Environmental Studies

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Program of Study

College students are increasingly interested in the environment. They recognize that the impact of human activities on the natural world grows steadily more profound. They see the quality of life on Earth challenged. They draw implications for their personal and professional lives and for the well-being of humankind and the web of life in the generations to follow. They seek educational opportunities to guide their citizenship, scholarship, and career development. They want to know and understand and respond to what is going on.

The primary concern of the program in environmental studies is with the manifold relationship between the human enterprise and the natural world that sustains it. Approaching this vast topic calls for a multidisciplinary education through which complex issues, now unfolding, can be approached. We therefore aim to build mastery of specialized knowledge upon a broad background. A seminar program is also conducted to acquaint students at all levels with the practical implications of their didactic courses and to provide a forum for guest lectures and senior research presentations. The program is sponsored by the New Collegiate Division, a home for innovations in interdisciplinary undergraduate education.

Program Requirements

Candidates for the degree of B.A. in environmental studies will ordinarily enter the program before the end of their second year by meeting with the program chairman. They will pursue a plan of study tailored to their individual interests under the guidance and oversight of the program chairman and their College adviser. Normally, students will pursue depth in an area of biological, physical, or social science to develop recognized expertise in a traditional discipline in preparation for graduate study or professional activity. This focus should be balanced by a broad environmental education. Following are suggestions of relevant courses that meet general education requirements, as well as courses appropriate for a concentration program emphasizing biological, physical, or social sciences. A senior paper is required.

Summary of Program

General Education. Introductory courses appropriate for students interested in environmental studies include the Natural Sciences sequence entitled Environmental Sciences (ENST 12100-12200-12300-12400-12500-12600); this six-quarter sequence satisfies the general education requirements in the

physical, biological, and mathematical sciences for humanities and social sciences students. Other relevant introductory science courses include CHEM 11101-11201-11301 or equivalent, or a physical sciences sequence that includes GEOS 13300 or 13400, or a biology sequence that includes ecology. The entry point for the concentration is ENST 21200. A Big Problems course (ENST 24400) is offered to third- and fourth-year students without prior environmental course work.

Concentration Program with Emphasis on Biological or Physical Sciences. Courses suggested to students who emphasize the natural sciences include BIOS 23246, 23351, and 23406; CHEM 20100-20200, 21000, and 22000-22200; PHYS 12100-12200-12300; and STAT 22000.

Concentration Program with Emphasis on Social Sciences. Courses suggested to students who emphasize social sciences include ENST 20600, 21800, 22000, 23100, 23600, 24100, 24700, and/or 24900.

Environmental Studies Seminar. Students and faculty associated with the concentration program meet periodically to host visiting scholars. Senior papers are also presented in this forum. Concentrators are expected to participate in the seminar without course credit.

B.A. Paper. A senior paper relevant to environmental issues is required by the program. Topics are usually chosen by the end of the third year in consultation with the program chairman. A faculty supervisor is then identified and preliminary work planned. Summer internships are often ideal starting points for B.A. projects. Work on B.A. papers proceeds throughout the fourth year under the guidance of faculty supervisors and the program preceptor. At the end of Spring Quarter, papers are submitted to readers and presented in the environmental seminar. Registration for ENST 29700 and/or 29900 provides course credit for relevant independent study.

Summary of Requirements

Concentration	1	ENST 21200
	1	ECON 19800 or higher
	1	course in statistics (ENST 12500 or higher)
	2	additional social sciences courses of relevance
	2	additional biological or physical sciences courses of relevance
	3	additional courses in the area of emphasis
	1	ENST 29700 or 29900 (B.A. paper)
	–	ENST Seminar
	11	

Grading. Courses required for the concentration may not be taken on a *P/F* basis without prior consent of the program chairman.

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.

Faculty

D. Archer, R. S. Berry, T. Clark, M. Conzen, D. Coursey, J. R. Engel, G. Eshel, J. Frederick, A. Gugliotta, H. Henderson, A. Hunter, A. Kolata, H. Margolis, A. McCright, M. Mikesell, R. Nicholas, D. Oxtoby, R. Pierrehumbert, A. Sanderson, T. Steck, M. Stein, G. Tolley, S. Trainor

Courses

10400. Environmental Ecology. (=BIOS 13107, NTSC 10400) *PQ: NTSC 10300.* 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. M. Leibold. Winter.*

11101-11201-11301/11102-11202-11302. General Chemistry I, II, III: Variant A/Variant B. (=CHEM 11101-11201-11301/11102-11202-11302) *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.* For complete course descriptions, see Chemistry.

