

Environmental Studies

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Beginning Autumn 2007, the Environmental Studies program will be housed in the Social Sciences Collegiate Division. Students who matriculated before July 2006 and wish to complete their degree under this program of study should consult the Environmental Studies Program Director, Mark T. Lycett (702-6040, m-lycett@uchicago.edu), to devise a plan of study that will fulfill the requirements below.

Program of Study

The Environmental Studies program addresses the full range of environmental issues: scientific, political, social, and cultural. How do humans use the natural world? What impact does human activity have on its natural legacy? How shall we best interact with our environment both for ourselves and on behalf of future generations and the web of life?

To explore these far-reaching questions, the Environmental Studies program offers a curriculum that is both broadly multidisciplinary and focused. The goal is to build mastery of topics of special concern upon a general environmental education. Our approach includes not only didactic course work but also special seminars and individual senior research papers. The program is sponsored by the New Collegiate Division, a home for innovations in interdisciplinary undergraduate education.

Summary of Program

Below are suggestions of courses appropriate for students who are majoring in Environmental Studies as well as for other interested students.

Introductory Courses. ENST 12100, 12300, 12402, and 12404 are environmentally relevant introductory natural science courses that are appropriate for undergraduates with interests in the humanities and social sciences. These courses are not required of students who are majoring in Environmental Studies, and these courses may not be appropriate for students planning advanced scientific study. Other relevant introductory science courses include CHEM 11101-11201-11301 and GEOS 13300 or 13400. Third- and fourth-year students who are not majoring in Environmental Studies may wish to consider a relevant Big Problems course, such as ENST 24400 (Is Development Sustainable?).

The Major. Students majoring in Environmental Studies may take the required introductory course, ENST 21201 (Human Impact on the Environment), in their second, third, or fourth year. They must also take courses in economics and statistics in addition to two relevant social science and two relevant biological or physical science courses beyond their general education requirements (see below).

Relevant Biological and Physical Sciences Courses: BIOS 23246; ENST 23289, 23900, 25100, 25500, and 27400; and STAT 20000 or higher.

Relevant Social Sciences Courses: ENST 20500, 20600, 21800, 22000, 23100, 23600, 23700, 23800, 24100, 24300, 24701, 24901, 25900, 26100, and 26500.

Environmental Studies Seminar. Students and faculty associated with the program meet periodically to hear talks by visiting scholars. Senior papers are also presented in this forum. Students in the program are expected to participate in these events without course credit.

B.A. Paper. During their third year, students should begin to choose a topic for their senior thesis (B.A. paper) and a faculty adviser. Guidance is available from the program chair and the B.A. preceptor. By Monday of ninth week of Spring Quarter of their third year, students should present to the program chair a brief plan for their B.A. project that identifies the topic, an adviser, and a list of relevant summer readings. Summer internships are often ideal starting points for B.A. projects. Students generally work on their senior thesis throughout their fourth year under the guidance of their faculty adviser and the B.A. program preceptor. Their thesis is submitted to readers and presented orally in the Environmental Studies seminar at the end of Spring Quarter. Students wishing to be considered for honors must submit their papers by seventh week of Spring Quarter; the deadline for other students is eighth week.

This program will accept a B.A. paper or project used to satisfy a senior thesis requirement in another major if certain conditions are met and the consent of the other program chair is obtained. Students should consult with the chairs by the earliest B.A. proposal deadline, or by the end of third year if neither program publishes a deadline. A consent form, to be signed by both chairs, is available from College advisers. It must be completed and returned to the College adviser by the end of Autumn Quarter of the student's year of graduation.

B.A. Colloquium. Students preparing their B.A. papers are expected to enroll in the B.A. Colloquium during the Autumn and Winter Quarters. This two-quarter course, taken *P/F*, is intended to assist students with the research and writing of their papers.

Summary of Requirements

1	ENST 21201
1	ECON 19800 or higher
1	STAT 20000 or higher
2	additional relevant social sciences courses
2	additional relevant natural sciences courses
3	additional courses in the area of emphasis
<u>2</u>	B.A. Colloquium (ENST 29801 and 29802)
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Grading. With the exception of ENST 29801 and 29802, courses that meet requirements for the major may not be taken on a *P/F* basis without consent of the program chair.

Honors. Students may be nominated for graduation with honors on the basis of the excellence of their senior research papers if their overall GPA is higher than 3.25. Students wishing to be considered for honors must secure a third reader for their senior papers, in addition to their adviser and the program chair, and submit their papers by seventh week of Spring Quarter.

