Environmental Science and Policy

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The Major


The environmental science and policy (ES&P) major is designed for students with interests in the environment and sustainability and a commitment to scientifically based problem solving and policy analysis. The objectives of the major are to prepare students to transcend disciplinary boundaries, combine analytical and communication skills with a well-rounded understanding of the environment, and translate this knowledge into meaningful action and innovative solutions. Four integration courses form the intellectual and organizational core of the major. Each course brings together frameworks, proficiencies and knowledge from natural and social sciences in an explicitly integrative fashion to explore and analyze important environmental topics at local, regional, national and global levels. Additional introductory courses provide breadth in the natural and social sciences, humanities, and statistics, and introduce students to fundamental aspects of disciplines important to understanding human-environment interactions. Students gain depth of knowledge by choosing a coherent sequence of electives with a clear environmental focus. Students are strongly encouraged to engage in environmentally oriented internships, independent research or study-away opportunities. Prospective majors should consult with an ES&P faculty adviser in choosing their courses. In their first semesters, students are encouraged to enroll in one of the introductory courses (see list) and an appropriate integration course (101), as well as statistics.

Requirements: The ES&P major requires 14 courses. These include the following:

- Four environmental integration courses (101, 201/202, 311, 312)
- Three introductory courses in the natural sciences from different areas (BIO, CHM, GEO, PHY/EGR), two of which must include labs (see list)
- Two introductory courses in the category of social sciences, humanities and policy from different departments (see list)
- One course in statistics (see list)
- Four electives that create a coherent sequence with a clear environmental focus. No more than one elective may be at the 100 level and at least one must be at the 300 level; ENX 100 may not be used as an elective. One semester of independent study (400) or credit toward an honor’s thesis (430d) may be substituted for one elective, but neither may count as the 300-level elective.
- One course fulfilling the major requirements may be taken S/U; 201/202, 311, and 312 may not be taken S/U.

Environmental Integration Courses

All majors must complete the four environmental integration courses:

- ENV 101 Sustainability and Social-Ecological Systems
- ENV 201 Researching Environmental Problems
- ENV 202 Researching Environmental Problems Laboratory
- ENV 311 Interpreting and Communicating Environmental Information
- ENV 312 Sustainable Solutions

Introductory Courses

Natural Sciences

All majors must take one course in three of the following four natural science areas: biological sciences, chemistry, geosciences, or physics and engineering. Two of these courses must include a laboratory or field component. BIO 131 and GEO 102 count only as lab courses. BIO 131 must accompany GEO 102. GEO 102 must accompany an introductory GEO lecture course. Students with Advanced Placement credit (4 or 5) in an area may substitute an appropriate upper-level course in consultation with an ES&P adviser and in accordance with guidelines of the home department.

Natural Science Lab or Field Courses

- BIO 131 Biodiversity, Ecology and Conservation Laboratory
- CHM 111 Chemistry I: General Chemistry
- CHM 118 Advanced General Chemistry
- EGR 100 Engineering for Everyone
- FYS 103 Geology in the Field
- GEO 102 Exploring the Local Geologic Landscape
- GEO 108 Oceanography: An Introduction to the Marine Environment
- PHY 117 Introductory Physics I
- PHY 118 Introductory Physics II
Natural Science Lecture Courses
BIO 130  Biodiversity, Ecology and Conservation
CHM 108 Environmental Chemistry
ENV 108 Environmental Chemistry
GEO 101 Introduction to Earth Processes and History
GEO 104 Global Climate Change: Exploring the Past, the Present and Options for the Future
GEO 105 Natural Disasters: The Science Behind the Headlines
GEO 106 Extraordinary Events in the History of Earth, Life and Climate

Social Sciences, Humanities and Policy
All majors must take two courses from the social science, humanities and policy category listed below. The courses must be from different departments. Students with Advanced Placement credit (4 or 5) in an area may substitute an appropriate upper-level course in consultation with an ES&P adviser and in accordance with guidelines of the home department.

ANT 130  Introduction to Cultural Anthropology
ECO 150 Introductory Microeconomics
GOV 200 American Government
GOV 207 Politics of Public Policy
GOV 241 International Politics
PHI 238 Environmental Ethics
PPL 220 Public Policy Analysis
SOC 101 Introduction to Sociology
SWG 150 Introduction to the Study of Women and Gender

Statistics
Majors must take one course in statistics (ECO 220, GOV 203, MTH 220, PSY 201, SDS 220 or SOC 204). Students with Advanced Placement credit (4 or 5) in statistics may substitute an appropriate upper-level statistics course in consultation with an ES&P adviser and in accordance with guidelines of the home department.

