

# Requirements: 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 four green centers: the Kenyon Farm, the Kokosing Nature Preserve, the Philander Chase Conservancy and the 700-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 department'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.

*The Kenyon College faculty voted to change from Kenyon units to semester hours. This change will go into effect for all students who start at the College in the fall of 2024. Both systems will be used throughout the course catalog with the Kenyon units being listed first.*

## 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  
STAT 106: Elements of Statistics

### **Students Graduating in 2026-2027**

Use the major requirements found in the [archived](#) course catalog.

### **Requirements for the Major**

The environmental studies major requires a total of 62 semester hours, including a 20 semester-hour common core. Students select one of three tracks: Environmental Science, Economics and Policy, and Cultures and Justice.

### **Common Core: five courses required of all tracks**

ENVS 112: Introduction to Environmental Studies  
BIOL 115: Energy in Living Systems  
ENVS 220: Applied Environmental Analysis  
ENVS 231: Earth Systems Science  
ENVS 461: Seminar in Environmental Studies

### **Environmental Science Track**

#### **Skills and Labs (two courses required)**

##### **Lab Skills: choose one set**

ENVS 210 and two semesters of ENVS 385  
BIOL 109Y-110Y and (BIOL 229 or BIOL 353)  
CHEM 123, CHEM 126, and CHEM 233

**Quantitative Skills: choose one course** from COMP 118, ECON 101, MATH 111, or STAT 106

**Environmental Skills: choose one course** from ENVS 104, ENVS 253, ENVS 261, CHEM 341

**Foundations: choose one course** from BIOL 106, BIOL 116, CHEM 110, CHEM 121, CHEM 122, PHYS 108

**Living Systems: choose two courses** from BIOL 228, BIOL 352, ENVS 341, ENVS 342, ENVS 343

**Cognate Courses: choose two courses from one of the categories below**

Economics and Policy: ECON 101, ECON 331, ECON 336, ECON 342, ECON 347, ECON 360, ECON 379, ECON 474, PSCI 310, PSCI 342, PSCI 363, PSCI 463, PSCI 480

Cultures and Justice: ANTH 111, ANTH 112, ANTH 113, ANTH 150, ANTH 157, ANTH 256, ANTH 320, ANTH 324, ENGL 206, ENGL 265, ENGL 268, ENGL 379, HIST 209, HIST 360, HIST 426, HIST 481, SOCY 101, SOCY 238, SOCY 242

**Elective Courses: choose two courses**

Select any additional ENVS course or courses listed in a department in your core, track or skills and lab departments (BIOL, CHEM, COMP, ECON, MATH, PHYS or STAT)

**Economics and Policy Track**

**Skills and labs (two courses required)**

Take ENVS 210 and one of the following courses- ENVS 104, ENVS 261, ENVS 385 (two semesters), PSCI 280 or STAT 106

**Foundation Courses (four required courses)**

ECON 101: Principles of Microeconomics

ECON 102: Principles of Macroeconomics

ECON 336: Environmental Economics

PSCI 363: Global Environmental Politics

**Exploratory course: choose one course** from ECON 201, ECON 205, ECON 331, ECON 342, ECON 347, ECON 360, ECON 379, ECON 474, PSCI 310, PSCI 342, PSCI 463, PSCI 480

**Cognate Courses: choose two courses from one category**

Cultures and Justice: ANTH 111, ANTH 112, ANTH 113, ANTH 150, ANTH 157, ANTH 256, ANTH 320, ANTH 324, ENGL 206, ENGL 265, ENGL 268, ENGL 379, HIST 209, HIST 360, HIST 426, HIST 481, SOCY 101, SOCY 238, SOCY 242

Environmental Science: BIOL 106, BIOL 108, BIOL 228, BIOL 238, BIOL 352, CHEM 110, ENVS 104, ENVS 106, ENVS 240, ENVS 253, ENVS 341, ENVS 342, PHYS 108, PYSC 235

**Electives: choose two courses**

Choose any ENVS course or any additional course listed in a department in your core, track or skills and labs (BIOL, ECON, PSCI, or STAT).

