

ENVIRONMENTAL STUDIES

Overview & Learning Goals

Overview

From its inception, the Environmental Studies Program (ES) at Bowdoin anchors students in both interdisciplinary environmental studies and a recognized academic discipline. With the pairing of a department or program as a coordinate major, environmental studies students are trained to embrace interdisciplinary breadth and disciplinary depth. This combination underscores the mission of Bowdoin as a liberal arts college. ES graduates have long found that the coordinate major translates into success after Bowdoin in graduate or professional school, plus a wide range of professional opportunities.

Learning Goals

The program's mission is to help students understand and respond wisely to environmental challenges facing the planet through rigorous training in the natural sciences, social sciences, and the humanities and arts.

Content

Students should demonstrate fluency in basic principles of the social sciences, humanities and arts, and natural sciences as they relate to environmental inquiry.

1. Engage principles and methods of the **humanities and the arts** to consider ethical, cultural, historical, literary, and artistic dimensions of environmental questions (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2403 Environment and Culture in North American History)
2. Engage principles and methods of the **natural sciences** to understand the physical, chemical, and biological processes that characterize natural and human systems (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science)
3. Engage principles and methods of the **social sciences** to analyze and evaluate political, economic, psychological, anthropological, and sociological dimensions of environmental questions (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2330 Environmental Policy and Politics)
4. Synthesize **these disciplinary perspectives** to understand the complexities of environmental questions (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS courses numbered 3900–3999 (ENVS advanced seminars))

Skills

Students should acquire and refine the following skills as part of their coordinate major in environmental studies:

1. To locate and critically assess varied **sources of information, data, and evidence** (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History)

2. To identify appropriate **methods** of inquiry to address research questions (ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History)
3. To gain **exposure and practice** in quantitative, qualitative, statistical, and spatial analyses (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History) and to work toward developing competency and fluency in these areas
4. To understand the importance of **place and locality** in environmental inquiry and evaluate its significance and applicability to other contexts (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History)
5. To understand the importance of **temporal and spatial scales** in environmental inquiry (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History)
6. To discern underlying **values and criteria** used to evaluate alternatives for addressing environmental problems (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History)
7. To work **collaboratively and communicate** across disciplines, while acknowledging and seeking out diverse perspectives (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches and ENVS courses numbered 3900–3999 (ENVS advanced seminars))
8. To develop the ability to identify and engage various **communities**, while acknowledging questions of equity and power (ENVS courses numbered 3900–3999 (ENVS advanced seminars))
9. To **research, write, and present** within multiple disciplines (ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History)

Options for Majoring or Minor in the Program

Students may elect to coordinate a major in environmental studies with any other department/program major. Students pursuing coordinate majors may not normally elect a second major. Non-majors may elect to minor in environmental studies.

Program Website (<https://www.bowdoin.edu/environmental-studies/>)

Faculty

Matthew W. Klinge, *Program Director*
Eileen Sylvan Johnson, *Program Manager*
Rosemary Armstrong, *Program Coordinator*

Professors: Connie Y. Chiang‡ (History), Dharni Vasudevan (Chemistry)

Associate Professor: Matthew W. Klinge (History)

Assistant Professors: Allison Guess, Mary Rogalski (Biology), Shana M. Starobin (Government)

Senior Lecturers: Eileen Sylvan Johnson*, Jill E. Pearlman

Roux Scholar: Ayana Elizabeth Johnson

Visiting Faculty: Brandon Tate (Chemistry)

Adjunct Lecturers: Aaron Gilbreath (fall), Anne CJ Hayden (spring), Kate Olson (fall)

Contributing Faculty: Mark O. Battle, Rachel J. Beane, Philip Camill†, David B. Carlon, Vladimir Douhovnikoff, Laura A. Henry, Guillermo E. Herrera, Amy S. Johnson‡, Patricia L. Jones, Susan A. Kaplan, Michèle G. LaVigne, Barry A. Logan, Erik Nelson, Emily M. Peterman, Samia Rahimtoola, Collin S. Roesler, Allen L. Springer, Anthony E. Walton

Faculty/Staff Website (<https://www.bowdoin.edu/environmental-studies/faculty-and-staff/>)

Requirements

Environmental Studies Coordinate Major

Students coordinate their study of the environment with any department/program at Bowdoin that offers a major. To satisfy the requirements for the coordinate major in environmental studies, students must complete the eight credits detailed below as well as the major requirements within their coordinated department/program.

Code	Title	Credits
Required Courses		
ENVS 1101	Introduction to Environmental Studies: Interdisciplinary Approaches ^a	1
ENVS 2201	Perspectives in Environmental Science	1
ENVS 2330	Environmental Policy and Politics	1
ENVS 2403	Environment and Culture in North American History	1
	Select one advanced seminar chosen from ENVS courses numbered 3900–3999.	1
	Select three ENVS courses linked by a cohesive theme. With Environmental Studies program approval, one off-campus study course, and one semester of ENVS independent study or honors work may be used to fulfill the cohesive theme requirement for the ENVS major. ^b	3

^a preferably taken as a first-year student

^b Selecting these courses allows students to develop a particular interest from the broad spectrum of environmental studies courses offered at Bowdoin. An example of such a theme might be environmental health, environmental justice, or climate change and energy. Students meet with their ES advisor to discuss possible themes.

Environmental Studies Minor

The minor consists of five courses.

Code	Title	Credits
Required Courses		
ENVS 1101	Introduction to Environmental Studies: Interdisciplinary Approaches	1

Select two environmental studies intermediate courses (2000–2969) 2 or higher, one of which must be outside a student's departmental major. With Environmental Studies program approval, one off-campus study course, or one semester of independent study or honors work may be used to fulfill the intermediate course requirement for the ENVS minor.

Discipline-Based Option Requirements

Select two core courses in the disciplinary area as specified below: 2

Natural Science Majors

ENVS 2403 Environment and Culture in North American History

ENVS 2330 Environmental Policy and Politics

Social Science Majors

ENVS 2201 Perspectives in Environmental Science

ENVS 2403 Environment and Culture in North American History

Humanities Majors

ENVS 2201 Perspectives in Environmental Science

ENVS 2330 Environmental Policy and Politics

Additional Information

Additional Information and Program Policies

- A grade of C- or better must be earned in a course to fulfill the major or minor requirements, and no courses taken Credit/D/Fail may be applied to the major or minor.
- Students with a score of five on the Environmental Science AP exam can earn one general credit if the student completes ENVS 2201 Perspectives in Environmental Science with a minimum grade of B-. In order to receive credit for advanced placement work, students must have their scores officially reported to the Office of the Registrar by the end of their sophomore year at Bowdoin.
- Majors may count up to three courses cross-listed with ES and the students' departmental or program majors to fulfill the environmental studies major requirements. Minors may count up to two courses cross-listed with ES and the students' departmental or program minors to fulfill the environmental studies minor requirements.
- With Environmental Studies Program approval, one off-campus study course may be used toward fulfilling the cohesive theme requirement for the major or toward fulfilling the intermediate course requirements for the minor.
- ENVS core courses ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches, ENVS 2201 Perspectives in Environmental Science, ENVS 2330 Environmental Policy and Politics, ENVS 2403 Environment and Culture in North American History, and Advanced Seminar must be taken at Bowdoin College.
- Students may not declare a coordinate major in environmental studies with any of the following: a second departmental major, a student-designed major, or an interdisciplinary major. (See the Interdisciplinary Majors (<https://bowdoin-public.courseleaf.com/departments-programs/interdisciplinary-majors/>.)
- Students may engage in independent study at the intermediate (2970–2979) or advanced (4000–4051) level. Only one semester of independent study or honors work may count toward the major or the minor.

Information for Incoming Students (p. 3)

As part of the Environmental Studies (ES) Program at Bowdoin, you will join a community of students and faculty passionate about learning how to engage the environment from an interdisciplinary perspective.

Environmental challenges are often complex and require knowledge and skills drawn from all parts of campus—the natural sciences, social sciences, and the arts and humanities. Integrating these perspectives helps students understand environmental challenges in a deeper way and become more effective problem solvers.

ES students and faculty explore a number of questions related to a changing environment: What are environmental problems? Why do they arise? What kinds of knowledge do we need to explore them? How can we assess environmental impacts? How do we think about solving environmental challenges? In what kind of world do we ultimately want to live?

The ES Program provides many opportunities for engaging coursework and research on some of the most interesting environmental challenges of our time: climate change, sea level rise, environmental justice, food and agriculture, environmental pollution, energy, conservation, and sustainability, with Maine being a great place to explore and learn about these topics. ES students also have the opportunity to participate in the ES summer fellowship program in partnership with local municipalities and nonprofits to explore a wide range of projects. Recent examples include climate action planning, renewable energy development, urban planning and design, environmental education, political action, local advocacy, sustainable farming, community-based science, and conservation.

First-year students interested in environmental studies are encouraged to take the gateway course ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches in the fall. ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches is an interdisciplinary introduction to the environment as framed by perspectives from the natural sciences, social sciences, and arts and humanities. This course does not meet the INS (Inquiry in the Natural Sciences) distribution requirement, nor is it a science course, but it does meet the DPI (Difference, Power, and Inequality) distribution requirement. Students in ENVS 1101 Introduction to Environmental Studies: Interdisciplinary Approaches meet in a small group discussion section with an instructor once a week for 55 minutes. Discussion sections are listed as separate labs in the Classfinder (<https://classfinder.bowdoin.edu/classfinder/>), but they are not labs. This course is offered every fall.