11101-11201-11301. General Chemistry I, II, III: Variant A. Variant A emphasizes the role of chemical and physical processes in the environment, especially in water and in the atmosphere. Variant B has a more traditional organization of basic chemistry. *D. Oxtoby, Autumn; T. Oka, Winter; D. Levy, Spring. L: M. Zhao. Autumn, Winter, Spring.*

11102-11202-11302. General Chemistry I, II, III: Variant B. Variant B is a traditional treatment of the chemical and physical processes studied in basic chemistry. *J. Norris, Autumn; Staff, Winter; P. Guyot-Sionnest, Spring. L: M. Zhao. Autumn, Winter, Spring.*

12100. Atmospheric Chemistry and Air Quality. (=NTSC 12100, PHSC 13500) *PQ: MATH 10600, or placement in 13100 or higher, or consent of instructor. This sequence is open only to first- and second-year students and to first-year transfer students. Courses must be taken in sequence.* This course considers: (1) the chemical, physical, and radiative processes that determine the composition of the atmosphere; and (2) the effects that increasing global industrialization and agriculturization are having upon the atmosphere. Particular attention is given to stratospheric ozone depletion, the chemistry of the global troposphere, the quality of urban air throughout the world, and the formation of acid precipitation. The extent to which locally released pollutants effect the atmosphere on a global scale is addressed. *J. Frederick. Autumn. L.*

12200. Cells in their Environment. (=BIOS 10300, NTSC 12200) *PQ: ENST 12100 or consent of instructor. This course is an alternative to BIOS 10100 for students enrolled in the Environmental Sciences sequence.* We consider the molecular basis of life. Our focus is on the evolved structure, function, and organization of cells and their constituents. We also take up how cells store and express information, obtain and use energy, and interact with their natural environment. *T. Steck. Winter. L.*

12300. Global Warming: Understanding the Forecast. (=GEOS 13400, NTSC 12300, PHSC 13400) *PQ: ENST 12200 or consent of instructor.* 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, R. Pierrehumbert. Spring. L.*

12400. Organisms And Ecosystems in the Environment. (=BIOS 10301, NTSC 12400) *PQ: BIOS 10100 or 10300, or consent of instructor. This course qualifies as the second biological sciences course in the Environmental Sciences sequence.* This course examines the interactions between organisms and their environments. Topics include reproduction, nutrition, disease, population, conservation, and interactions between species. Organismal biology and ecology are related to environmental problems (e.g., overpopulation, biodiversity loss, pollution) from a scientific perspective. *A. Hunter. Autumn.*

12500. Quantitative Methods in Environmental Science. (=NTSC 12500, STAT 12500) *PQ: ENST 12400 or consent of instructor.* This course studies mathematical, statistical, and computational approaches to scientific issues raised previously in this sequence. Three principal tools are: differential equations as a way to model a changing world, probability theory as a way to quantify uncertainty, and the application of computer simulations to understanding environmental processes. *M. Stein. Winter.*

12600. Environmental Science and Society. (=NTSC 12600, PHSC 12600) *PQ: ENST 12500 or consent of instructor.* In this course, we apply the knowledge and the methods of science to an exploration of humanity's use of its natural environment. We explore the meaning of scientific knowledge and how it is applied to problems in human affairs (e.g., the use of scientific evidence in policy and public debates). Of particular interest is the nature and application of energy. We also explore the parallels between science and art. *G. Eschel. Spring.*

13300. The Atmosphere. (=GEOS 13300) *PQ: MATH 13200 or consent of instructor.* This course provides an introduction to 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. *N. Nakamura. Spring.*

20500. Introduction to Population. (=SOCI 20122/30122) This course provides an introduction to the field of demography, which examines the growth and characteristics of human populations. The course provides an overview of our knowledge of three fundamental population processes:

fertility, mortality, and migration. We also 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. Spring, 2004.*

20600. Population and Development. (=SOCI 20124/30124) This course is a broad overview of demographic issues in the "less developed regions of the world." Demographic patterns and change are discussed with a particular interest in the relationship between socioeconomic development and demographic factors. How do social and economic changes affect population dynamics? Is there a social or an economic optimum rate of population change? We discuss how demographic thought and policies have evolved on these issues in light of the empirical evidence. *P. Heuveline. Autumn, 2002.*

21200. Human Impact on the Environment. (=NCDV 21200) We 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. *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 changes, 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. *Spring.*

22000. The Anthropology of Development. (=ANTH 22000/35500) For course description, see Anthropology. *A. Kolata. Winter, 2002.*

22800. Environmental Sociology. (=SOCI 20132/30132) This course applies the principal theories and paradigms of sociology to an analysis of major factors affecting human impact on the environment, including population growth, industrial technology, capitalism, and systems of values and beliefs. Particular issues are energy consumption, quality of life, carrying capacity, sustainable development, environmental justice, and global environmental change. *A. McCright. Winter.*

23100. Environmental Law. (=LLSO 23100, 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. *H. L. Henderson. Autumn.*

