

# Environmental Studies

## *Interdisciplinary*

The major and concentration bring together the different perspectives of the life sciences, physical sciences, social sciences and humanities to help students understand the interactions between the human and natural systems that affect our environment. The academic program is enhanced by five green centers: the Office of Green Initiatives, the Kenyon Farm, the Kokosing Nature Preserve, the Philander Chase Conservancy and the 480-acre Brown Family Environmental Center (BFEC). The BFEC, within walking distance of campus, features a wide range of natural and managed habitats and includes part of the Kokosing River. The program's goals are for students to understand the interplay among humans, together with their social and cultural institutions, and the physical, chemical and biological processes of the natural world; approach complex problems from an analytical perspective and apply logic, scientific principles and quantitative tools to their solutions; understand the social, historical, philosophical, spiritual and literary traditions that define the relationships between humans and their environment; and persuasively communicate ideas and logical arguments both orally and in writing as active participants in the environmental problem-solving process. Consequently, the major and concentration knit together many traditional academic disciplines, drawing on coursework in anthropology, economics, philosophy, political science, religious studies and sociology, in addition to biology, chemistry and physics.

## First-Year and New Students

Students interested in environmental studies are encouraged to take ENVS 112 in their first year. Other appropriate courses for first-year or new students include:

- ANTH 111 Introduction to Biological Anthropology
- BIOL 115 Energy in Living Systems
- ECON 101 Principles of Microeconomics
- PHIL 190 Anthropocene Philosophical Problem
- SOCY 101 Powers, Energies and Peoples

## Requirements for the Major

The environmental studies major requires a total of 8.25–8.75 units, including a 2.0–2.5 unit curricular focus. Students who complete an approved second major, minor or concentration have completed the curricular focus requirement and require a total of 6.25 units to complete the major.

### Common Core

#### **Required Courses: six courses**

BIOL 115 Energy in Living Systems  
 ECON 101 Principles of Microeconomics  
 ECON 336 Environmental Economics  
 ENVS 112 Intro to Environmental Studies  
 ENVS 231 Earth Systems  
 ENVS 461 Seminar in Environmental Studies

#### **Choose one additional living systems course: one course**

BIOL 228 Ecology  
 BIOL 352 Aquatic Systems Biology

#### **Choose one quantitative skills course: one course**

ENVS 220 Applied Environmental Analysis  
MATH 258 Mathematical Biology

**Choose one lab skills course: one lab**

BIOL 229 Ecology Laboratory  
BIOL 353 Aquatic Systems Lab  
ENVS 210 Introductory Environmental Lab

**Choose one additional skills course: one course**

CHEM 110 Environmental Chemistry  
CHEM 121 Introductory Chemistry  
ENVS 104 Solar Power Systems: Science, Policy and Practicum  
ENVS 261 Geographical Information Science

**Choose one policy course: one course**

PSCI 310 Public Policy  
PSCI 342 Politics of Development  
PSCI 363 Global Environmental Politics  
PSCI 364 American Environmental Politics and Policy  
PSCI 480 Science and Politics

**Choose two courses in cultures, societies and environments (one each in two different disciplines): two courses**

ANTH 111 Introduction to Biological Anthropology  
ANTH 112 Introduction to Archaeology  
ANTH 113 Introduction to Cultural Anthropology  
ANTH 256 Habitat and Humanity  
HIST 360 Corn, Farming and the Roots of American Cultures  
PHIL 190 Anthropocene Philosophical Problem  
SOCY 101 Powers, Energies and Peoples  
SOCY 238 Environmental Sociology  
SOCY 242 Science and Society: Nature, Ecology and the Crisis of the Enlightenment  
RLST 481 Religion and Nature

### Area of Curricular Focus

Students develop depth of knowledge in a curricular area in one of three ways: by completing an approved second major, an approved minor or concentration, or an area of curricular focus. Focal area requirements change frequently as course options change, so students should contact the program director or administrative assistant for a current schedule of focal area requirements. Students may propose a customized focal area with approval of a program co-director. If a student chooses to meet the focal area requirement with a relevant major, minor or concentration, the program director must approve the student's program of study. The program director may require the major, minor or concentration to include particular courses to ensure the relevance of the program to the environmental studies major. Each area of curricular focus must exhibit the following characteristics:

1. Focal areas must comprise no less than two (2) units and may require more.
2. Focal areas must exhibit a clear pedagogical rationale and will be designed to develop curricular depth for the student. Such depth may or may not be contained within a single traditional discipline.
3. Focal areas must contain at least one 300-level or 400-level course.

