 PUBLIC RELATIONS AND MARKETING: UNRAVELING THE SPIN
**Gail Bambrick**

What is the formula for mind control? Take a little psychology, a pinch of sociology, a smidge of anthropology, some cognitive analysis, and add a healthy dash of strategic media manipulation. Give a good stir. It's all the ingredients you need to decide a Presidential election, repair the reputation of BP after the Gulf oil spill, make more people buy Hondas than Kias, or choose Coke over Pepsi. Primarily using case studies, this course will look at the history of public relations and marketing in the US and how it evolved in parallel with our media environment. We will explore how the mechanics of this global mega-industry create strategies that influence complex world affairs or simply the toothpaste we use. Guest speakers from the industry will share their thoughts. Students will work in teams on a final project to solve a PR/marketing challenge by creating their own ads, messages, and strategic plan. Note: Please use SIS and the Ex-College website to check the availability of this course, as courses offered through the Experimental College change regularly.

### EXP 053 PRODUCING FILMS FOR SOCIAL CHANGE
**Khary Jones**

In this course, students will develop critical viewing and "hands-on" production skills, as they learn the language of documentaries geared toward social change. We will discuss the evolution of documentary filmmaking and explore how these films comment on society. We will examine the varied forms of documentary filmmaking, including historical films, advocacy videos, political satire, propaganda, cinema verité, and other depictions of "reality." Students will engage in production and post-production workshops to develop their own skills as directors, producers, and editors. Small groups will create a complete documentary film by the end of the semester. This class should be of equal significance to students with interests in journalism, documentary history, active community leadership, and filmmaking of any kind. Class enrollment will be limited to sixteen students. Note: Please use SIS and the Ex-College website to check the availability of this course, as courses offered through the Experimental College change regularly.

### EXP 101 ADVANCED FILMMAKING
**Howard Woolf**

Based on a directed study model, this course provides the means by which students who have completed EXP-0056-CS: Making Movies – or who are able to demonstrate equivalent competence – can continue their training as filmmakers. Students who initially qualify will present a business plan for their project and, if accepted, will receive credit, access to TuftsFilmWorks' production and editing equipment, and a supervised context within which to work. In return, they agree to watch a negotiated number of source films, keep a Producer's Log, and write a final assessment, taking into account both the process they went through to produce their film and their reaction to the film once it is done. Note: Please use SIS and the Ex-College website to check the availability of this course, as courses offered through the Experimental College change regularly.

## FAM 064 PHOTOGRAPHY: FOUNDATION
**Mandel/Gardner**

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.Please see departmental website for specific details: http://www.smfa.edu/Continuing_Education/Studio_Art_Courses_Open_to_Tufts_Students.asp

## FAM 065 PHOTOGRAPHY AND COMPUTER
**Tom Macintyre**

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. Please see departmental website for specific details: http://www.smfa.edu/Continuing_Education/Studio_Art_Courses_Open_to_Tufts_Students.asp

## HIST 005 HISTORY OF CONSUMPTION
**Ina Baghdiantz-McCabe**

The socio-political history of the use made of goods, food, and energy by different groups through an analysis of class, race, and gender. The course examines economic factors through social and cultural history in order to understand consumption within a global economy. Analysis of social structures in the Americas, China, Europe, India, and the Ottoman Empire, from the seventeenth century to the present day.

## MATH 021 INTRODUCTORY STATISTICS
**Patricia Garmirian/Staff**

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.

## NUTR 215/UEP 223 FUNDAMENTALS OF US AGRICULTURE
**Timothy Griffin**

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.

### NUTR 220 INTRODUCTION TO WRITING ABOUT NUTRITION AND HEALTH
**Christine Smith**

This introductory course is designed to teach the basic skills necessary to write nutrition- and health-related papers that are clear, accurate, and audience-appropriate. It is a practical review of writing and revision, and will enable students to develop a clear, fluent, and readable style. The course will include both individual and collaborative exercises and will require several writing and editing assignments, as well as rewrites. It is a prerequisite for NUTR 205 and NUTR 306, both of which build on the skills it provides. ENVS majors need to obtain permission from the instructor.