In the spring, students should consider taking the environmental science core course ENVS 2201 Perspectives in Environmental Science, or the environmental social science core course ENVS 2330 Environmental Policy and Politics

Students with a score of 5 on the Environmental Science AP exam can earn one general credit if the student completes ENVS 2201 Perspectives in Environmental Science with a minimum grade of B-. To receive credit for advanced placement work, students must have their scores officially reported to the Registrar's office by the end of their sophomore year at Bowdoin.

Courses

ENVS 1027 (b) The Politics of Climate Change

Laura Henry.

Every Other Fall. Fall 2024. Enrollment limit: 16.

Provides an overview of the major actors engaged in climate politics, ranging from governments to NGOs and corporations. Examines the politics of climate change at multiple levels—from the individual to global governance—and reviews climate policy in different countries. Pays particular attention to cases where active policy making or public mobilization around climate is occurring, asking why we see initiative and innovation in climate policy in these venues and less action in other spaces. Considers themes such as how climate policy is developed differently in democracies and authoritarian regimes, how climate policy may affect economic development, the role of non-state actors such as citizens, social movements, and industry in climate politics, and the ethical implications of different climate policy options. (Same as: GOV 1027)

Previous terms offered: Fall 2022, Fall 2020.

ENVS 1028 (a) Water Insecurity: Emerging Threats to a Vital Natural Resource

Brandon Tate.

Non-Standard Rotation. Fall 2024. Enrollment limit: 16.

Explores integrative approaches to address critical threats to the global water supply, drawing on principles of environmental science, sustainable development, and green technology. Through scientific inquiry, policy analysis, and creative problem solving, students develop critical multidisciplinary research and writing skills while investigating a selection of case studies in groundwater depletion, wetland habitat destruction, wastewater remediation, and other emerging sustainability challenges surrounding one of the world's most vital and most threatened natural resources. (Same as: CHEM 1020)

ENVS 1056 (a, INS) Ecology and Society

Non-Standard Rotation. Enrollment limit: 50.

Explores the basic principles of ecology and environmental science to better understand the interactions between humans and their environment (biotic and abiotic). Weekly readings and labs using ecosystem simulators will be used to explore ecological dynamics and the application of the scientific method. Class discussions will focus on the application of ecological principles to the understanding of societal issues. The relevance of ecology to society will be an area of concentration, with emphasis on natural resource use, conservation, and public health. Professionals in a broad range of relevant fields will join us for discussions. (Same as: BIOL 1056)

Previous terms offered: Fall 2023, Spring 2023, Spring 2022, Fall 2021, Fall 2020.

ENVS 1060 (a, INS, MCSR) Prove It!: The Power of Data to Address Questions You Care About

Non-Standard Rotation. Enrollment limit: 24.

Climate change, biodiversity loss, pollution, and other environmental issues present significant threats to ecological integrity, human health, and social justice. An overwhelming amount of information exists on these topics, from a variety of perspectives—some reliable, some not. Strategies are required for processing this information and drawing conclusions. Students develop skills in accessing reliable information, data analysis, and interpretation, as well as science communication. (Same as: BIOL 1060)

Previous terms offered: Spring 2024, Spring 2022.

ENVS 1083 (a, INS, MCSR) Energy, Physics, and Technology

Every Other Spring. Enrollment limit: 50.

How much can we do to reduce the disruptions of the Earth's physical, ecological, and social systems caused by global climate change? How much climate change itself can we avoid? A lot depends on the physical processes that govern the extraction, transmission, storage, and use of available energy. Introduces the physics of solar, wind, nuclear, and hydroelectric power and discusses the physical constraints on their efficiency, productivity, and safety. Reviews current technology and quantitatively analyzes the effectiveness of different strategies to reduce greenhouse gas emissions. Not open to students with credit for Physics 1140. (Same as: PHYS 1083)

Previous terms offered: Spring 2022.

ENVS 1090 (a, INS) Understanding Climate Change

David Carlon.

Every Spring. Spring 2025. Enrollment limit: 20.

Why is the global climate changing and how will biological systems respond? Includes sections on climate systems and climate change, reconstructing ancient climates and past biological responses, predicting future climates and biological responses, climate policy, the energy crisis, and potential solutions. Incorporates a few field trips and laboratories designed to illustrate approaches to climate change science at the cellular, physiological, and ecological levels. (Same as: BIOL 1090)

Previous terms offered: Spring 2021.

ENVS 1101 (DPI) Introduction to Environmental Studies: Interdisciplinary Approaches

Shana Starobin; Kate Olson.

Every Fall. Fall 2024. Enrollment limit: 90.

An interdisciplinary introduction to the environment framed by perspectives from the natural sciences, social sciences, and arts and humanities. Surveys past and present status of scientific knowledge about major global and regional problems, explores both successes and inadequacies of environmental ideas to address specific crises, and assesses potential responses of governments, corporations, and individuals. Topics include food and agriculture, pollution, fisheries, and climate change and energy. Other subjects include biodiversity, population, urbanization, consumption, environmental justice, human and ecological health, and sustainability.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Fall 2020.

ENVS 1102 (a, INS) Oceanography

Cathryn Field; Collin Roesler.

Every Spring. Spring 2025. Enrollment limit: 36.

The fundamentals of geological, physical, chemical, and biological oceanography. Topics include tectonic evolution of the ocean basins; deep-sea sedimentation as a record of ocean history; global ocean circulation, waves, and tides; chemical cycles; ocean ecosystems and productivity; and the ocean's role in climate change. Weekly labs and fieldwork demonstrate these principles in the setting of Casco Bay and the Gulf of Maine. Students complete a field-based research project on coastal oceanography. (Same as: EOS 1505)

Previous terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

ENVS 1117 (c, DPI) Introduction to Environmental Literature

Samia Rahimtoola.

Non-Standard Rotation. Fall 2024. Enrollment limit: 50.

Introduces students to literature that features the relationship of humans with their 'natural' environment, while asking how such relationships are sustained and delimited by structures of class, race and ethnicity, citizenship, and gender/sexuality. Students will gain an understanding of environmental literature's powerful role in shaping conversations about national belonging, American ethnic and racial identity, and how to best live an environmental life, while directing the majority of their attention to how writers from the margins—African American, Latinx, Indigenous, and global—challenge these orthodoxies. Key topics include American agrarianism, the pastoral and wild, and the literatures of environmental justice. Authors may include Henry David Thoreau, Aldo Leopold, Willa Cather, Helena María Viramontes, Leslie Marmon Silko, and Octavia Butler. Note: Beginning with the Class of 2025, this class will fulfill the African American, Asian American, Indigenous, Latinx, multiethnic American, or global literature requirement for English majors (Same as: ENGL 1117)

Previous terms offered: Fall 2022.

ENVS 2004 (a, MCSR) GIS and Remote Sensing: Understanding Place

Aaron Gilbreath.

Every Year. Fall 2024. Enrollment limit: 20.

Geographical information systems (GIS) organize and store spatial information for geographical presentation and analysis. They allow rapid development of high-quality maps and enable powerful and sophisticated investigation of spatial patterns and interrelationships. Introduces concepts of cartography, database management, remote sensing, and spatial analysis. Examines GIS and remote sensing applications for natural resource management, environmental health, and monitoring and preparing for the impacts of climate change from the Arctic to local-level systems. Emphasizes both natural and social science applications through a variety of applied exercises and problems culminating in a semester project that addresses a specific environmental application. Students have the option of completing a community-based project. (Same as: DCS 2335, URBS 2004)

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Spring 2021.

ENVS 2024 Science Communication

Barry Logan.

Non-Standard Rotation. Fall 2024. Enrollment limit: 20.

Scientists are communicators, using images, graphical representations, written and spoken words to convey their findings. Those findings achieve their greatest impact through dissemination; a research project is not complete until it has been described for others. Mindfulness of the intended audience and the goals of communication dictate the most suitable forms. Explores and develops effective communication with peer scientists, potential funders (i.e., grant proposals), non-specialist scientists, children and adult lay audiences through written work, presentations, posters, displays, podcasts, short videos and documentary films. Involves individual and group projects, critiques, site visits, and engagement with scientists and communication professionals (including journalists, filmmakers and museum curators). (Same as: BIOL 2024)

Prerequisites: BIOL 1100 - 2969 or BIOL 3000 or higher or CHEM 1100 - 2969 or CHEM 3000 or higher or EOS 1100 - 2969 or EOS 3000 or higher or PHYS 1100 - 2969 or PHYS 3000 or higher.

Previous terms offered: Fall 2022, Spring 2021.

ENVS 2118 (MCSR) The Physics and Economics of Energy

Mark Battle; Guillermo Herrera.

Non-Standard Rotation. Spring 2025. Enrollment limit: 50.

Energy is both a physical phenomenon and a key driver of human production and consumption. This course develops basic concepts in physics of energy (conservation of energy, conversion from one form to another, increasing entropy, etc.) and economic issues (role of energy in production functions; extraction, storage, and transmission; industrial structure and protectionism; etc.). The course explores these concepts using different forms of energy (fossil fuels of different kinds, solar, hydropower, wind, nuclear, and others). A large focus is on the environmental aspects of energy use: science and economics of risks and effects outside of energy markets, per se. In light of these environmental effects, we also consider the science and economics of different government policies. (Same as: ECON 1181, PHYS 1181)

Prerequisites: Two of: either ECON 1050 or ECON 1101 or ECON 1102 or Placement in earned ECON 1101 or Placement in ECON 2000 Level and PHYS 1130 or Placement in PHYS 1140.