## Experiential Community Exercise

Each student must complete an applied environmental exercise that provides a practical application of the knowledge and skills developed in the program within a community setting. The principle elements of the project are that a student must conceptualize, plan and/or execute a project, and that the project either benefit, or be in partnership with, some community. The student may be part of a team, but the student must be a principal in the project, not simply an observer. The senior capstone may not serve as the experiential community exercise, but may arise out of it. Examples of potentially acceptable experiences include, but are not limited to: approved courses with a practicum or community engagement component; a field-based study-abroad program that requires students to complete individual research; participation in NFS REU (Research Experiences for Undergraduates) research with community implications; an internship in which the student completes a significant environmental project; independent research with a faculty member; or an independent study working with a faculty member and a professional staff member at one of Kenyon's green centers.

## Senior Capstone

Majors will undertake a substantial, independent research project that demonstrates the development of depth in their environmental education and their ability to approach environmental issues from a systems-based, interdisciplinary perspective. Senior Capstones usually take the form of a research paper of around twenty to thirty pages in length, but may also take the form of substantial creative works for those whose area of curricular focus is in the arts. The choice of topic should reflect the student's area of curricular focus in consultation with, and with approval from, the director and the faculty advisor. Students are encouraged to consult with any faculty member whose expertise supports their investigation. The faculty supervisor will generally be a member of the environmental studies faculty, but the director may approve other willing faculty members when their areas of expertise are appropriate to the topic. Projects are due early in the Spring semester of the senior year.

## Requirements for the concentration

The concentration requires a total of eight courses. Affiliated courses are offered in anthropology, biology, chemistry, economics, philosophy, physics, political science, religious studies and sociology.

### Required Environmental Studies Courses: two courses

ENVS 112 Introduction to Environmental Studies

ENVS 461 Seminar in Environmental Studies

### Core Courses in Environmental Studies: three courses

BIOL 106 Conservation Biology

BIOL 115 Energy in Living Systems

CHEM 110 Environmental Chemistry

CHEM 121 Introductory Chemistry

CHEM 122 Chemical Principles

ECON 101 Principles of Microeconomics

ENVS 220 Applied Environmental Analysis

ENVS 231 Earth Systems

**Elective Courses for Environmental Studies: three courses from the following courses in at least two departments:**

#### **Anthropology courses:**

ANTH 111 Introduction to Biological Anthropology

ANTH 256 Habitat and Humanity

ANTH 320 Anthropology of Food  
ANTH 324 Human Ecology: Biocultural Adaptations

**Biology courses:**

BIOL 228, 229 Ecology and Ecology Laboratory  
BIOL 328 Global Ecology and Biogeography  
BIOL 352, 353 Aquatic Systems Biology and Aquatic Systems Lab

**Chemistry courses:**

CHEM 231, 233 Organic Chemistry I and Organic Chemistry Lab I  
CHEM 341 Instrumental Analysis

**Economics courses:**

ECON 336 Environmental Economics  
ECON 342 Economics of Regulation  
ECON 347 Economics of the Public Sector

**Environmental Studies courses:**

ENVS 104 Solar Power Systems: Science, Policy and Practicum  
ENVS 251 Field Experience: Environmental Outreach  
ENVS 253 Sustainable Agriculture  
ENVS 261 Geographic Information Science

**Philosophy courses:**

PHIL 110 Introduction to Ethics  
PHIL 115 Practical Issues in Ethics  
PHIL 190 Anthropocene Philosophical Problem

**Physics course:**

PHYS 108 Geology

**Political science courses:**

PSCI 310 Public Policy  
PSCI 342 Politics of Development  
PSCI 363 Global Environmental Politics  
PSCI 364 American Environmental Politics and Policy  
PSCI 480 Science and Politics

**Religious studies course:**

RLST 481 Religion and Nature

**Sociology courses:**

SOCY 101 Powers, Energies and Peoples  
SOCY 233 Sociology of Food  
SOCY 238 Environmental Sociology  
SOCY 242 Science and Society: Nature, Ecology, and the Crisis of the Enlightenment

## Transfer Credit Policy

Because careful course selection is necessary to achieve specific objectives, students are urged to consult as early as possible with the program director and other faculty members in the Environmental Studies Program.