Faculty

D. Aftandilian, D. Archer, J. Bergelson, A. Boden, J. Borevitz, T. Clark, M. Conzen, G. Davis, G. Eshel, J. Frederick, A. Gugliotta, A. Kolata, J. List, R. Lodato, D. MacAyeal, P. Martin, M. Mikesell, K. Morrison, J. Opie, C. Pfister, S. Pieck, R. Pierrehumbert, T. Price, M. Ruddat, S. Shaikh, T. Steck, M. Stein, G. Tolley, A. Turkewitz, T. Wootton

Courses: Environmental Studies (ENST)

11101-11201-11301. General Chemistry I, II, III: Variant A. (=CHEM 11101-11201-11301) *PQ: Good performance on the mathematics or calculus placement test. The first two courses in this sequence meet the general education requirement in the physical sciences.* Variant A emphasizes the role of chemical and physical processes in the environment, especially in water and in the atmosphere. It also takes on a more synthetic perspective in the third quarter. *Autumn, Winter, Spring. L: M. Zhao. Autumn, Winter, Spring.*

12100. Chemistry and the Atmosphere. (=PHSC 13500) *PQ: MATH 10600, or placement in MATH 13100 or higher.* This course focuses on aspects of chemistry as they apply to the Earth's atmosphere. The first half considers atmospheric structure and fundamental chemical principles, while the second half presents examples of chemical systems that operate in the atmosphere. Topics include the chemical composition of the atmosphere, the structure of atoms and molecules, the nature of chemical reactions, the interaction of solar radiation with atmospheric gases, the properties of the water molecule, formation of an ozone layer, and the chemistry of urban air pollution. *J. Frederick. Autumn. L.*

12300. Global Warming: Understanding the Forecast. (=GEOS 13400, PHSC 13400) *PQ: MATH 10600, or placement into 13100 or higher, or consent of instructor required; some knowledge of chemistry or physics helpful.* This course presents the science behind the forecast of global warming to enable the student to evaluate the likelihood and potential severity of anthropogenic climate change in the coming centuries. It includes an overview of the physics of the greenhouse effect, including comparisons with Venus and Mars; an overview of the carbon cycle in its role as a global thermostat; predictions and reliability of climate model forecasts of the greenhouse world; and an examination of the records of recent and past climates, such as the glacial world and Eocene and Oligocene warm periods. *D. Archer. Spring. L.*

12402. Life through a Genomic Lens. (=BIOS 11125) *PQ: BIOS 10100 or 10110, or consent of instructor.* The implications of the double helical structure of DNA triggered a revolution in cell biology. More recently, the technology to sequence vast stretches of DNA has offered new vistas in fields ranging from human origins to the study of biodiversity. This course considers a set of these issues, including the impact of a DNA perspective on the legal system, on medicine, and on conservation biology. *A. Turkewitz, M. Nobrega. Winter.*

12404. Environmental Ecology. (=BIOS 13107, NTSC 10400) *PQ: PQ: BIOS 10100 or 10110.* This course emphasizes basic scientific understanding of ecological and evolutionary principles that relate most closely to the ways humans interact with their environments. Topics include population growth, adaptation, and ecosystem structure and function. We also discuss the regulation and consequences of biodiversity. *Discussion required. T. Price. Winter.*

13106. The Hungry Earth: Light, Energy, and Subsistence. (=BIOS 13106) *PQ: BIOS 10100 or 10110.* This course considers the continuing erosion of the resources of the Earth by the persisting pressures of a growing human population, which makes a broad knowledge and appreciation of biology essential. Discussion includes the principles of energy conversion by plants as primary producers, the evolution of the structures and mechanisms involved in energy conversion, the origin of crop plants, improvements of plants by conventional breeding and genetic engineering, and the interactions of plants with pathogens and herbivores. *M. Ruddat. Winter.*

13300. The Atmosphere. (=GEOS 13300) *PQ: MATH 13200 or consent of instructor.* This course introduces the physics, chemistry, and phenomenology of the Earth's atmosphere with an emphasis on the role of the atmosphere as a component of the planet's life support system. Topics include (1) atmospheric composition, evolution, and structure; (2) solar and terrestrial radiation; (3) the role of water in atmospheric processes; (4) winds, the global circulation, and weather systems; and (5) atmospheric chemistry and pollution. We focus on the mechanisms by which human activity can influence the atmosphere and on interactions between atmosphere and biosphere. *J. Frederick, N. Nakamura. Spring.*