ENVS 2155 (b) Gender, Race and Environmental Justice

Non-Standard Rotation. Enrollment limit: 35.

Introduces students to the struggle for environmental justice in various cultural arenas, with a focus on gender, race, and their intersections. Through readings, films, lectures, and discussions, the course addresses topics such as migration, resource extraction, and food and climate justice. Provides tools for cross-cultural understanding by examining the dynamic interplay among people, places, and non-human species within multiple regions of the world. Explores concepts such as racial capitalism, colonialism, and imperialism and their relationship to environmental change. Evaluates the potential of different feminist and decolonial approaches to achieve environmental justice. (Same as: ANTH 2155, GSWS 2155)

Previous terms offered: Fall 2023.

ENVS 2201 (a, INS, MCSR) Perspectives in Environmental Science

Shana Stewart Deeds; Mary Rogalski; Brandon Tate.

Every Spring. Spring 2025. Enrollment limit: 35.

Understanding environmental challenges requires scientific knowledge about the different spheres of the Earth – land, water, air, and life – and how they interact. Presents integrated perspectives across the fields of biology, chemistry, and earth and oceanographic science to examine the scientific basis for environmental change from the molecular to the global level. Foundational principles are developed to address major course themes, including climate change, energy, soil/air/water pollution, chemical exposure and risk, land use change, and biodiversity loss. Laboratory sessions consist of local field trips, laboratory experiments, group research, case study exercises, and discussions of current and classic scientific literature. (Same as: BIOL 1158, CHEM 1105)

Prerequisites: BIOL 1101 or BIOL 1109 or CHEM 1091 - 2260 or PHYS 1130 or PHYS 1140 or EOS 1105 or EOS 1305 (same as ENVS 1104) or EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221) or EOS 2115 or EOS 2335 or EOS 2345 (same as ENVS 2270) or EOS 2365 or EOS 2525 (same as ENVS 2251) or EOS 2535 or EOS 2585 (same as ENVS 2282) or ENVS 1101.

Previous terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

ENVS 2211 (a, INS, MCSR) Coral Reefs in the Anthropocene

Non-Standard Rotation. Enrollment limit: 35.

Coral reefs are the largest biogenic structures on earth that support exceptional levels of biodiversity in all the branches of the tree of life. They also face multiple threats due to human activities, including increased ocean acidity that is reducing reef construction, major coral bleaching events that are increasing in intensity and frequency, overfishing of increasingly limited wild fisheries stocks, and changes in land use in tropical nations and islands that can have strong local impacts on reef health. This course will explore the geological processes that build coral reefs, and the ecological and evolutionary processes that maintain exceptionally high levels of biodiversity. It will apply theory and data to the challenges now confronting coral reef ecosystems, and their future prospects. The class will include lectures, discussions, weekly lab meetings, and field trips.. (Same as: BIOL 2311)

Prerequisites: BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level or CHEM 1092 or CHEM 1102 or CHEM 1109 or Placement in CHEM 2000 level or Placement in CHEM 2000/1109 or ENVS 2201 (same as BIOL 1158 and CHEM 1105) or MATH 1001 - 2969 or Placement in MATH 1600 (M) or Placement in MATH 1700 (M) or Placement in MATH 1750 (M) or Placement in MATH 1800 (M) or Placement in MATH 1808 {2108} (M) or Placement in MATH 2020 or 2206 (M) or Placement in 2000, 2020, 2206 (M) or PHYS 1130 or PHYS 1140 or Placement in PHYS 1140.

Previous terms offered: Fall 2020.

ENVS 2217 (a, INS, MCSR) Current Topics and Research in Marine Science

Jaret Reblin.

Every Fall. Fall 2024. Enrollment limit: 12.

Current Topics and Research in Marine Science is an experiential research course in which students design and carry out an individual semester long research project. In an advanced seminar setting, students choose topics and learn to (1) search for information in the scientific literature; (2) evaluate the utility of papers to their research topic; (3) identify gaps in existing understanding; (4) formulate hypothesis-driven research questions; and (5) utilize the R programming environment for analysis and presentation of scientific data. Ultimately, students design and carry out a research project that includes integration of their understanding of the scientific literature. Students present their results in a final oral presentation and written paper. Taught in residence at the Schiller Coastal Studies Center as part of the BCSS, Bowdoin Coastal Studies Semester program. (Same as: BIOL 3117)

Prerequisites: Two of: either BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level or either CHEM 1102 or CHEM 1109 or Placement in CHEM 2000 level or either EOS 1305 (same as ENVS 1104) or EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221) or PHYS 1140 and MATH 1000 or higher.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021.

ENVS 2221 (a) Biogeochemistry: An Analysis of Global Change

Cathryn Field; Trang Nguyen.

Every Fall. Fall 2024. Enrollment limit: 35.

Understanding global change requires knowing how the biosphere, geosphere, oceans, ice, and atmosphere interact. An introduction to earth system science, emphasizing the critical interplay between the physical and living worlds. Key processes include energy flow and material cycles, soil development, primary production and decomposition, microbial ecology and nutrient transformations, and the evolution of life on geochemical cycles in deep time. Terrestrial, wetland, lake, river, estuary, and marine systems are analyzed comparatively. Applied issues are emphasized as case studies, including energy efficiency of food production, acid rain impacts on forests and aquatic systems, forest clearcutting, wetland delineation, eutrophication of coastal estuaries, ocean fertilization, and global carbon sinks. Lectures and three hours of laboratory or fieldwork per week. (Same as: EOS 2005)

Prerequisites: EOS 1100 - 1999 or BIOL 1102 or BIOL 1109 or CHEM 1092 or CHEM 1102 or CHEM 1109 or ENVS 1102 or ENVS 1104 or ENVS 1515.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Fall 2020.

ENVS 2222 (a, INS, MCSR) Satellite Remote Sensing of the Ocean

Collin Roesler.

Every Other Fall. Fall 2024. Enrollment limit: 35.

In the 1980s, NASA's satellite program turned some of its space-viewing sensors towards the earth to better understand its processes. Since that time, NASA's Earth Observatory mission has yielded a fleet of satellites bearing an array of sensors that provide a global view of the earth each day. Global-scale ocean properties, including bathymetry, temperature, salinity, wave height, currents, primary productivity, sea ice distribution, and sea level, are revealed through satellite-detection of ultraviolet, visible, infrared and microwave energy emanating from the ocean. These satellite data records currently exceed thirty years in length and therefore can be used to interpret climate-scale ocean responses from space. A semester-long research project, targeted on a student-selected oceanic region, focuses on building both quantitative skills through data analysis and writing skills through iterative writing assignments that focus on communicating data interpretation and synthesis. (Same as: EOS 2550)

Prerequisites: Two of: either EOS 1105 - 2969 or EOS 3000 or higher and either MATH 1300 - 2969 or MATH 3000 or higher or Placement in MATH 1600 (M) or Placement in MATH 1700 (M) or Placement in MATH 1750 (M) or Placement in MATH 1800 (M) or Placement in MATH 2020 or 2206 (M) or Placement in 2000, 2020, 2206 (M).

Previous terms offered: Fall 2022.

ENVS 2223 (a, INS, MCSR) Plant Ecophysiology

Barry Logan; Kyle Martin.

Every Spring. Spring 2025. Enrollment limit: 35.

Examines the functional attributes of plants and the manner in which they vary across the plant kingdom by the processes of evolution and acclimation. Topics of focus include photosynthesis and protection against high-light stress, the acquisition and distribution of water and mineral nutrients, and environmental and hormonal control of development. Special topics discussed may include plant parasitism, carnivory, the origins and present state of agriculture, plant responses to global climate change, plant life in extreme environments, and the impacts of local land-use history on plant communities. Contemporary research instrumentation is used in weekly laboratories, some conducted in the field, to enable first-hand exploration of phenomena discussed in lecture. (Same as: BIOL 2210)

Prerequisites: BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level.

Previous terms offered: Spring 2024, Spring 2023, Fall 2020.

ENVS 2227 (a, INS) Ecology

Shana Stewart Deeds; Mary Rogalski.

Every Fall. Fall 2024. Enrollment limit: 35.

Ecology, the study of how organisms interact with each other and their environment, incorporates topics from how organisms cope with environmental stressors to global carbon cycling. Addresses current questions in ecology, from global change to food security to invasive species. Lectures, labs, primary and popular literature emphasize how scientists use the tenets of ecology to address current environmental issues. Labs, discussions and activities focus on practical applications of ecological theory, scientific writing and data analysis on topics such as plant-insect interactions, amphibian decline, river restoration and natural history. (Same as: BIOL 2327)

Prerequisites: BIOL 1102 or BIOL 1109 or ENVS 2201 (same as BIOL 1158 and CHEM 1105) or Placement in BIOL 2000 level.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Fall 2020.

ENVS 2229 (a, INS, MCSR) Biology of Marine Organisms

Bethany Whalon; Tyler Griffin.

Every Fall. Fall 2024. Enrollment limit: 35.