A maximum of two off-campus courses may be applied to the core of the major. A maximum of two additional off-campus courses may be applied to the area of curricular focus unless this is being satisfied by a minor, concentration or second major. In those cases, that program's requirement must be met. A maximum of two off-campus courses may be applied to the concentration. Students planning to take a course for transfer credit should consult the program director in advance as all transfer credit must be approved.

## Courses in Environmental Studies

### Solar Power Systems: Science, Policy and Practicum

ENVS 104 CREDITS: 0.5

Photovoltaic power generation is proving to be a viable renewable alternative to fossil fuels and Kenyon College is embarking on a multi-year plan to install PV systems on several buildings across campus. This course is uniquely situated to take advantage of this endeavor. We will discuss the role energy serves in society and examine the basic physics of energy in general before discussing and comparing traditional fossil fuels versus alternatives. Focusing our attention on PV electrical energy, a series of hands-on lab exercises will explore the science of electricity, PV power generation and linking such systems to the grid. Determining potential locations for installing Kenyon's growing network of solar power systems will be addressed via a combination of spatial analysis exercises and on-site visits to past and future installation sites. Additional field trips to local residential and commercial agricultural PV systems and conversations with their owners will augment these efforts. Through conversations with leaders of Kenyon's campus efforts and online virtual meetings with leaders in the industry at the state, regional and national levels, we will learn the ins and outs of designing, planning, installing and financing PV systems from the perspectives of buyers, sellers and investors. During semesters when an installation is in process, we will be directly involved in site evaluations and will closely follow along with the design and construction of the system. During these times, students will help plan and will host a public flip-the-switch event at system sites when these new systems are commissioned and are officially energized and connected to the grid. This counts toward the additional skills requirement for the major. This interdisciplinary course does not count toward the completion of any diversification requirement. No prerequisite. Offered every year.

### Introduction to Environmental Studies

ENVS 112 CREDITS: 0.5

This course examines contemporary environmental problems, introducing the major concepts pertaining to human interactions with the biosphere. We will explore this interaction at both local and global scales. Course topics include basic principles of ecology (flows of energy, cycling of matter and the role of feedback), the impacts of human technology, the roots of our perceptions about and reactions to nature, the social and legal framework for responding to problems and economic issues surrounding environmental issues. We will discuss methods for answering questions regarding the consequences of our actions and, using a systems approach, focus on methods for organizing information to evaluate complex issues. The format of the course will be three-quarters discussion and lecture and one-quarter workshop. The workshops will include field trips, experience with collecting data, and application of systems thinking. This course taken at Kenyon, paired with any biology course, counts toward the natural science diversification requirement. This course is required for the major. No prerequisite. Offered every year.

### Introductory Environmental Lab

ENVS 210 CREDITS: 0.25 QR

This course is an introduction to the field and laboratory techniques used in environmental science. Students will receive an overview of scientific and research methods, data handling and field techniques to assess water quality, soil characteristics and ecosystem composition and health. This is a community-engaged learning course: students will travel to a local farm (transportation provided by instructor) to

assess the long-term environmental effects of switching from conventional to sustainable agricultural practices. This course counts toward the lab skills major requirement. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: ENVS 112. Offered every fall semester.

### Applied Environmental Analysis

ENVS 220 CREDITS: 0.5 QR

An examination of the processes used to understand, analyze and solve environmental problems. Students are introduced to the use of mathematics and statistics to analyze environmental data. Problems involving stock, dimensions, mass balance, energy and population analysis are studied. Applied static and dynamical modeling of environmental problems is emphasized. This counts toward the quantitative skills requirement for the major. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: ENVS 112. Offered every fall.