Electives for the Environmental Focus
Majors should choose their elective courses in consultation with the major adviser to create a coherent sequence with a clear environmental focus; the focus may be specific to a discipline, topic or location. No more than one elective can be at the 100 level; at least one must be at the 300 level. Several colloquium and seminar courses have rotating themes; approval is required for years when the focus is on environmental and sustainability topics. ENX 100 may not be used as an elective. Electives and the environmental focus can be identified at the time the major is declared but not later than the end of the add/drop period of the first semester of junior year. Subsequent changes require approval of the major adviser. Electives can include but are not limited to the following approved list. Other relevant courses offered at Smith, within the Five College Consortium, or in study-away programs may be used to satisfy the electives requirement of the major with consultation and approval of the major adviser. ENX 100 may not be used as an elective. Internships, study-abroad or Praxis experiences are encouraged.
Social Sciences, Humanities and Policy

ANT 224 Anthrosop in the Anthropocene: Human-Environment Relations in a Time of Ecological Crisis
ANT 229 Africa and the Environment
ANT 317 Seminar: The Anthropology of Landscape – Space, Place, Nature
EAS 220 Colloquium: Environment and Society in Contemporary China
ECO 224 Environmental Economics
ECO 271 The Economics of Climate Change
ECO 324 Seminar Economics of the Environment and Natural Resources
ENG 118 Colloquia in Writing Water: Science and Politics Writing About Science
ENG 119 Writing Roundtable This Overheating World What's for Dinner? Writing About Food
ENG 135 Introduction to Writing Creative Nonfiction Writing About Place and Travel Writing About the Environment
ENV 220 Natural Resource Management and Environmental Justice
ENV 224 Anthrosop in the Anthropocene: Human-Environment Relations in a Time of Ecological Crisis
ENV 275 Decoding the Experts: Modeling the Impact of Climate Change
ENV 323 Climate and Energy Policy
ENV 326 Seminar: Natural Resource Management and Environmental Justice in the US and the Global South
FYS 113 The World Water Crisis
FYS 129 Tierra y Vida: Land and the Ecological Imagination in U.S. Latino/a Literature
FYS 133 Reading the Landscape
FYS 141 Reading, Writing and Placemaking: Landscape Studies
FYS 163 Exploring Our National Parks
GOV 241 International Politics
GOV 242 International Political Economy
GOV 254 Colloquium: Politics of the Global Environment
GOV 347 Seminar in International Politics and Comparative Politics Environmental Security
HST 263 (C) Aspects of Latin American History
FS 170 Reading the Landscape
FYS 141 Reading, Writing and Placemaking: Landscape Studies
FYS 163 Exploring Our National Parks
GOV 241 International Politics
GOV 242 International Political Economy
GOV 254 Colloquium: Politics of the Global Environment
GOV 347 Seminar in International Politics and Comparative Politics Environmental Security
HST 263 (C) Aspects of Latin American History
HST 263 (C) Natural Resources and the Environment in Latin American History
The Environmental History of Latin America
JUD 229 Judaism and Environmentalism
LSS 250 Studio: Landscape and Narrative
PHI 238 Environmental Ethics
PHI 304 Colloquium in Applied Ethics Sustainability
PSY 268 The Human Side of Climate Change
SOC 232 World Population
SOC 333 Seminar: Social Justice, the Environment and the Corporation
SWG 230 Gender, Land and Food Movements

Special Studies

ENV 400 Special Studies
Admission by permission of the instructor. Special Studies are open to qualified juniors and seniors and, in appropriate cases, to sophomores. Students are encouraged to contact the instructor in advance of the semester they intend to take this course. Credits: 1–4

Members of the department
Normally offered both fall and spring semesters

Honors

Students with a strong academic background who wish to conduct independent and original work on an environmental topic are encouraged to pursue an honors project. Interested students should contact potential honors advisers by the beginning of February in the spring semester of their junior year.

Please consult the director of honors for specific requirements and application procedures.