The study of the biology and ecology of marine mammals, seabirds, fish, intertidal and subtidal invertebrates, algae, and plankton. Also considers the biogeographic consequences of global and local ocean currents on the evolution and ecology of marine organisms. Laboratories, field trips, and research projects emphasize natural history, functional morphology, and ecology. Lectures and four hours of laboratory or field trip per week. One weekend field trip included. Students have the opportunity to take an optional field trip to the Bowdoin Scientific Station on Kent Island in the Bay of Fundy. (Same as: BIOL 2319)

Prerequisites: BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Fall 2020.

ENVS 2235 (a, INS, MCSR) Methods in Ocean Change Ecology

Every Fall. Enrollment limit: 12.

Explores how marine organisms, populations, communities, and ecosystems will respond to global ocean change. Concepts in ecology, behavior, physiology, and evolution will be highlighted to demonstrate how marine systems are affected by ocean change factors like warming, ocean acidification, hypoxia, habitat loss, and invasive species. Emphasizes in-depth discussion of key literature to exemplify the theory, study design, and analysis tools marine scientists employ to research current and projected ocean change. Also integrates laboratory, fieldwork, and computer activities to illustrate approaches to monitoring and predicting shifts in biological communities. Taught in residence at the Schiller Coastal Studies Center. Biology 2503/Environmental Studies 2235 is a course-module in the Bowdoin Marine Science Semester. Biology 2232 (same as Environmental Studies 2232), Biology 3117 (same as Environmental Studies 2217), and History 2129 (same as Environmental Studies 2449) are co-requisites of this course. (Same as: BIOL 2503)

Prerequisites: Two of: either BIOL 1102 or BIOL 1109 and MATH 1000 or higher.

Previous terms offered: Fall 2022, Fall 2021.

ENVS 2236 (c, IP) Religion, Nature, and the Environment

Every Other Year. Enrollment limit: 35.

Environmental degradation and climate change have become matters of deep concern to the leaders, institutions, and practitioners of many religious traditions. Practitioners and leaders' words and actions have a history in how nature has been understood as a space in which humans might learn about themselves, about the divine, and about their ethical responsibilities. Sometimes nature has been understood as divine, sometimes independent of divine control, and sometimes just as God's creation. With case studies taken from Christian, Hindu, Islamic, and Buddhist traditions, this course surveys changes in religions' views of nature and humanity's responsibilities to nature and, more recently, the environment. This course pays special attention to groups on the racial, socioeconomic, and political margins. (Same as: REL 2236)

Previous terms offered: Spring 2024, Spring 2022.

ENVS 2238 (b, MCSR) Eatconomics: The Economic Analysis of the Food Industry

Guillermo Herrera.

Non-Standard Rotation. Fall 2024. Enrollment limit: 35.

We eat food to live (we "need" it), but we also use food to express the values of variety and aesthetics. Using applied microeconomic tools, this course will study the production, storage, distribution, and consumption of food by individuals, firms, government, and nongovernmental organizations. Economic models will be developed to analyze why some people experience food scarcity and hunger while others have access to plentiful food; food technologies (e.g., organic vs "conventional" farming); food distribution (grocery stores, restaurants, food trucks, the "gig economy"; fair trade); the diet industry; the environmental impacts of food production (water use and climate impacts); food security and international trade of food products; and other topics as student demand dictates. (Same as: ECON 2238)

Prerequisites: ECON 1050 or ECON 1101 or Placement in earned ECON 1101 or Placement in ECON 2000 Level.

ENVS 2250 (a, INS) Earth, Ocean, and Society

Every Spring. Enrollment limit: 35.

Explores the historical, current, and future demands of society on the natural resources of the earth and the ocean. Discusses the formation and extraction of salt, gold, diamonds, rare earth elements, coal, oil, natural gas, and renewable energies (e.g., tidal, geothermal, solar, wind). Examines how policies for these resources are written and revised to reflect changing societal values. Students complete a research project that explores the intersection of natural resources and society. (Same as: EOS 2020)

Prerequisites: EOS 1100 - 1999 or EOS 2005 (same as ENVS 2221) or ENVS 1102 or ENVS 1104 or ENVS 1515.

Previous terms offered: Spring 2021.

ENVS 2251 (a) Marine Biogeochemistry

Every Spring. Enrollment limit: 15.

Oceanic cycles of carbon, oxygen, and nutrients play a key role in linking global climate change, marine primary productivity, and ocean acidification. Fundamental concepts of marine biogeochemistry used to assess potential consequences of future climate scenarios on chemical cycling in the ocean. Past climate transitions evaluated as potential analogs for future change using select case studies of published paleoceanographic proxy records derived from corals, ice cores, and deep-sea sediments. Weekly laboratory sections and student research projects focus on creating and interpreting new geochemical paleoclimate records from marine archives and predicting future impacts of climate change and ocean acidification on marine calcifiers. (Same as: EOS 2525)

Prerequisites: Two of: EOS 1100 - 1999 or either ENVS 1102 or ENVS 1104 or ENVS 1515 and EOS 2005 (same as ENVS 2221).

Previous terms offered: Spring 2022, Spring 2021.

ENVS 2253 (a, INS, MCSR) Atmospheric and Ocean Dynamics

Every Other Fall. Enrollment limit: 35.

A mathematically rigorous analysis of the motions of the atmosphere and oceans on a variety of spatial and temporal scales. Covers fluid dynamics in inertial and rotating reference frames, as well as global and local energy balance, applied to the coupled ocean-atmosphere system. (Same as: PHYS 2810, EOS 2810)

Prerequisites: PHYS 1140.

Previous terms offered: Fall 2023, Fall 2020.

ENVS 2255 (a, INS) Environmental Chemistry

Every Other Spring. Enrollment limit: 20.

Focuses on two key processes that influence human and wildlife exposure to potentially harmful substances, chemical speciation and transformation. Equilibrium principles as applied to acid-base, complexation, precipitation, and dissolution reactions are used to explore organic and inorganic compound speciation in natural and polluted waters; quantitative approaches are emphasized. Weekly laboratory sections are concerned with the detection and quantification of organic and inorganic compounds in air, water, and soils/sediments. (Same as: CHEM 2050, EOS 2325)

Prerequisites: CHEM 1092 or CHEM 1102 or CHEM 1109 or CHEM 2000 - 2969 or Placement in CHEM 2000 level or Placement in CHEM 2000/1109.

Previous terms offered: Spring 2024, Spring 2022.

ENVS 2266 (a, INS) Quaternary Environments: Reconstructing Landscapes Changed by Climate Shifts in Recent Geologic Past

Non-Standard Rotation. Enrollment limit: 35.

The past 2.6 million years of Earth's history, known as the Quaternary, is uniquely characterized by intense and frequent swings in global climate. The record of both 'Ice Ages' and interglacial warming in Earth's recent geologic past can be studied through many lenses of Earth science. In this course we will explore how sedimentology, geomorphology, and dating methods can be applied to reconstruct past environments associated with Quaternary climate shifts. Specific topics include Quaternary climate records and forcing mechanisms, basic glacial dynamics, isostasy and sea level changes, sediments, landforms, and dating methods. Students will complete a semester long project investigating the Quaternary record of a specific region of the world and will participate in several field trips exploring the Quaternary record of New England. (Same as: EOS 2330)

Prerequisites: EOS 1100 or higher.

Previous terms offered: Fall 2020.

ENVS 2270 (a) Geomorphology: Form and Process at the Earth's Surface

Every Other Fall. Enrollment limit: 35.

Earth's surface is marked by the interactions of the atmosphere, water and ice, biota, tectonics, and underlying rock and soil. Even familiar landscapes beget questions on how they formed, how they might change, and how they relate to patterns at both larger and smaller scales. Examines Earth's landscapes and the processes that shape them, with particular emphasis on rivers, hillslopes, and tectonic and climatic forcing. (Same as: EOS 2345)

Prerequisites: EOS 1105 or EOS 2005 (same as ENVS 2221).

Previous terms offered: Fall 2023, Fall 2022, Fall 2020.

ENVS 2282 (a, INS, MCSR) Ocean and Climate

Collin Roesler.

Every Other Year. Fall 2024. Enrollment limit: 18.

The ocean covers more than 70 percent of Earth's surface. It has a vast capacity to modulate variations in global heat and carbon dioxide, thereby regulating climate and ultimately life on Earth. Beginning with an investigation of paleo-climate records preserved in deep-sea sediment cores and in Antarctic and Greenland glacial ice cores, the patterns of natural climate variations are explored with the goal of understanding historic climate change observations. Predictions of polar glacial and sea ice, sea level, ocean temperatures, and ocean acidity investigated through readings and discussions of scientific literature. Weekly laboratory sessions devoted to field trips, laboratory experiments, and computer-based data analysis and modeling to provide hands-on experiences for understanding the time and space scales of processes governing oceans, climate, and ecosystems. Laboratory exercises form the basis for student research projects. Mathematics 1700 is recommended. (Same as: EOS 2585)

Prerequisites: Two of: either EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221) and MATH 1600 or Placement in MATH 1700 (M) or Placement in MATH 1750 (M) or Placement in MATH 1800 (M) or Placement in MATH 2020 or 2206 (M) or Placement in 2000, 2020, 2206 (M).

Previous terms offered: Fall 2022, Fall 2020.