**Cultures and Justice Track**

**Skills and Labs (two courses required)**

Take ENVS 210 and one of the following courses: ENVS 104, ENVS 261, ENVS 385 (two semesters), STAT 106

**Foundations courses: choose two courses from two departments** (ANTH 111, ANTH 112, ANTH 113), HIST 209, PHIL 190, SOCY 101, SOCY 103

**Exploratory Courses: choose three from two categories**

Environmental History and Justice: ANTH 256, ANTH 310D, ANTH 324, ENGL 379, HIST 180, SOCY 238

Cultures and Societies: ANTH 259, ANTH 320, ANTH 342, ENGL 265, PHIL 285, RLST 350, SOCY 238, SOCY 322

Scientific Communication/Knowledge Production: ANTH 150, ANTH 258, ANTH 321, ANTH 353, ENGL 206, PHIL 245, SOCY 242, HIST 360

**Cognate Courses: choose two courses from one category**

Economics and Policy: ECON 101, ECON 331, ECON 336, ECON 342, ECON 347, ECON 360, ECON 379, ECON 474, PSCI 310, PSCI 342, PSCI 363, PSCI 463, PSCI 480

Environmental Science: BIOL 106, BIOL 108, BIOL 228, BIOL 238, BIOL 352, CHEM 110, ENVS 104, ENVS 106, ENVS 240, ENVS 253, ENVS 341, ENVS 342, PHYS 108, PYSC 235

**Electives: choose two courses**

Any additional ENVS course or any course listed in the department in your core, track or skills and labs (ANTH, BIOL, ENGL, HIST, PHIL, RLST, SOCY or STAT)

**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 principal elements of the project: A student must conceptualize, plan and/or execute a project, and it must 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 20 to 30 pages, 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 chair 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 chair 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.

**Senior Capstone Guidelines**

As an ENVS major, you will undertake a substantial, independent research project that demonstrates the development of depth of your environmental education and your ability to approach environmental issues from a systems-based, interdisciplinary perspective.

The senior capstone project usually takes the form of a research paper, 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 your area of curricular focus in consultation with, and with approval from, the chair and the faculty mentor. Capstone papers are written during the fall semester of the senior year and are due early in the spring semester.

**Faculty Mentor**

The faculty mentor may be a member of the environmental studies faculty or a faculty member with expertise in the student's curricular focal area or research topic. The role of the faculty mentor is to help the student shape the research project, find literature in the field, review the student's progress at milestones, and potentially to provide technical assistance with research methods. The faculty mentor is not a co-author and is not encouraged to read drafts or proofread for grammatical errors. While there is generally only one mentor, there may be several faculty members with useful experience, so students are encouraged to consult with any faculty member whose expertise supports their investigation.

**Required Characteristics**

In completing the capstone, you should focus on the following goals:

Use primary literature to understand and develop ideas and arguments using an interdisciplinary, systems approach.

Demonstrate your ability to identify important questions, understand complex issues, synthesize information and think critically.

Demonstrate expertise in your curricular focal area and integrate material from your courses and focal areas into a cohesive whole.

Demonstrate excellent communication skills.

**Format**

A research-based senior capstone will be around 5,000 – 6,000 words in length, not including references, figures, tables, headings, etc. That is approximately 20 – 25 pages

in the required formatting but the word count is your defined goal. The actual page count can vary widely depending on margins, headings, fonts chosen, etc. Even different fonts of the same point size can vary significantly in characters per page. The final report should be formatted in a double-spaced, 12 point serif typeface (Times Roman, Garamond, Caslon, etc.) provided electronically in Adobe Acrobat (PDF) format. Headings and figure/table titles may be formatted in a sans-serif font (Helvetica, Arial, Calibri, etc.) if desired.

A non-research based senior capstone may be approved for students whose curricular focal area is in the arts. Such projects must represent an exceptional scholarly or creative opportunity for the student. If approved, an ENVS faculty member appointed by the chair will work with the student and faculty in the relevant discipline to design guidelines on an individual basis. Even where the main part of the senior capstone is creative, the student is still expected to provide written academic context for the work.

### **Timeline**

The following timeline is designed to encourage environmental studies majors to complete the bulk of their senior capstone in the fall semester, and to ensure there is time for the capstone to be evaluated with sufficient time remaining in the year for any necessary revisions to be completed without creating undue stress for students.