Director: Amy L. Rhodes

ENV 430D Honors Project
Full-year course, 4 credits each semester. Offered every year. Please consult the director of honors, Professor Amy L. Rhodes, for specific requirements and application procedures. Credits: 8

Normally offered both fall and spring semesters

Study Abroad

Students may elect to take courses for the major outside Smith College by participating in an environmentally oriented, off-campus program. Relevant Smith-approved programs include but are not limited to Arava Institute for Environmental Studies, Danish Institute for Study Abroad, Duke University's Organization for Tropical Studies, Frontiers Abroad Earth Systems New Zealand, the School for Field Studies, the School for International Training, SEA Semester, and the Maritime Studies Program of Williams College and Mystic Seaport. Courses from other study-away programs may also be eligible for credit with approval of the major adviser. Study-away courses will generally count as 200-level electives, but specific courses in specific programs may be authorized to count as 300-level electives with preapproval of the major adviser.

Study Abroad Adviser: Your major adviser for environmental science and policy

The Minor

Advisers: Advisers for the major also serve as advisers for the minor

The minor consists of six courses chosen with the guidance and approval of an ES&P adviser. Interested students are urged to meet with the director, program administrator or ES&P adviser early in their academic planning.

Requirements: Six courses: 101; two courses from the natural science category (must not be in the same area); one course from the social science, humanities and policy category; and two electives in consultation with the minor adviser. For three of the six courses, two must be 200 level or higher; the third should normally be above the 100 level. EGR 315 and GEO 301 may be used to fulfill
a natural science requirement in either of two categories (see list below). EGR 100 has several rotating themes and may count toward the minor when the focus is on energy, natural resources or sustainability. ENX 100 may not be used as an elective; 201/202 and 311 may count as electives toward the minor but do not fulfill either the natural science or the social science, humanities and policy requirements. We recommend taking a course in geographic information systems (ENV 150/GEO 150) as an elective. Appropriate Smith courses not listed below, Five College courses, or courses taken at other institutions and through summer and semester-away programs may be counted toward the minor with preapproval of the adviser. Students must satisfy the prerequisites for all courses included in their minor program. No more than three of the six courses may be taken at other institutions. No more than one course may be taken S/U; 101 may not be taken S/U.

**Natural Sciences**

All minors must take one course in two of the following four natural science areas:

**Biological Sciences**

BIO 130  Biodiversity, Ecology and Conservation
BIO 268  Marine Ecology
BIO 269  Marine Ecology Laboratory
BIO 364  Plant Ecology
BIO 365  Plant Ecology Laboratory
BIO 390  Seminar: Topics in Environmental Biology

**Chemistry**

CHM 108  Environmental Chemistry
CHM 346  Environmental Analytical Chemistry
ENV 108  Environmental Chemistry
GEO 301  Aqueous Geochemistry

**Geosciences**

GEO 101  Introduction to Earth Processes and History
GEO 104  Global Climate Change: Exploring the Past, the Present and Options for the Future
GEO 105  Natural Disasters: The Science Behind the Headlines
GEO 106  Extraordinary Events in the History of Earth, Life and Climate
GEO 108  Oceanography: An Introduction to the Marine Environment
GEO 301  Aqueous Geochemistry
GEO 309  Groundwater Geology
EGR 315  Seminar: Ecohydrology

**Physics and Engineering**

EGR 100  Engineering for Everyone
EGR 312  Seminar: Atmospheric Processes
EGR 315  Seminar: Ecohydrology

**Social Sciences, Humanities and Policy**

All minors must take one course in the social sciences, humanities and policy category.

ANT 224  Anthropos in the Anthropocene: Human-Environment Relations in a Time of Ecological Crisis
ANT 229  Africa and the Environment
ECO 224  Environmental Economics
ECO 271  The Economics of Climate Change
ENV 220  Natural Resource Management and Environmental Justice
ENV 224  Anthropos in the Anthropocene: Human-Environment Relations in a Time of Ecological Crisis
ENV 275  Decoding the Experts: Modeling the Impact of Climate Change
ENV 323  Climate and Energy Policy
ENV 326  Seminar: Natural Resource Management and Environmental Justice in the US and the Global South
GOV 207  Politics of Public Policy
GOV 242  International Political Economy
GOV 254  Colloquium: Politics of the Global Environment
GOV 347  Seminar in International Politics and Comparative Politics

**Electives**

All minors must take two elective courses. Electives may include 201/202; 311; courses listed above for the minor in the natural sciences and social sciences, humanities and policy categories; and courses listed under electives for the environmental focus for the major. Other relevant courses offered at Smith, within the Five College Consortium, or in study-away programs may be used to satisfy the electives requirement of the minor with consultation and approval of the major adviser.