ENVS 2284 (a) Ecology of Rivers

Every Other Fall. Enrollment limit: 12.

Explores the ecology of river systems. Rivers are linear features through watersheds and across the landscape where ecosystem influences are reflected, focused, and transported from hilltops to coastal estuaries, and sometimes back again. Considers the role of rivers as corridors connecting a wide range of ecosystems, as indicators of broader landscape ecology, and as ecosystems in their own right with particular focus on the interaction of geomorphology, hydrology, and biology in the development and function of these dynamic and essential ecosystems. (Same as: BIOL 2284)

Prerequisites: BIOL 2315 (same as ENVS 2224) or BIOL 2316 or BIOL 2319 (same as ENVS 2229) or BIOL 2325 (same as ENVS 2225) or BIOL 2330 (same as ENVS 2233).

Previous terms offered: Fall 2023, Fall 2021.

ENVS 2287 (a) Poles Apart: Exploration of Earth's High Latitudes

Every Other Year. Enrollment limit: 35.

The Arctic and Antarctic polar regions are largely dominated by ice, yet they are vastly different in terms of geography. The Arctic is an ocean largely surrounded by continents, while the Antarctic is a continent surrounded by ocean. Antarctica is dominated by ice caps, glaciers and ice shelves, surrounded by a seasonal band of sea ice. The Arctic Ocean is mostly covered year-round by sea ice with ice caps and glaciers found mainly in Greenland. These differences lead to profoundly contrasting impacts on global climate and ocean circulation. Tectonic evolution, ice dynamics, ocean circulation, and biology of these regions are compared and contrasted through lectures and readings and discussions of journal articles. Readings from twentieth century journals of polar exploration are used to provide students with first hand accounts of scientific discoveries and a "sense of place", that deep emotional connection people have toward a place. Fulfills the within-department elective in EOS. (Same as: EOS 2530)

Prerequisites: EOS 1105 or EOS 1305 (same as ENVS 1104) or EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221).

Previous terms offered: Fall 2021.

ENVS 2301 (b, MCSR) Building Resilient Communities

Eileen Sylvan Johnson.

Every Year. Spring 2025. Enrollment limit: 20.

Explores approaches by communities and regions to build resilience in the face of changing environmental and social conditions. Examines the ways communities establish policies and collaborate with state, federal, private and nonprofit sectors towards strengthening local economies, safeguarding environmental values, protecting public health, addressing issues of economic and social justice, and implementing mitigation and adaptation strategies. Provides students with firsthand understanding of how digital and computational technologies including Geographic Information Systems (GIS) are playing an increasingly important role in understanding and informing effective approaches for expanding resilience at a community level to inform policy decision. Students gain proficiency with GIS as part of the course. (Same as: DCS 2340, URBS 2301)

Previous terms offered: Spring 2024, Spring 2023, Fall 2020.

ENVS 2302 (b, MCSR) Environmental Economics and Policy

Non-Standard Rotation. Enrollment limit: 35.

An exploration of environmental degradation and public policy responses in industrial economies. Market failures, property rights, and materialistic values are investigated as causes of pollution and deteriorating ecosystem functions. Guidelines for equitable and cost-effective environmental policy are explored, with an emphasis on the roles and limitations of cost-benefit analysis and techniques for estimating non-monetary values. Three core themes are the transition from "command and control" to incentive-based policies; the evolution from piecemeal regulation to comprehensive "green plans" (as in the Netherlands); and the connections among air pollution, energy systems, and global warming. (Same as: ECON 2218)

Prerequisites: ECON 1050 or ECON 1101 or Placement in ECON 1102 or Placement in earned ECON 1101 or Placement in ECON 2000 Level.

Previous terms offered: Fall 2023, Spring 2021.

ENVS 2303 (b, MCSR) Natural Resource Economics and Policy

Non-Standard Rotation. Enrollment limit: 35.

A study of the economic issues surrounding the existence and use of renewable natural resources (e.g., forestry/land use, fisheries, water, ecosystems, and the effectiveness of antibiotics) and exhaustible resources (such as minerals, fossil fuels, and old growth forest). A basic framework is first developed for determining economically efficient use of resources over time, then extended to consider objectives other than efficiency, as well as the distinguishing biological, ecological, physical, political, and social attributes of each resource. Uncertainty, common property, and various regulatory instruments are discussed, as well as alternatives to government intervention and/or privatization. (Same as: ECON 2228)

Prerequisites: ECON 1050 or ECON 1101 or Placement in earned ECON 1101 or Placement in ECON 2000 Level.

Previous terms offered: Spring 2023, Spring 2022.

ENVS 2304 (b) Environmental Law and Policy

Every Other Fall. Enrollment limit: 35.

Critical examination of some of the most important American environmental laws and their application to environmental problems that affect the United States and the world. Students learn what the law currently requires and how it is administered by federal and state agencies, and are encouraged to examine the effectiveness of current law and consider alternative approaches. (Same as: GOV 2915)

Previous terms offered: Fall 2023, Fall 2021.

ENVS 2308 (b, IP) International Environmental Policy

Non-Standard Rotation. Enrollment limit: 35.

Examines the political, legal, and institutional dimension of international efforts to protect the environment. Problems discussed include transboundary and marine pollution, maintaining biodiversity, and global climate change. (Same as: GOV 2615)

Previous terms offered: Spring 2024, Spring 2021.

ENVS 2311 (b) Changing Cultures and Dynamic Environments

Susan Kaplan.

Non-Standard Rotation. Fall 2024. Enrollment limit: 35.

Over the last 20,000 years the Earth's environment has changed in both subtle and dramatic ways. Some changes are attributable to natural processes and variation, some have been triggered by human activities. Referring to anthropological and archaeological studies, and research on past and contemporary local, regional, and global environments, examines the complex and diverse relationship between cultures and the Earth's dynamic environment. A previous science course is recommended. (Same as: ANTH 2170)

Prerequisites: ANTH 1100 or ANTH 1101 or ANTH 1103.

Previous terms offered: Spring 2022.

ENVS 2312 (b, DPI, IP) Contemporary Arctic Environmental and Cultural Issues

Susan Kaplan.

Non-Standard Rotation. Spring 2025. Enrollment limit: 35.

Throughout the Arctic, northern peoples face major environmental changes and cultural and economic challenges. Landscapes, icescapes, and seascapes on which communities rely are being transformed, and arctic plants and animals are being affected. Many indigenous groups see these dramatic changes as endangering their health and cultural way of life. Others see a warming Arctic as an opportunity for industrial development. Addressing contemporary issues that concern northern peoples in general and Inuit in particular involves understanding connections between leadership, global environmental change, human rights, indigenous cultures, and foreign policies, and being able to work on both a global and local level. (Same as: ANTH 2572)

Prerequisites: Two of: either ANTH 1100 or ANTH 1101 or ANTH 1103 and BIOL 1000 - 2969 or EOS 1000 - 2969 or ENVS 1000 - 2969 or CHEM 1000 - 2969 or PHYS 1000 - 2969.

Previous terms offered: Fall 2023, Fall 2021.

ENVS 2313 (b, IP) Food, Environment, and Development

Non-Standard Rotation. Enrollment limit: 35.

Explores the nexus of food, environment, and development in global environmental politics. Examines the interconnected challenges of governing across trans-boundary socio-ecological systems amidst competing demands on scarce natural resources—to sustain a global food system, foster economic development, and promote equity and justice. Prepares students to engage with interdisciplinary scholarship from political science, international development, public policy, and food studies. Draws on comparative cases from local to global scales, with an emphasis on Maine, the U.S., and Latin America. (Same as: GOV 2492, LACL 2513)

Prerequisites: ENVS 1101 or ENVS 2330 (same as GOV 2910).

Previous terms offered: Spring 2021.

ENVS 2314 (b) Talking to Farmers and Fishermen: Social Science Field Methods for Environmental Policy Research

Shana Starobin.

Every Fall. Spring 2025. Enrollment limit: 12.

Natural resource users—like farmers and fishermen—possess intimate knowledge of the complex socioecological systems where they live and work. How can researchers appropriately and ethically engage individual and community stakeholders as participants in environmental research? Through assignments, activities, and class excursions (lab), students will gain competence in collaborative field research skills, including the ethical conduct of research with human subjects, participant observation, conducting interviews and focus groups, writing up field notes, developing metadata, and establishing protocols for data management. Students will also practice preliminary data analysis—transcription and text analysis of field collected data, descriptive statistics, and identification of future research questions. (Same as: GOV 2902)

Prerequisites: ENVS 2330 (same as GOV 2910) or ENVS 2313 (same as GOV 2482 and LAS 2513).

Previous terms offered: Spring 2023, Spring 2021.

ENVS 2321 Troubled Waters: Fishing in the Gulf of Maine

Anne Hayden.

Non-Standard Rotation. Spring 2025. Enrollment limit: 16.

Around the world and in the Gulf of Maine, overfishing, threats to habitat, and climate change are putting marine ecosystems and coastal communities under great stress. Interdisciplinary seminar draws on oceanography, ecology, history, economics, anthropology, and political science to explore the causes and scope of pressures on the marine environment; the potential for restoring ecosystems, fisheries, and coastal economies; political conflicts over fisheries and related issues; federal, state, and community-based approaches to managing marine ecosystems; and strategies for coping with scientific and management uncertainties.

Prerequisites: ENVS 1101.