- Sept. 5, 2025: Proposed topic due (1-2 pages)
- Sept. 12, 2025: Faculty mentor chosen by student (if not already chosen)
- Sept. 19, 2025: Initial meeting with faculty mentor by this date
- Oct. 10, 2025: Annotated bibliography due to co-chairs and faculty mentor
- Nov. 21, 2025: Detailed outline due to co-chairs and faculty mentor
- Feb. 13, 2026: Final paper due to co-chairs and faculty mentor
- March 27, 2026: Results provided to students (This is our goal. It sometimes varies.)
- April 1, 2026: Experiential Community Exercise reflection due to department chair

### **Grading**

Your capstone will be graded by two readers, one of whom is often the mentor. Each reader assigns a grade independently, with differences generally resolved through a negotiated consensus. If consensus cannot be reached, another ENVS faculty member chosen by the chair will read the capstone and choose which grade prevails. The possible grades are: distinction, high pass, pass and no pass. In the case of no pass, the student must rewrite the capstone, addressing the problems identified by the

readers. A grade of distinction represents exceptional work and is noted in a student's transcript. Note that students who miss or are late on any of the milestones (without prior permission from the department chair) are only eligible for pass or no pass.

## **Timeline Milestones**

### **Meeting with Faculty Mentor**

Early in the semester, you will meet with your faculty mentor to discuss your project and get feedback on the direction you are taking, get advice on promising literature that you might use, and help with any questions you may have about getting started. The goal is to ensure you are on the right track as you begin your capstone research.

### **Annotated Bibliography**

As part of your capstone project, you will put together an annotated bibliography with 8-10 references: these will be primarily peer-reviewed journal articles, published reports, and perhaps books published on the subject. No more than one-third of your references should be review papers or books. As part of this assignment, you should identify at least three recent papers that describe core recent developments you intend to focus on in your work.

In an annotated bibliography, the article citation is followed by a short description of the paper (see example below), highlighting the main points. In your annotation, you will also address why this paper will be useful as you write your capstone.

Note that, as your ideas develop about your capstone, you will undoubtedly cite additional papers, and some of those you included in the annotated bibliography may not ultimately be included in the final version.

### **Example:**

Sarah R. Weiskopf, Madeleine A. Rubenstein, Lisa G. Crozier, Sarah Gaichas, Roger Griffis, Jessica E. Halofsky, Kimberly J.W. Hyde, Toni Lyn Morelli, Jeffrey T. Morissette, Roldan C. Muñoz, Andrew J. Pershing, David L. Peterson, Rajendra Poudel, Michelle D. Staudinger, Ariana E. Sutton-Grier, Laura Thompson, James Vose, Jake F. Weltzin, Kyle Powys Whyte. 2020. Climate change effects on biodiversity, ecosystems, ecosystem services, and natural resource management in the United States, *Science of The Total Environment* 733: 137782.

This paper provides an assessment of the threat that climate change presents to biodiversity and ecosystems globally. The authors document changes seen in species (for example, changes in morphology, behavior, and range shifts) and in ecosystems (primary productivity, species interactions). This paper is relevant to my work because I am interested in reviewing the role of climate change on ecological systems, the species that make them up, and how this impacts the emergent properties of ecosystems.

### Detailed Outline

A detailed outline will show the scope of your capstone project by giving details on each section. The outline should indicate the major sections of the capstone and the flow of logic from one section to the next should be clear. Outlines are typically written in a hierarchical format designed to show your arguments, present some of the information you'll use to support those arguments, and to track the relationships between ideas. They are typically about two or three pages in length. A one-page outline will not be detailed enough for this part of the assignment.

### AI Policy

In all cases when you use any source beyond your own brain, you must acknowledge that source. In some cases, this may take the form of a traditional works cited or references list. If you use AI in any capacity, you are required to disclose exactly how AI was used. This includes any use related to finding and organizing sources or proofreading. **AI should never be used to generate writing for the capstone or any of the intermediate milestones.**

All work submitted for the capstone project must include an acknowledgement statement that includes the source and nature of any assistance. For example, "I used Grammarly to identify possible grammatical errors in a draft of my capstone."

**Capstones must include an AI Use Statement in order to pass.** If you did not use any AI, you must still include a statement affirming that no AI was used.

### General Advice

- As with most complex tasks, your capstone project is best tackled by dividing the work into smaller, more manageable parts. Plan accordingly!
- Develop the necessary expertise to critique the work. To write an effective research paper, you must read widely. Consult and cite relevant papers that flesh out the topic.