23500. Political Sociology. (=PBPL 23600, PPHA 33600, SOCI 20106/30106) *PQ: Completion of the general education requirement in social sciences.* For course description, see Sociology. *T. Clark. Spring.*

23600. The Environment in U.S. History. (=LLSO 23600) Contemporary environmental issues are deeply rooted in a complex history, often ignored or misunderstood. This course examines human engagement with the natural world in what is now the United States: how the expansion of the market economy impacted the natural world; how various peoples struggled to control resources; how landscapes changed from ecosystems to infrastructures; how natural resources fostered industry and agriculture; and how conceptions of the natural world evolved. We consider the politics, economics, and social and cultural development of the United States in an environmental framework. *A. Gugliotta. Winter.*

23700. Technology and Environment in History. (=HIPS 23800, HIST 25200) Technology is a principal means by which humans shape their living space and, often unintentionally, transform the natural environment. Important historical case studies include our use of resources and production of goods. We also consider the impact of such technologies on human affairs. Finally, we use these historical reflections to examine concepts of technological determinism and historical inevitability, choices among technologies, and the meaning of progress. *A. Gugliotta. Spring.*

23900. Environmental Chemistry. (=CHEM 21000, GEOS 23900) *PQ: CHEM 11101-11201/11102-11202 or equivalent; and prior calculus course.* For course description, see chemistry. *D. Archer. Spring. L.*

24100. The Environment in U.S. Politics. (=NCDV 24100, PBPL 22600) From genetically modified foods to fossil fuels, from environmental justice to nuclear waste storage, environmental issues pervade American politics. Guided by leading theories on political power and behavior, we shall examine how major actors influence environmental policy, including the scientific and business communities, social movements, the public, and policymakers themselves. *A. McCright. Autumn.*

24400. Is Development Sustainable? (=BPRO 23400, HIPS 23400, NCDV 27300, 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, Staff. Spring.*

24700. Environmental Policy and Decision Making. (=LLSO 28900, PBPL 22500) This course provides an overview of the theory and application of policy solutions to environmental problems. It also examines the processes by which environmental policy decisions are made, with special attention to environmental conflict resolution. *S. Trainor. Winter.*

24900. Global Environmental Politics. (=NCDV 21100, PBPL 24300) This course provides an introduction to global environmental politics. We examine several environmental issue areas to identify the roles, interests, and behavior of main actors such as states, international organizations, NGOs, and the business community. Students are introduced to major contemporary debates relating environmental issues to trade liberalization, security, social justice, and human rights. They are also provided with analytical tools for further exploration of environmental issues. *E. Tennant. Spring*.

25100. Ecological Applications to Conservation Biology. (=BIOS 23351, ECEV 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 understanding current issues in conservation biology. The course emphasizes quantitative methods and their use for applied problems in ecology, such as the design of natural reserves, the risk of extinction, the impact of harvesting, the dynamics of species invasions, and the role of species interactions. Course material is drawn mostly from the current primary literature. *Two Saturday field trips and computer modeling labs are in addition to scheduled class time. J. Bergelson, C. Pfister. Autumn. L.*

25500. Biogeography. (=BIOS 23406/35500/45500, ECEV 45500, GEOG 25500/35500) *PQ: Completion of the general education requirement for the biological sciences 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, such as the design and effectiveness of nature reserves. *B. Patterson (odd years), L. Heaney (even years). 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) For course description, see Geography. *Superior term papers from this course may be selected for special publication. An all-day Illinois field trip required. M. Conzen. Autumn.*

26500. Environmental Economics. (=ECON 26500, PBPL 32800) *PQ: ECON 20100 or consent of instructor.* For course description, see Economics. *G. Tolley. Winter.*

27400. Principles of Epidemiology. (=HSTD 30900) 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 appraisement of both classic and contemporary research articles. The final project is to write a brief, critical review of the epidemiologic literature on a topic of the student's choice. *K. Pickett. Autumn.*

28000. Environmental Philosophy and Ethics. (=LLSO 29300) This course considers questions concerning moral obligations to nature and humans by applying theories of environmental philosophy and ethics to current problems in industry, management, technology, activism, environmental policy, and the valuation of nature. *S. Trainor. Spring.*

28200. Reading American Environmental Classics. (=ENGL 28000) Brief critical reviews by students of both historic and modern environmental classics (mostly American) serve as the basis for class discussion. Possible authors include Thomas Jefferson, George Perkins Marsh, William Faulkner, Annie Dillard, Gretel Ehrlich, and Terry Tempest Williams. We also may read Joseph Conrad's *Heart of Darkness* in parallel with screening *Apocalypse Now. J. Opie. Autumn.*

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 *grade. Autumn, Winter, Spring.*

29900. Senior Paper Preparation. *PQ: Open only to concentrators with fourth-year standing. 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 *grade.* Designed for fourth-year Environmental Studies students to be used for the preparation of the required senior paper. *Autumn, Winter, Spring.*