### NUTR 229 HUMANITARIAN ACTION IN COMPLEX EMERGENCIES
**Daniel Maxwell**

This course examines the evolution of the humanitarian action in relation to changes in the operating environment and changes in the international system. This multi-disciplinary course will cover a broad range of subjects, and addresses a number of topics:--A historical perspective on humanitarian action;--The normative frameworks of humanitarian action - international humanitarian law, humanitarian principles, and codes of conduct;--Conceptual frameworks for addressing the protection of life, livelihoods, rights and safety of people caught in complex emergencies;--The impact of conflicts and the "global war on terror"on humanitarian space and humanitarian action;--The political economy of conflict and humanitarian aid;--Methodologies developed to improving the effectiveness and accountability of humanitarian action;--The evolving structure of the international humanitarian system;--The ethical and practical implications of incorporating human rights in humanitarian action.The course will rely on a case-study approach to examining these issues, and students will be involved in developing the case studies for presentation in class. By the end of this course students will be aware of the foundations on humanitarian action (International Humanitarian Law, humanitarian principles, different traditions); the historical, legal, social, political and moral context of humanitarian emergencies; the main analytical frameworks used to understand the causes and consequences of complex emergencies; and major forms of humanitarian responses to complex emergencies. Students will understand the complex relationship between humanitarian action and the international environment, the impact of humanitarian emergencies on social relations, and will have a working knowledge of the principles and standards of accountability for engaging in humanitarian response in complex emergencies. ENVS majors need to obtain permission from the instructor, only open for seniors.

### NUTR 231 FUNDAMENTALS OF GIS FOR FOOD, AGRICULTURE, AND ENVIRONMENT
**Paul Cote**

Most issues in the food system, from agricultural productivity to urban food security, cannot be completely understood without integrating many layers of information. Geographic information systems GIS) provide a powerful tool for synthesizing data for which the only shared trait is a common geographic position. Consequently, geospatial analysis is critical for understanding such complex phenomena. This course will provide students with the fundamental knowledge and skills to begin using GIS in research and applied projects. It will cover the structure of spatial data, key concepts in geography, common vector-based and raster-based analyses, basic spatial modeling, and project management. Principles of GIS science will be introduced through lectures then reinforced through intensive laboratory exercises using the ArcGIS software package. The primary goal of this course is to cultivate a level of competence sufficient to enable the student to conduct a simple project independently. Credit: 0.5

### PHIL 024 INTRODUCTION TO ETHICS
**Monica Wong Link/Staff**

An introduction to moral judgment--and the reasoning it is based on--by a detailed study of current issues such as abortion, vegetarianism, and responsibility for war crimes, and the application to such problems of ethical theories, such as egoism, utilitarianism, and the doctrine of rights.

**PHIL 033 LOGIC**
**Susan Russinoff**
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.

**PHIL 038 RATIONAL CHOICE**
**Stephen White**
Introduction to the systematic development of decision theory, game theory, and social choice theory. Emphasizes their application to problems in philosophy and the social sciences, and examines their foundations in the philosophical analysis of rationality.

**PS 103 POLITICAL SCIENCE RESEARCH METHODS**
**Deborah Schildkraut Russell**
This course introduces the use of quantitative methods for investigating political issues such as campaigns and elections, the death penalty, public opinion about war and terrorism, and other policy controversies. Students will develop research designs and learn how to collect, analyze, and present data. The course emphasizes hands-on training that will provide useful skills for academic and professional settings. Most readings and assignments emphasize politics in the United States, though the skills students will develop are useful for every aspect of political science.

**PSY 025 PHYSIOLOGICAL PSYCHOLOGY**
**Joseph DeBold**
The biological basis of behavior. Basic functioning of the nervous system; physiological basis of hunger, thirst, sex, aggression, sleep, sensory and motor systems, learning and memory. Lectures and demonstrations. Students cannot receive credit for both PSY 25 and PSY 103. Biopsychology majors, who completed PSY 25 before declaring the major, should speak with an advisor about substituting PSY 104 for the PSY 103 major requirement. Recommendations: PSY 1 or 9.

**PSY 031 STATISTICS FOR BEHAVIORAL SCIENCE**
**Staff**
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**
**Sam Sommers**
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 127 BEHAVIORAL ENDOCRINOLOGY**
**Joseph DeBold**
A seminar on the interrelationships of the endocrine system and behavior. Topics include the effects of hormones on sex, parental behavior, aggression, hunger, thirst, learning, and mental functions, as well as the influence of behavior on hormones. Recommendations: PSY 25, or 103, or equivalent.

**PSY 128 NUTRITION AND BEHAVIOR**
**Marcy Goldsmith**
The interactions between nutritional variables and behavior in man and other animals. Effects of obesity, starvation, protein malnourishment, and vitamin and mineral deficiencies on intellectual function and behavior. Influences of diet on brain biochemistry and learning. Only for Biology and Biopsychology majors. Recommendations: PSY 31 or BIO 132 or CH 54

**SOC 101 QUANTITATIVE RESEARCH METHODS IN SOCIOLOGY**
**Orly Clerge**
Data analysis and statistics for the social sciences. Sampling, describing data, and logic of inference, especially with surveys. Introduction to microcomputer tools for analysis and graphic display. Answering research questions through individual or group projects. Recommendations: One introductory social science course.