Previous terms offered: Spring 2023, Spring 2021.

ENVS 2330 (b, IP) Environmental Policy and Politics

Shana Starobin.

Every Fall. Spring 2025. Enrollment limit: 35.

Explores the political, economic, legal, ethical, and institutional dimensions of the environmental policy-making process. Examines the formation and implementation of regulatory institutions and policies across a range of issues in the U.S. and internationally—including terrestrial, coastal and marine natural resources management, biodiversity, water and air pollution, sustainable development, and environmental justice. Prepares students to analyze historical cases as well as contrive and evaluate competing policy alternatives to emerging problems. (Same as: GOV 2910)

Prerequisites: ENVS 1101.

Previous terms offered: Spring 2023, Spring 2022, Fall 2020.

ENVS 2331 (b, MCSR) The Nature of Data: Introduction to Environmental Analysis

Every Spring. Enrollment limit: 20.

Examines emerging digital techniques in environmental management and analysis within government, academic, and media sectors. Provides an overview of social science methods including analysis of qualitative data, text analysis, spatial analysis, survey design and analysis, and social network analysis. Topics include collaborative resource management, leveraging the power of social networks, spatial analysis, social-ecological system management, the role of volunteered information and citizen science, and expanding capacities for adaptation and resilience. Labs as part of class time provide students exposure to standard software programs used in social science research, including NVivo, ArcGIS, and Gephi and introduce the basics of R as a programming language for text analysis, and spatial analysis. (Same as: DCS 2331)

Previous terms offered: Fall 2023, Fall 2020.

ENVS 2332 (b) Introduction to Human Population

Non-Standard Rotation. Enrollment limit: 35.

Focuses on the processes of population change—fertility/reproduction, mortality/death, and migration—with attention to the causes of and consequences of those changes. Also examines the politics around population change, discourse, and policies, and the ways those have been connected to global inequality, gender inequalities, and race and ethnicity. (Same as: SOC 2222, GSWS 2224)

Prerequisites: SOC 1101 or GSWS 1000 - 2969 or GSWS 3000 or higher.

Previous terms offered: Fall 2020.

ENVS 2333 (a, INS, MCSR) Benthic Ecology

Christopher Wells.

Every Fall. Fall 2024. Enrollment limit: 15.

The principles of ecology, emphasizing the hard- and soft-bottom communities of Casco Bay and Harpswell Sound. Field trips and field exercises demonstrate the quantitative principles of marine ecological research, including good practices in sampling designs and field experiments. A class field project designs and implements a long-term study, based at the Bowdoin Marine Laboratory, to monitor and detect changes in community structure driven by climate change in the twenty-first century. Assumes a basic knowledge of biological statistics. Taught in residence at the Schiller Coastal Studies Center as part of the BCSS, Bowdoin Coastal Studies Semester program. (Same as: BIOL 2333)

Prerequisites: Two of: either BIOL 1102 or BIOL 1109 or Placement in BIOL 2000 level or either CHEM 1102 or CHEM 1109 or Placement in CHEM 2000 level or either EOS 1305 (same as ENVS 1104) or EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221) or PHYS 1140 and MATH 1000 or higher.

Previous terms offered: Fall 2023, Fall 2022.

ENVS 2340 (b, IP) Global Political Ecology

Tulio Zille.

Non-Standard Rotation. Spring 2025. Enrollment limit: 35.

In light of the ecological crisis exacerbated by climate change, scholars in the humanities and social sciences have become increasingly preoccupied with the relationship between humans and nature, in a field of study loosely termed “political ecology.” Central to this field are critiques of the separation between humans and nature in modernity and how we should understand this relationship. This course expands the current debates in this field beyond the intellectual circles of Europe and North America—which have focused on science and technology studies and new materialisms—to consider contributions that have remained marginal (for example, indigenous political thought and decolonial theory). The course will include authors from various disciplines ranging from indigenous intellectuals and activists to academics, with a focus on the Global South, including the work of Chilean filmmaker Patricio Guzmán, Maori scholar Linda Tuhiwai Smith, Indian activist Vandana Shiva, and Martinican writer Édouard Glissant. (Same as: GOV 2470, LACL 2540)

Previous terms offered: Spring 2024, Spring 2023, Spring 2021.

ENVS 2356 (b, IP) Ecological Crisis and Reparation: Arts of Living on a Damaged Planet

Every Other Year. Enrollment limit: 35.

Human beings confront a paradox as we become aware of anthropogenic climate change. On the one hand, we are geological agents powerful enough to irreparably transform life on earth. On the other, we face collective despair and powerlessness in our attempts to avert certain ecological collapse. This course draws on contemporary anthropology and other approaches in the social sciences and humanities to explore how cultivating diverse ‘arts of living’ addresses this double-bind. Dominant environmental paradigms that emphasize ‘natural conservation’ are examined in relation to the re-emergence of patriarchy, racism, xenophobia, and class conflict in various socio-cultural contexts. Through course readings, activities, and assignments students re-imagine ecology from the starting point of repair rather than conservation in order to develop a more conducive ethics of life on an already damaged planet. (Same as: ANTH 2256)

Prerequisites: ANTH 1100 or ANTH 1101 or ANTH 1103 or SOC 1101.

Previous terms offered: Spring 2023, Spring 2022, Fall 2020.

ENVS 2360 (b, DPI) Race, Land, and Settler (Racial) Capitalism: Ongoing Topics in (Dis)/(Re)Possession

Allison Guess.

Every Spring. Spring 2025. Enrollment limit: 35.

An introduction to ongoing topics in colonialism, racial thinking, environmental studies, global, and Caribbean studies. Examines how race, gender, and class operate under racial capitalism and settler colonialism. Readings will center on the works of critical geographers, Caribbeanists, and scholars of the African diaspora (including Latin America), among other critical, anti-capitalist, decolonial, and environmentalist scholars. Reading in this course will take up the question(s) of land and land-making and race, racialization, and racial thinking alongside questions of space and place, as they all relate to the various processes, projects, and methods of (dis)/(re)possession. Weekly in-class discussions will be combined with guest lectures to provide the opportunity for exploring how race, space, and (dis)(re)possession can be understood geographically, and to also explain how a range of these territorializing processes operate. Sample topics include the following: indigeneity and Blackness, dispossession and accumulation, and environmental imperialism, war, and colonial resistance. (Same as: AFRS 2350, LACL 2860)

ENVS 2375 (a, INS) Physical Hydrology

Jabari Jones.

Non-Standard Rotation. Spring 2025. Enrollment limit: 18.

Water is an incredible molecule that sustains life, carves landscapes, and transfers nutrients as it cycles through the earth system. The science of hydrology investigates the distribution and movement of water through earth spheres. This course builds an intuitive and quantitative understanding of hydrologic processes, with a focus on the terrestrial sphere. Utilizes publicly available data, field measurements, and numerical models to monitor and predict water movement. Discusses the role of humans in the hydrologic cycle through agriculture, dams, diversions, and land use change. (Same as: EOS 2375)

Prerequisites: EOS 1105 or EOS 1305 (same as ENVS 1104) or EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221).

Previous terms offered: Spring 2023.

ENVS 2377 (b, DPI, IP) Arctic Politics

Laura Henry.

Non-Standard Rotation. Fall 2024. Enrollment limit: 35.

The Arctic looms in our political imagination as the region most directly affected by a changing global climate that threatens the displacement of northern communities and cultures. It is also a site of fierce competition for state control and economic development. This course investigates the Arctic as a political space that encapsulates elements of comparative politics and international relations. It examines cross-national variation in policies toward Arctic regions in states such as the United States, Canada, Russia, Iceland, and Norway. It also explores dynamic international engagement around the Arctic by state officials, corporations, indigenous communities, and activists. The course will address governance issues such as indigenous rights, economic development and natural resource exploitation, environmental issues and climate change, the potential militarization of the region, international law, and the role of the Arctic Council. (Same as: GOV 2577, RUS 2577)

Previous terms offered: Spring 2023, Spring 2021.

ENVS 2385 (c, DPI, MCSR) Environmental Justice and Earth Surface Processes

Every Other Year. Enrollment limit: 18.

The environmental justice movement has a rich history, but earth scientists often lack the analytical framework needed to address issues of environmental injustice. This course takes a data-driven approach to questions of environmental justice, with a focus on the interplay of Earth surface processes and societal inequity. Topics may include flood hazards, shoreline management and access, water quality, storage of toxic substances, and global climate risk. Includes discussion of contemporary and foundational environmental justice literature, lab exercises using geographic and statistical techniques, and a final project on questions of interest. (Same as: EOS 2385)

Prerequisites: EOS 1105 or EOS 1505 (same as ENVS 1102) or ENVS 2201 (same as BIOL 1158 and CHEM 1105).

Previous terms offered: Spring 2024.

ENVS 2403 (c, DPI) Environment and Culture in North American History

Matthew Klinge.

Every Spring. Fall 2024. Enrollment limit: 35.

Explores relationships between ideas of nature, human transformations of the environment, and the effect of the physical environment upon humans through time in North America. Topics include the "Columbian exchange" and colonialism; links between ecological change and race, class, and gender relations; the role of science and technology; literary and artistic perspectives of "nature"; agriculture, industrialization, and urbanization; and the rise of modern environmentalism. Note: This course is part of the following field(s) of study: United States. (Same as: HIST 2182)

Prerequisites: ENVS 1101.