14200-14300. Paleoclimate, Earth Systems, and the Emergence of Humankind. *PQ: MATH 10600, or placement into MATH 13100 or higher. Must be taken in sequence. Register by lab section.* This two-quarter sequence (Winter and Spring Quarters) aims to examine the complex natural systems that have determined Earth's environment during the time when *Homo sapiens* emerged as a species and began to alter the environment in the process of building settlement systems. The sequence is intended to prepare students to apply the insights and world views of physical science to the understanding of history and current world events. *Labs are done in the computer classroom of Crerar USITE.*

14200. The Dynamic Environment: Global Systems and Climate During the Emergence of Humankind. (=PHSC 13200) This course begins the two-quarter sequence by looking at the topic of human genesis through the eyes of the physical and biological sciences. By genesis, we mean the evolution of our species from ancestral apes during the time period when Earth's climate was descending into a sequence of abruptly changing ice ages. We examine the environmental dynamism using modern physical science techniques as a means to explore the various theories of Hominid evolution and migration. Topics include the fossil record of human evolution, the Y-chromosome record of human migration, effects of the little ice age, solar physics, radiation balance of the earth relative to the sun, greenhouse effect, Greenland ice-core geochemistry, ice-age Milankovitch theory, glacial geology, volcanoes and their effect on weather and climate, volcanic hazards to settlement, precipitation systems, El Niño and the Indian monsoon, groundwater hydrology, rivers and fluvial systems, deltaic sedimentation patterns. The computer lab (held in Crerar USITE) involves scientific visualization exercises using paleoclimate data with Matlab software. *D. MacAyeal. Winter. L.*

14300. Settlement Systems, the Management of Nature, and the Emergence of Humankind within a Dynamic Environment. (=PHSC 13300) *PQ: ENST 14200 or PHSC 13200.* This course represents the examination of human interaction with the dynamic environment during the emergence of civilization and settlement systems designed to reshape nature for the local benefit of human economy. Topics include the fossil record of hominid evolution, drying climates of Africa, the Younger Dryas event, catastrophic environmental change in the Black Sea associated with sea-level rise, physics and chemistry of irrigation and water management, hydroelectric power generation, desert and Aeolian geomorphology, desertification, deforestation, primitive and advanced metallurgy as a basis for human culture, geoarchaeological methods, soil development, land degradation, sea-level rise, oil and petroleum production and environmental catastrophes in antiquity. The computer lab (held in Crerar USITE) involves scientific visualization exercises using paleoclimate data with Matlab software and satellite imagery with ArcMap software. Please register by lab section. *D. MacAyeal. Spring. L.*

20500. Introduction to Population. (=SOCI 20122/30122) This course introduces the field of demography, which examines the growth and characteristics

of human populations. We give an overview of our knowledge of three fundamental population processes: fertility, mortality, and migration. We cover marriage, cohabitation, marital disruption, aging, and population and environment. In each case, we examine historical trends. We also discuss causes and consequences of recent trends in population growth, and the current demographic situation in developing and developed countries. *L. Waite. Winter.*

21201. Human Impact on the Environment. The goal of this course is to analyze the impact of the human enterprise on the natural world that sustains it. Topics include human population dynamics, the role of economic and industrial activity in human well-being, our use of natural resources, biodiversity, sustainable development, and the role played by cultural institutions and values. We read and discuss diverse sources and write short weekly papers. *T. Steck. Autumn.*

21800. Economics and Environmental Policy. (=PBPL 21800) *PQ: ECON 19800 or higher.* This course combines basic microeconomic theory and tools with contemporary environmental and resources issues and controversies to examine and analyze public policy decisions. Theoretical points include externalities, public goods, common-property resources, valuing resources, benefit/cost analysis, and risk assessment. Topics include pollution, global climate change, energy use and conservation, recycling and waste management, endangered species and biodiversity, nonrenewable resources, congestion, economic growth and the environment, and equity impacts of public policies. *S. Shaikh. Spring.*

22000. The Anthropology of Development. (=ANTH 22000/33500) This course applies anthropological understanding to development programs in “underdeveloped” and “developing” societies. Topics include the history of development; different perspectives on development within the world system; the role of principal development agencies and their use of anthropological knowledge; the problems of ethnographic field inquiry in the context of development programs; the social organization and politics of underdevelopment; the culture construction of “well-being”; economic, social, and political critiques of development; population, consumption, and the environment; and the future of development. *A. Kolata. Winter.*

23100. Environmental Law. (=HIPS 28801, PBPL 23100) *PQ: Third- or fourth-year standing, or consent of instructor.* This lecture/discussion course examines the development of laws and legal institutions that address environmental problems and advance environmental policies. Topics include the common law background to traditional environmental regulation, the explosive growth and impact of federal environmental laws in the second half of the twentieth century, regulations and the urban environment, and the evolution of local and national legal structures in response to environmental challenges. *G. Davis. Autumn.*