ENV 101 Sustainability and Social-Ecological Systems
We have entered a new geological epoch, the Anthropocene, characterized by the accelerating impact of human activities on the Earth's ecosystems. All over the globe, humans have transformed the environment and have sometimes created catastrophic dynamics within social-ecological systems. Scientists have studied these phenomena for decades, alerting both the general public and policy-makers of the consequences of our actions. However, despite convincing evidence of environmental degradation, humans continue to radically transform their environment. This course explores this puzzle and asks how we can remodel our social-ecological systems to build a more sustainable and resilient future. Enrollment limited to 60. *(H) {N} {S}* Credits: 4

Alexander Richard Barron
Normally offered each fall

ENV 108 Environmental Chemistry
Same as CHM 108. An introduction to environmental chemistry, applying chemical concepts to topics such as acid rain, greenhouse gases, air quality, pesticides and waste treatment. Chemical concepts are developed as needed.

*(N)* Credits: 4

Nuru Stracey
Normally offered each spring
ENV 150 Mapping Our World: An Introduction to Geographic Information Systems

Same as GEO 150. A geographic information system (GIS) enables data and maps to be overlain, queried and visualized in order to solve problems in many diverse fields. This course provides an introduction to the fundamental elements of GIS and applies the analysis of spatial data to issues in geoscience, environmental science and public policy. Students gain expertise in ArcGIS—the industry standard GIS software—and online mapping platforms, and carry out semester-long projects in partnership with local conservation organizations. Enrollment limited to 20. [N] Credits: 4

John Loveless
Normally offered each fall

ENV 201 Researching Environmental Problems

While focusing on topical environmental issues, students learn how to gather, analyze and present data using methods from the natural and social sciences. Data are drawn from multiple sources, including laboratory experiments, fieldwork, databases, archival sources, surveys and interviews. Emphasis is on quantitative analysis. Environmental topics vary in scale from the local to the global. Note: 202 must be taken concurrently. Prerequisite: 101. Enrollment limited to 18. Q [N] {S} Credits: 4

Members of the department
Normally offered both fall and spring semesters

ENV 202 Researching Environmental Problems Laboratory

In this laboratory complement to 201, students use a variety of methods to gather and analyze different types of environmental data (quantitative, qualitative, spatial). Enrollment limited to 18. Q [N] {S} Credits: 1

Members of the department
Normally offered both fall and spring semesters

ENV 220 Natural Resource Management and Environmental Justice

This course examines the connections between natural resource management and environmental justice in the U.S. and the Global South. We study the benefits and limits of traditional top-down approaches to the management of forests, land, fisheries, biodiversity, underground resources, water, food and genomes in different parts of the world. By discussing case studies of environmental justice issues from mountaintop removal mining and hydraulic fracturing in West Virginia to the impact of biofuels and GMOs on local populations in Mexico, students question and rethink the management of natural resources. Enrollment limit of 20. Credits: 4

Members of the department
Expected to be offered in the next 3 years

ENV 224 Anthropos in the Anthropocene: Human-Environment Relations in a Time of Ecological Crisis

Same as ANT 224. Anthropology seeks to understand human life in all its complexity, but what constitutes “the human” is far from straightforward. This course examines the changing ways that “Anthropos” is being understood in an era of rapid global climate change and our planet’s sixth mass extinction event, both driven by human activities. We review perspectives on the relationship between humans and their environment from various cultural perspectives, considering how they engage notions of race, class, and gender; and what they imply for nature conservation. Topics include modernity, pets, cyborgs, kinship, symbiosis, extinction, species invasions, settler colonialism, and the Anthropocene concept. Enrollment limit of 30. [S] Credits: 4

Colin Hoag
Normally offered each fall

ENV 266 Landscapes of Northern Germany: Natural Environments and Human Influences

This course is part of the Smith Study Abroad Program in Hamburg, Germany, and limited to students enrolled in this program. The course includes lectures, field trips to locations in Northern Germany, and seminars with student presentations and discussion. The lectures cover a general introduction to different landscape types of Northern Germany: their geology, characteristic plant and animal life, and development through time; and focus on the effects of humans on landscape development for the last 6,000 years. Discussions explore possibilities and constraints of sustainable development based on the natural resources of the region. Visits to different landscapes of Northern Germany over five days of field trips provide a good overview of the landscape types present. Kai Jensen, course instructor. [N] [S] Credits: 4