- As you read the literature, think about both the strengths and weaknesses of each paper.
- Be sure to clearly delineate each sub-section of your paper. Many students find subheadings to be useful (and readers definitely find them useful). Use informative headings wherever appropriate.
- The effective use of language will be critical to your success. The 5000 - 6000 word limit means you must be concise. Organize the paper by preparing an effective outline; ideas and paragraphs should flow logically. Avoid wordiness and use care with sentence structure. Do not obscure your meaning with multiple clauses or overly complicated sentence structures.
- Address several subdisciplines of environmental studies knowledge that are relevant to the topic of your paper. Make explicit links and connections with other areas.
- We do not require everyone to use the same style (citations format). Citations must be in the format of a major journal in the discipline of your focal area. A standard journal paper citation includes authors, title, journal, volume, pages, and year, but other types of sources may require different or additional information. Once you identify a style commonly used in your focal area, you can use a [style guide in Chalmers Library](#) to guide your formatting. Consistency in citations formatting is critical.
- Use a citation manager program, such as [Zotero](#), to organize and format your citations. In addition, a citation manager program can help you to maintain notes about each article so you can search for key words and phrases across your source material. [Here is a page](#) from Chalmers Library providing more information about citation management tools, including some basic instructions for how to use Zotero. Don't be afraid of the up-front time it will take you to learn a new program. You will save significantly more time using a citation manager than you will invest in learning it and entering citations.
- Even after you have handed in your annotated bibliography, you should continue to annotate your source material. Once you have a few dozen articles to keep track of, it can be difficult to remember which one had the specific information or argument you needed. Searchable annotations in a citation management program help you to find that article again.
- Your senior fall semester will get busy quickly, so it is important that you hit the ground running when you arrive back in the fall. We recommend that you spend time over the summer choosing your topic and doing some initial investigation of the literature. Feel free to email members of the ENVS faculty for advice on choosing a topic.

## Experiential Community Exercise

The Experiential Community Exercise (ECE) is a graduation requirement. Just like the capstone, you must complete it before you can graduate. Here is the language from the catalog.

*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 principal elements of the project: A student must conceptualize, plan and/or execute a project, and it must 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.*

You will document your completion of the ECE by submitting a 1-2 page reflection to the chair in .pdf format by April 1 of your senior year. Explain what you did, how it turned out, and why it meets requirements above. This will be placed in your advising file to document your completion of the requirement.

You may undertake the exercise any time during your four years at Kenyon, anywhere in the world, and you may submit the reflection whenever you complete it. You will be busy in the spring of your senior year, so if you have already completed the ECE, then go ahead and write the reflection over the summer.

Most of our majors will have completed their ECE just by doing the things they are interested in, but if you have completed it, and you need a project, just get with your advisor or a green center director for suggestions. There are opportunities for ECEs at the BFEC, the Kenyon Farm and the Philander Chase Conservancy.

### **Requirements for the Concentration**

The concentration requires a total of 3.50 units/28 semester hours. Affiliated courses are offered in anthropology, biology, chemistry, economics, English, history philosophy, physics, political science, religious studies and sociology.

**Required Environmental Studies Course: 0.50 units/4 semester hours**

ENVS 112: Introduction to Environmental Studies

**Core Courses in Environmental Studies: 1.50 units/12 semester hours**

Take 12 semester hours of ENVS courses

**Elective courses for Environmental Studies: 1.50 units/12 semester hours from the elective course list in at least two departments:****Anthropology:**