23289. Marine Ecology. (=BIOS 23289) *PQ: Prior introductory course in ecology or consent of instructor.* This course provides an introduction into the physical, chemical, and biological forces controlling the function of marine ecosystems

and how marine communities are organized. The structures of various types of marine ecosystems are described and contrasted, and the lectures highlight aspects of marine ecology relevant to applied issues such as conservation and harvesting. *T. Wootton. Winter.*

24101. U.S. Environmental Politics. (=HIPS 28301, PBPL 22600) This course introduces the actors and processes that shape environmental policies in the United States. We examine the conflicts in values that underlie contemporary environmental debates. Case studies are used to examine the effectiveness of governmental institutions and procedures addressing environmental problems. We also use these cases to examine our own values and how we think about people living in different places and in the future. *Autumn.*

24301. International Development: Theory, Politics, and Policy. Why are some countries rich and others poor? How, if at all, can developed nations and international organizations promote development around the world? What are the power structures that define the meaning and implementation of international development? This course seeks answers to these questions. It provides a broad, interdisciplinary introduction to development studies. Topics include theories of economic development, Bretton Woods institutions, decolonization, gender, and human rights. *Autumn.*

24400. Is Development Sustainable? (=BPRO 23400, HIPS 23400, PBPL 24400) *PQ: Third- or fourth-year standing.* This is a discussion course for students without a background in environmental issues. Its aim is to grapple with the “big problem” of sustainable development. We analyze problematical issues underlying population growth, resource use, environmental transformation, and the plight of developing nations through a consideration of economic, political, scientific, and cultural institutions and processes. *T. Steck, S. Pieck. Spring.*

24701. U.S. Environmental Policy. (=PBPL 24701) Making environmental policy is a diverse and complex process. Environmental advocacy engages different governmental agencies, congressional committees, and courts, depending on the issue. This course examines how such differentiation has affected policy making over the last several decades. *R. Lodato. Winter.*

24800. The Complex Problem of World Hunger. (=BIOS 02810, BPRO 24800, SOSC 26900) *PQ: Third- or fourth-year standing.* Few of our policymakers are experts in economics, agronomy, food science, and molecular biology, yet all of these disciplines are essential for developing strategies to end world hunger. Choosing one country as a test case, we look at the history, politics, governmental structure, population demographics, and agricultural challenges. We then study the theory of world markets, global trade, and microeconomics of developing nations, as well as the promise and limitation of traditional breeding and biotechnology. *J. Malamy, D. Levine. Spring.*

24901. Global Environmental Politics. (=HMRT 24911, PBPL 24301) We examine the ways in which international society responds to global environmental problems. The aim is to develop a broad understanding of global environmental politics over the past three decades and provide tools for the analysis of complex environmental issues. The course will review the history of international environmental cooperation and key theoretical frameworks as well as identify the roles, interests, and behaviors of political actors. We apply these ideas to a variety of contemporary environmental debates related to trade, conservation, pollution, security, biotechnology, and climate change under the rubric of “global sustainable development.” *S. Pieck. Spring.*

25100. Ecological Applications to Conservation Biology. (=BIOS 23351, ECOL 31300) *PQ: Completion of the general education requirement for the biological sciences and consent of instructor.* We focus on the contribution of ecological theory to the understanding of current issues in conservation biology. We emphasize quantitative methods and their use for applied problems in ecology (e.g., design of natural reserves, risk of extinction, impact of harvesting, dynamics of species invasions, role of species interaction). Course material is drawn mostly from the current primary literature. *One Saturday field trip and computer modeling labs are in addition to scheduled class time. J. Bergelson, C. Pfister. Autumn. L.*

25300. The Planetary Footprint of Farming. (=GEOS 25300) *PQ: Third- or fourth-year standing, or consent of instructor.* This course draws on a ten-day field study of small, organic farms in the Berkshires to explore the environmental impact of modern industrial agriculture and realistic alternatives. Of interest are the roles of natural setting (i.e., geology, climate, meteorology); energy use and material flow; techniques of food production; dietary choices; and development and conservation strategies. A classroom component of lectures, readings, and exercises precedes the field trip. *Students are financially responsible for travel in December. G. Eshel, P. Martin. Autumn, Winter.*