Previous terms offered: Fall 2023, Fall 2022, Fall 2021, Spring 2021.

ENVS 2416 (c) California Dreamin': A History of the Golden State

Non-Standard Rotation. Enrollment limit: 16.

Seminar. Sunshine, beaches, shopping malls, and movie stars are the popular stereotypes of California, but social conflicts and environmental degradation have long tarnished the state's golden image. Unravels the myth of the California dream by examining the state's social and environmental history from the end of Mexican rule and the discovery of gold in 1848 to the early twenty-first century. Major topics include immigration and racial violence; radical and conservative politics; extractive and high-tech industries; environmental disasters; urban, suburban, and rural divides; and California in American popular culture. This course is part of the following field(s) of study: United States. (Same as: HIST 2640)

Previous terms offered: Spring 2022.

ENVS 2420 (c) Climate Change: The Making of a Global Threat

Non-Standard Rotation. Enrollment limit: 35.

Examines the intertwined scientific, political, and social histories of climate change. It traces the increasing use of fossil fuels since the late eighteenth century, paying attention to the way that producing and consuming energy has transformed human societies and their physical environments. The course explores these changes in both their global manifestations and their local effects, centering the stories of people who lived through the energy transitions of the past two centuries—for better or worse. It also chronicles the surprisingly long history of the scientific quest to understand and document our changing climate. (Same as: HIST 2202)

Previous terms offered: Spring 2024.

ENVS 2422 (c, IP) Climate Fiction

Non-Standard Rotation. Enrollment limit: 35.

Climate Fiction investigates the possibilities and limits of storytelling in the era of global climate change, explores humanity's impact on Earth by conceiving human and nonhuman communities after sea-level rise, desertification, or biodiversity loss; and by imagining the evolution of new species or social forms in response to environmental disaster and loss of resources. Situates novels, short stories, poetry, and film within the environmental humanities, combines scientific-cultural discourses about the environment with social concerns, and assesses how humanistic methodologies can complement scientific debates. Examines rhetoric, narrative conventions, and genres, asks how climate fiction narrates impending disaster on a global scale, and analyzes imaginations of alternative futures, ideas of environmentalism, and conceptions of social equality. Puts German, Austrian, and Swiss cultural productions in dialogue with Anglo-American ideas. All readings in English. (Same as: GER 2255)

Previous terms offered: Fall 2022.

ENVS 2427 (c, IP) City and Landscape in Modern Europe: London, Paris, Vienna, Berlin

Jill Pearlman.

Non-Standard Rotation. Fall 2024. Enrollment limit: 35.

Examines the changing nature of the urban built environment in four major European cities from the mid-nineteenth century to the present. Course considers a wide range of factors that have contributed to shaping the cities' spaces and forms, among them: politics, money, war, environmental degradation, spatial inequities, industrialization, immigration, public health, heritage, tourism, and gentrification. Explores the changing role these capital cities have played on the world stage while also exploring everyday life at street level, housing from slum life to mansion, urban infrastructure, and the impact of grand schemes of urban planning and design. This course satisfies the non-US requirement for the urban studies minor. (Same as: HIST 2005, URBS 2427)

Previous terms offered: Spring 2022.

ENVS 2431 (c, VPA) Modern Architecture: 1750 to 2000

Non-Standard Rotation. Enrollment limit: 35.

Examines major buildings, architects, architectural theories, and debates during the modern period, with a strong emphasis on Europe through 1900, and both the United States and Europe in the twentieth century. Central issues of concern include architecture as an important carrier of historical, social, and political meaning; changing ideas of history and progress in built form; and the varied architectural responses to industrialization. Attempts to develop students' visual acuity and ability to interpret architectural form while exploring these and other issues. (Same as: ARTH 2430, URBS 2431)

Previous terms offered: Fall 2023, Fall 2021.

ENVS 2432 (c) History of the American West

Non-Standard Rotation. Enrollment limit: 35.

Survey of what came to be called the Western United States from the nineteenth century to the present. Topics include Euro-American relations with Native Americans; the expansion and growth of the federal government into the West; the exploitation of natural resources; the creation of borders and national identities; race, class, and gender relations; the influence of immigration and emigration; violence and criminality; cities and suburbs; and the enduring persistence of Western myths in American culture. Students write several papers and engage in weekly discussion based upon primary and secondary documents, art, literature, and film. This course is part of the following field(s) of study: United States. (Same as: HIST 2160)

Previous terms offered: Spring 2021.

ENVS 2433 (c) Art, Science, and the Environment

Non-Standard Rotation. Enrollment limit: 18.

Guided independent studio practice. Explore crosspollination between art, science, and the environment through hands-on projects while also gaining exposure to a diverse range of contemporary artworks and interdisciplinary projects. Early assignments guide students through considerations for form, process, and meaning, followed by an emphasis on self-directed projects. (Same as: VART 3501)

Prerequisites: Two of: VART 1100 - 2969 and VART 1100 - 2969.

Previous terms offered: Fall 2023.

ENVS 2444 (c) City, Anti-City, and Utopia: Building Urban America

Non-Standard Rotation. Enrollment limit: 35.

Explores the evolution of the American city from the beginning of industrialization to the present age of mass communications. Focuses on the underlying explanations for the American city's physical form by examining cultural values, technological advancement, aesthetic theories, and social structure. Major figures, places, and schemes in the areas of urban design and architecture, social criticism, and reform are considered. Semester-long research paper required. Note: This course is part of the following field(s) of study: United States. (Same as: HIST 2006, URBS 2444)

Previous terms offered: Fall 2023, Spring 2021.

ENVS 2445 (c, VPA) The Nature and Urbanism of Frank Lloyd Wright
Jill Pearlman.

Non-Standard Rotation. Spring 2025. Enrollment limit: 35.

This course offers an in-depth investigation of the architecture and urbanism of North America's most celebrated architect, with emphasis on the major themes of his work—particularly the complex relationship between Wright's buildings, urban schemes, and nature. We will examine key projects for a diverse range of environments and regions while also placing Wright and his works into larger historical and architectural contexts. Throughout the course we will engage in a critical analysis of the rich historical literature that Wright has evoked in recent years. (Same as: URBS 2445)

Previous terms offered: Fall 2022, Fall 2020.

ENVS 2447 (c) Maine: A Community and Environmental History
Every Other Year. Enrollment limit: 16.

Seminar. Examines the evolution of various Maine social and ecological communities – inland, hill country, and coastal. Begins with the contact of European and Native American cultures, examines the transfer of English and European agricultural traditions in the seventeenth and eighteenth centuries, and explores the development of diverse geographic, economic, ethnic, and cultural communities during the nineteenth and into the early twentieth centuries. Note: This course is part of the following field(s) of study: United States. (Same as: HIST 2607)

Previous terms offered: Spring 2021.

ENVS 2459 (c) The Ethics of Climate Change

Britta Clark.

Non-Standard Rotation. Spring 2025. Enrollment limit: 35.

Examines moral questions raised by climate change including: What would constitute a just allocation of burdens? What do we collectively owe to future generations? If collective action fails, what are our obligations as individuals? When, if at all, is civil disobedience justified? Readings drawn primarily from contemporary philosophy. (Same as: PHIL 2359)

ENVS 2475 (c, IP, VPA) Ecocinema: China's Ecological and Environmental Crisis

Every Other Spring. Enrollment limit: 35.

Examines how China's economic development has caused massive destruction to the natural world and how environmental degradation affects the lives of ordinary people. An ecological and environmental catastrophe unfolds through the camera lens in feature films and documentaries. Central topics include the interactions between urbanization and migration, humans and animals, eco-aesthetics and manufactured landscapes, local communities and globalization. Considers how cinema, as mass media and visual medium, provides ecocritical perspectives that influence ways of seeing the built environment. The connections between cinema and environmental studies enable students to explore across disciplinary as well as national boundaries. Note: Fulfills the non-US cinema requirement and the film theory requirement for cinema studies minors. (Same as: ASNS 2075, CINE 2075)

Previous terms offered: Fall 2021.

ENVS 2481 (a, INS) Forest Ecology and Conservation

Vladimir Douhovnikoff.

Every Other Fall. Fall 2024. Enrollment limit: 15.

An examination of how forest ecology and the principles of silviculture inform forest ecosystem restoration and conservation. Explores ecological dynamics of forest ecosystems, the science of managing forests for tree growth and other goals, natural history and historic use of forest resources, and the state of forests today, as well as challenges and opportunities in forest restoration and conservation. Consists of lecture, discussions, field trips, and guest seminars by professionals working in the field. (Same as: BIOL 2481)

Prerequisites: BIOL 1102 or BIOL 1109 or ENVS 1000 - 2969 or ENVS 3000 or higher.

ENVS 2491 (c, IP) East Asian Environmental History, 1600-2000

Sakura Christmas.

Every Other Spring. Spring 2025. Enrollment limit: 16.

Seminar. The Anthropocene defines an epoch in which humans have become the dominant force in shaping their environment. Examines the role of East Asia in the emergence of this new era, from the seventeenth century to the present. In debating the narrative of ecological change in China, Japan, and Korea, readings and discussions focus on how successive regimes transformed their environments, and conversely, how those environments also structured modern human society. Questions what specific political, social, and economic changes triggered the Anthropocene in East Asia; how cultural, religious, and intellectual constructs have conditioned its arrival and acceleration. Weekly topics include: commodity frontiers, environmental sustainability, public health, industrial pollution, and nuclear technology. Note: This course is part of the following History field(s) of study: East Asia. It fulfills the non euro/us requirement for history majors and minors. (Same as: HIST 2891, ASNS 2890)

Previous terms offered: Spring 2024, Fall 2022, Fall 2020.