ANTH 111: Introduction to Biological Anthropology

ANTH 256: Habitat and Humanity

ANTH 320: Anthropology of Food

ANTH 324: Human Ecology: Biocultural Adaptations

**Biology:**

BIOL 106: Conservation Biology

BIOL 115: Energy in Living Systems

BIOL 228, 229: Ecology and Ecology Laboratory

BIOL 328: Global Ecology and Biogeography

BIOL 352, 353: Aquatic Systems Biology and Aquatic Systems Lab

**Chemistry:**

CHEM 110: Environmental Chemistry

CHEM 121: Introductory Chemistry

CHEM 122: Chemical Principles

CHEM 231, 233: Organic Chemistry I and Organic Chemistry Lab I

CHEM 341: Instrumental Analysis

**Economics:**

ECON 101: Principles of Microeconomics

ECON 336: Environmental Economics

ECON 342: Economics of Regulation

ECON 347: Economics of the Public Sector

**English:**

ENGL 206: Introduction to Science and Nature Writing

ENGL 268: Climate Emergencies

## **History:**

HIST 260: Corn, Farming and the Roots of American Cultures

## **Philosophy:**

PHIL 110: Introduction to Ethics

PHIL 115: Practical Issues in Ethics

PHIL 190: The Anthropocene as a Philosophical Problem

## **Physics:**

PHYS 108: Geology

## **Political Science:**

PSCI 310: Public Policy

PSCI 342: Politics of Development

PSCI 363: Global Environmental Politics

PSCI 463: American Environmental Politics and Policy

PSCI 480: Science and Politics

## **Religious Studies:**

RLST 350: Religion and Nature

## **Sociology:**

SOCY 101: Powers, Energies and Peoples

SOCY 233: Sociology of Food

SOCY 238: Environmental Sociology

SOCY 242: Science, Society and the Environment

## **Transfer Credit Policy**

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

A maximum of two off-campus courses may be applied to the major or to the concentration. Students planning to take a course for transfer credit should consult the department chair in advance as all transfer credit must be approved.

## **Environmental Studies Forms**

- [ENVS Major Checklist \(PDF\)](#)
- [ENVS Four-Year Advising Plan \(PDF\)](#)

---

# Classes in Environmental Studies

*The Kenyon College faculty voted to change from Kenyon units to semester hours. This change will go into effect for all students who start at the College in the fall of 2024. Both systems will be used throughout the course catalog with the Kenyon units being listed first.*

## Solar Power Systems: Science, Policy and Practicum

ENVS 104 CREDITS: 0.5/4

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 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 explores 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 is addressed via a combination of spatial analysis exercises and visits to past and future installation sites. Additional field trips to local residential and commercial agricultural PV systems and conversations with their owners 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 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 are directly involved in site evaluations and closely follow along with the design and construction of the system. During these times, students help plan and host a public flip-the-switch event at system sites when these new systems are commissioned and 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.

## Reading the Ohio Landscape

ENVS 106 CREDITS: 0.5/4

Kenyon's campus sits on glacial sediments marking the farthest extent of the Laurentide Ice Sheet, with glaciated till plains to our west and unglaciated Appalachian foothills to our east. Below these glacial sediments lies the Black Hand Sandstone, formed 350 million years ago from the erosion of the young and massive Appalachian Mountains. Through literary readings, local field trips and hands-on activities, this course explores the geologic forces that have shaped Ohio's landscape. Students develop a connection to place through repeated field observations – including sketching, photography, and writing – of a location on Kenyon property. In addition, we discuss topics such as the intersection between science and Indigenous knowledge, diversity and representation in outdoor spaces, and science communication. This counts toward the cultures, societies and environments requirement for the major. This interdisciplinary course does not count toward the completion of any diversification requirement. No prerequisite. Offered every other fall.

## Introduction to Environmental Studies

ENVS 112 CREDITS: 0.5/4

This course examines contemporary environmental problems, introducing the major concepts pertaining to human interactions with the biosphere. We explore this interaction on 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 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 course is three-quarters discussion and lecture and one-quarter workshop. The workshops 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: 0.25/2 QR**

This course is an introduction to the field and laboratory techniques used in environmental science. Students 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 or corequisite: ENVS 112. Offered every fall semester.

## Applied Environmental Analysis

**ENVS 220 CREDITS: 0.5/4 QR**

This course examines 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: 0.5/4**

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 examine our interactions within and among the subsystems at the level of the individual and of society. Lectures and laboratories on these broad topics are 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: 0.5/4

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 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 are asked to assist with planting in the late fall, with harvest 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.

## Sustainable Agriculture

ENVS 253 CREDITS: 0.5/4

The purpose of this limited enrollment 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 is 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 are drawn from relevant books, current environmental literature and the news media. Discussions are student-led and combine readings and their experiences in the field. Students must have available in their academic schedule four continuous hours (plus travel time) one day per week to spend working at a local organic farm. In addition, students participate in a weekly seminar discussion of assigned

readings, lasting from an hour and a half to two hours. Preference is 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. Permission of instructor required. Offered every fall.