**SOC 102 QUALITATIVE RESEARCH METHODS IN SOCIOLOGY**
**Helen Marrow**
In this course, students will first become familiar with the epistemological underpinnings of qualitative research. They will then learn to craft sociological questions, design effective research instruments, gather data that address their questions, and interpret the data's significance in relation to research done by other sociologists. Finally, students will share their findings with fellow students. While there are many qualitative methodologies ranging from archival research to focus groups to content analysis, this class will work primarily with in-depth interviews and ethnographic observations that will be conducted in a site of each student's own choosing.

**SOC 135 SOCIAL MOVEMENTS**
**Brett Nava-Coulter**
Social circumstances under which organized efforts by powerless groups of people to affect history are attempted, motivations for such efforts, processes by which such efforts are implemented and controlled, and the impact such efforts have on society. Major sociological perspectives on social movements. Selected use of films to illustrate major themes. Recommendations: SOC 1 or 10 or other introductory-level social science course.

**UEP 113 HOUSING POLICY**
**Rosalind Greenstein**
Overview of housing and community development programs and strategies -- past and present -- with a particular emphasis on problems of low income people, urban areas, and racial minorities. Focus on the political and economic interests that have shaped public policies and assessments of the major initiatives. Special emphasis on nonprofit community-based housing. Recommendations: UEP181.

**UEP 200/ENV 200 LAND USE PLANNING**
**Jon Witten**
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 232 INTRO TO GIS**
**Staff**
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 264 GREEN URBAN DESIGN
**Christine Cousineau**

The course applies sustainable design principles to selected urban sites with the objective of creating meaningful places of residence, work, shopping and entertainment for current and future communities. Student teams select a site and work on its redevelopment. Students learn to do urban design analysis, research relevant history, demographics, and the market environment, develop a program of uses, propose a design using SketchUp, apply LEED for Neighborhood Development criteria, present their project to the class, and produce a final planning report. Lectures, readings and assigned papers are designed to inform the planning and design process.

### UEP 265 CORPORATE MANAGEMENT OF ENVIRONMENTAL ISSUES
**Ann Rappaport**

(Co-listed with Department of Civil Engineering and Environmental Studies.) Explores companies' responses to pressure from stockholders, regulatory agencies, community and non-governmental 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. Seniors and graduate students only, permission required.

### UEP 271 COMMUNITY ECONOMIC DEVELOPMENT
**Margaret Barringer**

Goals, strategies, and issues for community economic development. Analysis of the national, regional, and local economic environment. Alternative strategies; planning, development, implementation, and financial models; and social and economic criteria for project selection and evaluation. UEP 251 or permission of instructor.

### UEP 275 POLICY IMPLEMENTATION AND INNOVATION
**Laurie Goldman**

Seminar explores how policies, programs, and initiatives get translated into practice in public and nonprofit organizations through case studies and individual student projects. Reviews the challenges of implementation in light of concerns about accountability to multiple stakeholders and responsibility for achieving results. Explores strategies for innovative solutions to overcome implementation challenges including performance measurement, diffusion and adaptation of innovations, inter-organizational coordination and collaboration, and strategic framing. ENVS majors need permission from the instructor.

### UEP 279 WATER RESOURCES POLICY AND PLANNING AND WATERSHED MANAGEMENT
**Scott Horsley**

Presents a comprehensive approach to water resources management through the integration of environmental science and policy. Intended for students with or without technical backgrounds. Course examines groundwater, lake, riverine, wetland, and coastal management issues and relies heavily on practical case studies to illustrate successful methods.

### UEP 293-03 SPECIAL TOPICS: RETROFITTING SUBURBS
**Christine Cousineau**

What do we do in response to suburban sprawl? While we redevelop cities and inner-city neighborhoods, low-density outlying suburbs represent a greater land area and challenge. The course presents the environmental, social and economic drivers of the need to retrofit suburbs, which can be improved in density, mix of uses, transportation choice, and affordability. Failed shopping centers and foreclosed subdivisions offer redevelopment opportunities. Public transportation, civic/commercial centers in residential subdivisions, and different types of housing in commercial areas, are other approaches being used. The course will look at examples of retrofitting strategies and evaluate them against stated goals. 0.5 credits.