### Earth Systems Science

ENVS 231 CREDITS: 0.5

Earth systems science is an integrated approach to studying the world in which we live. At the highest level, the four most basic interacting subsystems are: air (atmosphere), water (hydrosphere), land (geosphere) and life (biosphere). This course introduces students to the physical, chemical and biological processes of these major subsystems (and the interactions among them) by examining past and present states of the Earth system. Humans, as relatively late-coming members of the biosphere, are part of the overall Earth system, and we will examine our interactions within and among the subsystems at the level of the individual and of society. Lectures and laboratories on these broad topics will be supplemented by field trips to witness Earth's systems in context and by conversations with community members whose work is at the forefront of human interactions within the system. This course is required for the major. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: ENVS 112. Offered every spring semester.

### Permaculture and Homestead Winter Farming

ENVS 240 CREDITS: 0.5

This course intends to explore the principles of permaculture that link ecology, sustainability and community to farming. It is a holistic alternative to the destructive patterns and chemical abuse of agriculture. Our world is facing a long future of food insecurity as human population rises rapidly and land is turned over to housing and infrastructure. We need to bring ourselves back into balance with nature. In this course, students will learn to apply some of the principles of permaculture to extending a developing academic-year winter-harvest plan on the homestead Kenyon Farm and to year-round prospects. Students enrolling in this spring course will be asked to assist with planting in the late fall with harvesting occurring in winter months of the spring semester when the course is in session. The course is interdisciplinary, linking biology, sociology and sustainable farming strategies. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: ENVS 112 or BIOL115 or permission of the instructor.

### Field Experience: Environmental Outreach

ENVS 251 CREDITS: 0.13

In this course, students will examine special topics in environmental science, gaining subject knowledge so that they can lead educational experiences for elementary school classes visiting the Brown Family Environmental Center. Students will participate in two workshops at the beginning of the semester and then participate in at least four programs for visitors. Participants will keep a journal and submit a final report on their experiences along with evaluations of the effectiveness of the programs. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: ENVS 112 or equivalent or permission of instructor. Offered every semester.



## Sustainable Agriculture

ENVS 253 CREDITS: 0.5

The purpose of the course is to introduce students to the principles of sustainable agriculture through hands-on experience on local farms and through readings of current literature. The course thus combines fieldwork and seminar-style discussion. Work on the farm will be varied, determined by the seasons and farm projects under way. In addition, students may be taken to the local Producers Livestock Auction and other off-farm sites as the time and season allow. Students can expect to handle and feed animals, clean barns, harvest and plant crops, prepare farm products for market, build and repair fences, bale hay and work with, repair or clean equipment and buildings. Readings will be drawn from relevant books, current environmental literature and the news media. Discussions will be student-led and combine readings and their experiences in the field. Also, students must have available in their academic schedule four continuous hours one day per week to spend working at a local organic farm (travel time will be in addition to these four hours). In addition, students will participate in a weekly seminar discussion of assigned readings, lasting from an hour and a half to two hours. Participation is limited to eight to 10 students and permission of instructor is required. Preference will be given to juniors and seniors. Completion of ENVS 112 is highly recommended. This interdisciplinary course does not count toward the completion of any diversification requirement. No prerequisite. Offered every fall.

## Geographic Information Science

ENVS 261 CREDITS: 0.5

This course is for all students interested in improving their spatial literacy, or the ability to use spatial information to communicate, reason, and solve problems — in this case environmental problems, nearly all of which have a spatial component. Following a review of maps (coordinate and projection systems, cartographic principles, etc.) we will survey a number of online mapping applications (e.g., Google Earth) and use these to produce informative maps. We also will explore the nature of the Global Positioning System (GPS) and how data can be collected in the field for future analysis and presentation. The focus of the course will eventually settle onto the nature of computer-based geographic information systems (GIS) and the ways in which this powerful suite of tools can be used to analyze geographic data, model spatial processes and make informed decisions. Lectures will introduce fundamental concepts such as scale and resolution, the nature and structure of spatial data models, and the construction of GIS queries. A series of laboratory case studies will present real-world applications of GIS while offering students opportunities to apply the fundamental concepts discussed in lectures. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: sophomore standing.