## Geographic Information Science

ENVS 261 CREDITS: 0.5/4

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 survey a number of online mapping applications (e.g., Google Earth) and use these to produce informative maps. We also 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 eventually settles 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 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 presents real-world applications of GIS while offering students opportunities to apply the fundamental concepts discussed in lectures. 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. Sophomore standing.

## The Science of Climate Change

ENVS 341 CREDITS: 0.5/4

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 begin by examining the natural state of Earth's climate system and the factors that have caused past climate variability. We investigate how humans have altered the climate system as well as some of the most significant impacts of anthropogenic warming.

We end with a discussion of some proposed science-based approaches to mitigating climate change. This interdisciplinary course does not count toward the completion of any diversification requirement. This counts toward the living systems requirement for the major. Prerequisite: ENVS 112 and either ENVS 220 or MATH 258. Offered every other year.

## Disease Ecology

ENVS 342 CREDITS: 0.5/4

Hosts, pathogens and vectors are parts of complex ecosystems. To understand the impacts of disease, this course examines the effects of disease on ecosystems (including humans) and explores the ecological and evolutionary processes that drive disease dynamics. Diseases do not follow national boundaries, but disease incidence and mitigation approaches differ dramatically by country and continent. Thus, exploring ecological systems and disease dynamics requires a global approach. This course includes case studies, problem-based learning and discussions that focus on the global aspects of disease. Also emphasized are global change (climate change; urbanization and development; movement of people, animals and pathogens; and habitat loss and alteration) and impacts on emerging and re-emerging diseases. This counts toward the upper-level environmental biology requirement in the biology major and as an additional living systems elective in the environmental studies major. This interdisciplinary course does not count toward the completion of any diversification requirement. Prerequisite: BIOL 115 or ENVS 112 and sophomore standing.

## Managed Ecosystems

ENVS 343 CREDITS: 0.5/4

Nearly all ecosystems are managed in some way. Management can have a variety of goals including species conservation, food production, recreational opportunities or ecosystem resilience. This course focuses on understanding how ecosystems function, how they are managed and why management does or does not work as intended. We use primary literature, field trips to local managed ecosystems, and case studies from a range of systems, like fisheries, national parks, agricultural lands, and urban ecosystems to explore the scientific and human dimensions of natural resource management. We study historical and current

approaches to ecosystem management and apply ecological concepts to work toward developing management plans that meet social, economic and environmental sustainability goals. This course counts toward the living systems requirement for the major. Prerequisites: ENVS 112 or BIOL 115 and sophomore standing. Offered every spring.

## Research in Environmental Science

ENVS 385 CREDITS: 0.25/2

This course is intended to reward students with academic credit for their research activities, provide opportunities to develop skills related to communicating science, and encourage students to gain exposure to ongoing environmental science research. Students select their own research problems in consultation with an ENVS faculty member and/or a mentor at one of the Green Centers. Instead of frequent class meetings, students are expected to spend 6-10 hours per week working on their research project in close collaboration with their mentor. To develop communication skills, students present their work to their colleagues and compose a final manuscript that describes their research progress during the semester. This interdisciplinary course does not count toward the completion of any diversification requirement. This course is repeatable for credit. Prerequisite: BIOL 109Y-110Y or ENVS 210.

## Seminar in Environmental Studies

ENVS 461 CREDITS: 0.5/4

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 is on case studies of natural-resource management, with specific topic areas to be determined. In this strongly interdisciplinary effort, we explore ecological, economic, social and legal issues that influence how people exploit natural resources, and whether that exploitation is sustainable. Students are 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 declared environmental studies major or concentrator. Offered every spring.

## Individual Study

ENVS 493 CREDITS: 0.25-0.5/2-4

Because environmental studies is a broad interdisciplinary field, the nature of an individual study necessarily varies 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 are 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, 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 by the semester before, so that there is time to devise the proposal and seek departmental approval. 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 256	Habitat and Humanity

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 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
PHIL 190	The Anthropocene as a Philosophical Problem
PHYS 108	Geology
PSCI 361	Globalization
RLST 350	Religion and Nature

SOCY 101	Powers, Energies and Peoples
SOCY 238	Environmental Sociology
SOCY 242	Science, Society and the Environment