25500. Biogeography. (=BIOS 23406, EVOL 45500, GEOG 25500/35500) *PQ: Completion of the general education requirement for the biological sciences and a course in either ecology, evolution, or earth history; or consent of instructor.* This course examines factors governing the distribution and abundance of animals and plants. Topics include patterns and processes in historical biogeography, island biogeography, geographical ecology, areography, and conservation biology (e.g., design and effectiveness of nature reserves). *B. Patterson (odd years, lab); L. Heaney (even years, discussion). Winter.*

25900. Cultural Geography. (=GEOG 20100/30100) This course is an examination of the two main concerns of this field of geography: (1) the logic and pathology revealed in the record of the human use and misuse of the Earth, and

(2) the discordant relationship of the world political map with **more complicated patterns of linguistic and religious distribution.** *M. Mikesell. Winter.*

26100. Roots of the Modern American City. (=GEOG 26100/36100, HIST 28900/38900) This course traces the economic, social, and physical development of the city in North America from pre-European times to the mid-twentieth century. We emphasize evolving regional urban systems, the changing spatial organization of people and land use in urban areas, and the developing distinctiveness of American urban landscapes. *All-day Illinois field trip required. This course is offered in alternate years. M. Conzen. Autumn.*

26500. Environmental Economics. (=ECON 26500, PPHA 32800) *PQ: ECON 20100.* This course applies theoretical and empirical economic tools to environmental issues. Broad concepts discussed include externalities, public goods, property rights, market failure, and social cost-benefit analysis. These concepts are applied to areas including nonrenewable resources, air and water pollution, solid waste management, and hazardous substances. Emphasis is devoted to analyzing the optimal role for public policy. *G. Tolley, S. Shaikh. Winter.*

26510. Advanced Topics in Environmental Economics. (=ECON 26510) *PQ: ECON 20900, ECON 21000, ECON 26500, or ENST 26500.* This course applies theoretical and empirical economic tools to a number of environmental issues. We discuss broad concepts that include externalities, public goods, property rights, market failure, and benefit-cost analysis. These concepts are applied to a number of areas that include nonrenewable resources, air and water pollution, solid waste management, and hazardous substances. We emphasize analyzing the optimal role for public policy. *J. List. Spring.*

27400. Principles of Epidemiology. (=HSTD 30900, PPHA 36400, STAT 35000) *Prior course in statistics recommended. Epidemiology is the study of the distribution and determinants of health and disease in human populations. This course introduces the basic principles of epidemiologic study design, analysis, and interpretation through lectures, assignments, and critical appraisal of classic and contemporary research articles. L. Kurina. Autumn.*

28001. Environmental Ethics. (=RLST 25701) Is environmental ethics an application of traditional ethical theory or a new way of thinking ethically? The ideas we consider include ethical naturalism (Hans Jonas, Mary Midgley), utilitarianism (Peter Singer), ecophilosophy (Aldo Leopold), biocentrism (Paul Taylor), and duty-ethics (Holmes Rolston III). Our approach uses lectures, discussions, group work, and case studies. *M. Hogue. Spring.*

28200. Reading American Environmental Classics. (=ENGL 28000) Both historic and modern environmental classics are analyzed. Brief critical reviews by students serve as the basis for class discussion. Authors might include Crèvecoeur, Emerson, Thoreau, Mitchell, Nelson, Abbey, Dillard, and Leopold, as well as background materials from Nash and Meinig. *Class discussion encouraged. J. Opie. Spring.*

29700. Reading Course. *PQ: Consent of faculty supervisor and program chairman. Students are required to submit the College Reading and Research Course Form. Must be taken for P/F grading. Autumn, Winter, Spring.*

29801. B.A. Colloquium I. *PQ: Open only to students with fourth-year standing who are majoring in Environmental Studies. Must be taken for P/F grading.* This two-quarter colloquium assists students in conceptualizing, researching, and writing their B.A. theses. It is required of all students who are majoring in Environmental Studies unless an exception is made by the program chair. *D. Aftandilian. Autumn.*

29802. B.A. Colloquium II. *PQ: Open only to students with fourth-year standing who are majoring in Environmental Studies. Must be taken for P/F grading.* This two-quarter colloquium assists students in conceptualizing, researching, and writing their B.A. theses. It is required of all students who are majoring in Environmental Studies unless an exception is made by the program chair. *D. Aftandilian. Winter.*

29900. Senior Paper Preparation. *PQ: Open only to students with fourth-year standing who are majoring in Environmental Studies. Consent of faculty supervisor and program chairman. Students are required to submit the College Reading and Research Course Form. Must be taken for P/F grading.* This course is designed for fourth-year students who are majoring in Environmental Studies so that they can prepare the required senior paper. *Autumn, Winter, Spring.*