Members of the department
Normally offered each spring

ENV 275 Decoding the Experts: Modeling the Impact of Climate Change

The U.S. estimates the cost of carbon is $37/ton. Is this estimate too low? Too high? What will emission reductions cost? This course is a cooperative research effort to understand and evaluate the Integrated Assessment Models used to estimate the costs and benefits of carbon emission reductions. We begin with the IPCC predictions of the physical impacts of climate change and then turn to the economic models that translate physical predictions into cost estimates. Emphasis on understanding and critiquing the logic of the models and learning how differing assumptions translate into a wide range of reported estimates. Enrollment limit of 20. [E] [S] Credits: 4

Members of the department
Expected to be offered in the next 3 years

ENV 311 Interpreting and Communicating Environmental Information

This course focuses on the interpretation and communication of environmental issues and solutions from multi- and interdisciplinary perspectives. Using contemporary environmental topics as a foundation, this course emphasizes careful assessment of both message and audience to design effective communication strategies for complex topics. Students develop the ability to read, interpret, and critique environmental research from a variety of disciplines; to consider the needs and motivation of their audience; to develop evidence-based arguments tailored to a particular audience; and to articulate those arguments clearly and concisely. Prerequisite: one semester of statistics. 101 and 201/202 are strongly recommended. Enrollment limited to 25. [N] [S] Credits: 4

Susan Stratton Scyre
Normally offered each fall

ENV 312 Sustainable Solutions

This course is designed to develop a student’s abilities as an environmental problem solver through practice. The problems come in two forms: a campus or local problem related to environmental sustainability or resilience, and the problem of what to do with one’s life. To address each, students engage in a semester-long group project that addresses a real-world environmental issue or question (projects vary from year to year) and a more individualized examination of the student’s own values, career aspirations and skills. Student work is assessed via progress reports, exercises, class participation, an oral presentation and a final written report. Prerequisites: 101, a statistics course, 201/202 and 311 (311 may be taken concurrently). Enrollment limited to 16. [N] [S] Credits: 4

Alexander Richard Barron, L. David Smith
Normally offered both fall and spring semesters
ENV 323 Climate and Energy Policy
This course examines climate change and energy policy from several perspectives including scientific, economic, equity, political and practical considerations. We examine sources and trends of greenhouse gas emissions and climate impacts and then focus on a specific sector (e.g., electric power) to consider existing policies, market structures and the spectrum of approaches to reduce emissions. Students work in small groups on projects in an active policy area and prepare a briefing and paper. Prerequisite: ENV 101, 201/202 or permission of the instructor. (E) {N} {S} Credits: 4

Alexander Richard Barron

Normally offered each academic year

ENV 326 Seminar: Natural Resource Management and Environmental Justice in the US and the Global South
This course will examine the connections between natural resource management and environmental justice in the US and the Global South. We will study the benefits and limits of traditional top-down approaches to the management of forests, land, fisheries, biodiversity, underground resources, water, food, and genomes in different parts of the world. By discussing case studies of environmental justice issues from tar sands mining in Alberta to the impact of biofuels and GMOs on local populations in Mexico, students will question and rethink the management of natural resources. Prerequisite: at least two government courses prior or instructor permission. Enrollment limit of 12. {S} Credits: 4

Camille Washington-Ottombre

Normally offered each academic year

ENV 400 Special Studies
Admission by permission of the instructor. Special Studies are open to qualified juniors and seniors and, in appropriate cases, to sophomores. Students are encouraged to contact the instructor in advance of the semester they intend to take this course. Credits: 1–4

Members of the department

Normally offered both fall and spring semesters

ENV 430D Honors Project
Full-year course, 4 credits each semester. Offered every year. Please consult the director of honors, Professor Amy L. Rhodes, for specific requirements and application procedures. Credits: 8

Members of the department

Normally offered both fall and spring semesters

Cross-Listed Courses
BIO 131  Biodiversity, Ecology and Conservation Laboratory
ECO 150  Introductory Microeconomics
ECO 220  Introduction to Statistics and Econometrics
GOV 241  International Politics
MTH 220  Introduction to Probability and Statistics
PSY 201  Statistical Methods for Undergraduate Research
SOC 201  Statistics for Sociology