## The Science of Climate Change

ENVS 341 CREDITS: 0.5

Climate change is the defining environmental issue for our time, permeating conversations about economics, human rights and international relations. In order to engage in these conversations, it is critical to have a solid understanding of Earth's climate system and how humans are altering it. We will begin by examining the natural state of Earth's climate system and the factors that have caused past climate variability. We will investigate how humans have altered the climate system as well as some of the most significant impacts of anthropogenic warming. We will end with a discussion of some proposed science-based approaches to mitigating climate change. Prerequisite: ENVS 112 and 220 or MATH 258, or permission of the instructor. Offered every other year.

## Seminar in Environmental Studies

ENVS 461 CREDITS: 0.5

The intention of this capstone seminar is to draw together and apply the concepts learned in earlier courses in the Environmental Studies Concentration. The focus of the course will be on case studies of natural-resource management, with specific topic areas to be determined. In this strongly

interdisciplinary effort, we will explore ecological, economic, social and legal issues that influence how people exploit natural resources, and whether that exploitation is sustainable. Students will be expected to develop and communicate their understanding of the complex and inseparable relationships of human well-being, ecosystem services and environmental management. This course is required for the major. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: senior standing and environmental studies major or concentrator. Offered every spring.

### Individual Study

ENVS 493 CREDITS: 0.25 - 0.5

Because environmental studies is a broad interdisciplinary field, the nature of an individual study will necessarily vary depending on the home discipline of the faculty member guiding the course. Details regarding the expected number of contact hours per week, workload and assessment will be left to the discretion of the faculty member guiding the individual study. There are no formal restrictions on who can pursue an individual study in environmental studies. Individual studies may, upon consultation with an environmental studies co-chair, serve as an elective course in fulfilling the requirements for environmental studies, up to 0.5 units. To enroll in an individual study, a student must identify a member of the ENVS faculty willing to mentor the project and, in consultation with him or her, the student must draft a syllabus, including readings, schedule and assignments, which must be approved by a co-chair of the program. At a minimum, it is expected that the student meet regularly with his or her instructor, at least once per week or the equivalent, at the discretion of the instructor. At a minimum, the amount of work submitted for a grade in an IS should approximate that required, on average, for courses of equivalent units in the home department of the faculty mentor. In the case of a group individual study, a single course syllabus may be submitted, assuming that all group members will follow the same syllabus. Because students must enroll for individual studies by the end of the seventh class day of each semester, they should begin discussion of the proposed individual study preferably the semester before, so that there is time to devise the proposal and seek departmental approval before the registrar's deadline. This interdisciplinary course does not count toward the completion of any diversification requirement.

### Concentration

Courses that meet the requirement for this concentration:

ANTH 111 Introduction to Biological Anthropology  
 ANTH 320 Anthropology of Food  
 ANTH 324 Human Ecology: Biocultural Adaptations  
 BIOL 106 Conservation Biology  
 BIOL 115 Energy in Living Systems  
 BIOL 228 Ecology  
 BIOL 229 Ecology Laboratory  
 BIOL 328 Global Ecology and Biogeography  
 BIOL 352 Aquatic Systems Biology  
 BIOL 353 Aquatic Systems Lab  
 CHEM 110 Environmental Chemistry  
 CHEM 121 Introductory Chemistry  
 CHEM 122 Chemical Principles  
 CHEM 231 Organic Chemistry I  
 CHEM 232 Organic Chemistry II  
 CHEM 341 Instrumental Analysis  
 ECON 101 Principles of Microeconomics  
 ECON 336 Environmental Economics  
 ECON 342 Economics of Regulation  
 ECON 347 Economics of the Public Sector  
 PHIL 110 Introduction to Ethics



PHIL 115 Practical Issues in Ethics  
PHYS 108 Geology  
PSCI 361 Globalization  
PSCI 363 Global Environmental Politics  
PSCI 364 American Environmental Politics and Policy  
PSCI 480 Science and Politics  
RLST 481 Religion and Nature  
SOCY 233 Sociology of Food