ENVS 2504 (c) Animals in American History

Every Other Year. Enrollment limit: 16.

Seminar. Although modern humans tend to think of themselves as above nature, they are in fact part of it: partners in a myriad of relationships that have tied them to other members of the animal kingdom throughout their history. Examines a number of these relationships, focusing on North America from the sixteenth through the twentieth century. Topics considered include the role of animals in the development of the American economy, how domestic and wild animals have shaped the American environment, how Americans have conceived of the boundary between humanity and animality, and how pets have come to be viewed as part of the modern family. Note: This course is part of the following field(s) of study: United States. (Same as: HIST 2504)

Previous terms offered: Spring 2022.

ENVS 2548 (c) Wild Things: Gender, Sexuality, and Wilderness

Non-Standard Rotation. Enrollment limit: 35.

Examines how ideas of wildness and wilderness have been used to generate different gender and sexual identities and politics through literature and other cultural forms in the United States. Considers wilderness and wildness in relation to rugged individualism; transgressive sexualities; representations of health, disease, and disability; the extension of and resistance to state control of the body; and the intersections of gender, sexuality, race, and class. Students will learn how the idea of wilderness has been associated with and adopted by different bodies and identities over time, from the early European colonists' first encounter with Indigenous peoples and the American continent to the twenty-first century, which scientists have characterized as the era of the sixth mass extinction. Readings include canonical works of wilderness writing and lesser-known texts, including queer pastorals, feminist travelogues, and HIV/AIDS memoirs. (Same as: ENGL 2548, GSWS 2548)

Previous terms offered: Fall 2023.

ENVS 2804 (c) Maine Writers and the Environment

Non-Standard Rotation. Enrollment limit: 12.

Explores the wild and diverse literary territories of the state of Maine – past and present – with a focus on coastal narratives and environmental writing. Considers Maine's multi-ethnic folkways, its austere modernisms, remorseless gothic landscapes, natural splendors and antagonisms, coastal rhapsodies and adversities, and contemporary environmental imperatives. Includes poetry, short stories, novels, memoirs, personal narratives, children's literature, nature writing, and environmental advocacy by such writers as Thoreau, Jewett, Robinson, Millay, Beston, Carson, McCloskey, King, Russo, Strout, and Bryan. Taught in residence at the Bowdoin College Schiller Coastal Studies Center. English 2804/ Environmental Studies 2804 is a course-module in the Bowdoin Marine Science Semester. Biology 2232 (same as Environmental Studies 2232), Biology 2330 (same as Environmental Studies 2233), and Biology 2501 (same as Environmental Studies 2231) are co-requisites of this course. (Same as: ENGL 2804)

Previous terms offered: Fall 2022.

ENVS 2806 (c) The American Shore Ode

Anthony Walton.

Non-Standard Rotation. Fall 2024. Enrollment limit: 16.

We will read and discuss a series of poems that concern themselves with the American shore and coastline. Examples are Whitman's "Out of the Cradle Endlessly Rocking," Ammon's "Corson's Inlet," Steven's "Idea of Order at Key West," Eliot's "Dry Salvages," Crane's "Voyages," Bishop's "At the Fishhouses," Clampitt's "Beach Glass," and several more. We will also read, to begin, Rachel Carson's "The Edge of the Sea." According to American critic Paul Fussell, "This kind of poem does more than simply engage in transcendental meditations about the sea: the important thing is this dissimilarity between shore and sea, sand and water, separateness and cohesiveness, analysis and synthesis—a dissimilarity which explains and justifies their paradoxical marriage." Students will write critical papers and reflections, and will also have an opportunity to compose their own shore ode(s). (Same as: ENGL 2806)

Previous terms offered: Fall 2023.

ENVS 3070 (a) Geoscience for the Common Good

Michele LaVigne.

Non-Standard Rotation. Spring 2025. Enrollment limit: 16.

Human society is inextricably linked with the geosciences. From critical minerals and water resources to earthquake and climate hazards, every sphere of the Earth system plays a role in the health, economy, and security of our global community. Explores how geoscientists can apply skills and expertise to benefit society through public engagement. Students draw from local community partner conversations, media, geoscience legislation, and prior EOS course knowledge to identify connections between societal issues and Earth system science. Students research societally relevant topics spanning multiple spheres of the Earth system and practice non-partisan communication and science policy engagement through improvisational scenarios. Students synthesize geoscience literature or data for non-scientific audiences in a portfolio of public-facing communication products, such as expert witness testimonies, op-eds, policymaker meetings and memos, and broader impact statements for grants. (Same as: EOS 3070)

Prerequisites: Four of: EOS 2005 (same as ENVS 2221) and either EOS 2105 or EOS 2115 or EOS 2125 or EOS 2145 or EOS 2155 or EOS 2165 or EOS 2225 and either EOS 2335 or EOS 2345 (same as ENVS 2270) or EOS 2365 or EOS 2375 (same as ENVS 2375) or EOS 2385 (same as ENVS 2385) and EOS 2515 or EOS 2525 (same as ENVS 2251) or EOS 2565 or EOS 2585 (same as ENVS 2282) or EOS 2625 or either EOS 2685.

Previous terms offered: Spring 2024.

ENVS 3270 (c, VPA) Ecologies and Methods of Instrument Making

Frank Mauceri; Aruna Kharod.

Non-Standard Rotation. Spring 2025. Enrollment limit: 16.

Instrument-making traditions and industries shape and sustain musical practices across cultures, creating sounding bodies from components of natural environments and collaborations between suppliers, artisans, and musicians. This course examines histories of artisanship, labor, and ecology that sustain musical worlds with a focus on the interdisciplinary work of instrument making. Readings include political policies and white papers discussing resource governance, scientific papers on material qualities and sound, and scholarly research on histories and theories of labor, craft, and governance that shape the value and acoustics of instruments. Class members will construct an instrument throughout the course, engaging in workshops and processes that center embodied knowledges and understandings as a core element of the course. Students will be invited to draw on their disciplinary, musical, and making backgrounds to enrich interdisciplinary conversations and in the instrument-making process. (Same as: MUS 3270)

ENVS 3280 (a, INS) Plant Responses to the Environment

Non-Standard Rotation. Enrollment limit: 16.

Plants can be found growing under remarkably stressful conditions. Even your own backyard poses challenges to plant growth and reproduction. Survival is possible only because of a diverse suite of elegant physiological and morphological adaptations. The physiological ecology of plants from extreme habitats (e.g., tundra, desert, hypersaline) is discussed, along with the responses of plants to environmental factors such as light and temperature. Readings from the primary literature facilitate class discussion. Excursions into the field and laboratory exercises complement class material. (Same as: BIOL 3280)

Prerequisites: BIOL 2210 (same as ENVS 2223) or BIOL 2325 (same as ENVS 2225).

Previous terms offered: Fall 2023.

ENVS 3308 (a, INS) Research in Ecology, Evolution, and Marine Biology

Patricia Jones.

Every Spring. Spring 2025. Enrollment limit: 16.

Focuses on research methods in field biology, reading the primary literature, and training in scientific writing and presentation, careers in ecology, and next steps to pursuing those careers. Prepares students for productive future research experiences in areas of ecology, marine biology, animal behavior, and evolution. Students will focus on a research topic of their interest, for which they will read the primary literature, design experiments, produce a draft of a scientific paper, deepen their understanding of statistics and present their proposed research. Includes field excursions to marine and terrestrial environments. (Same as: BIOL 3308)

Prerequisites: Two of: either BIOL 1102 or BIOL 1109 and either BIOL 2315 (same as ENVS 2224) or BIOL 2316 or BIOL 2319 (same as ENVS 2229) or BIOL 2325 (same as ENVS 2225) or BIOL 2330 (same as ENVS 2233) or BIOL 2210 (same as ENVS 2223) or BIOL 2327 (same as ENVS 2227).

Previous terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

ENVS 3320 (a) Natural History of Maine

Patricia Jones; Janet Gannon.

Every Other Fall. Fall 2024. Enrollment limit: 16.

Explores Maine's natural history (i.e., the species present in the state of Maine and their interactions) from an evolutionary perspective based on research studies. Classroom time focuses on discussion of peer-reviewed journal articles that examine the evolutionary ecology of local species to understand how they interact, their evolutionary relationships, and observational and experimental methods to study them. In the laboratory section students experience the ecosystems in the state of Maine and learn to identify and observe the ecology of the common local species within plants, animals, and fungi in order to understand evolutionary relationships through identification of common traits. Students will practice writing for both scientific and general audiences. (Same as: BIOL 3320)

Prerequisites: BIOL 2112 or BIOL 2118 or BIOL 2124 (same as BIOC 2124) or BIOL 2135 (same as NEUR 2135) or BIOL 2175 or BIOL 2210 (same as ENVS 2223) or BIOL 2214 (same as NEUR 2214) or BIOL 2316 or BIOL 2319 (same as ENVS 2229) or BIOL 2327 (same as ENVS 2227).

ENVS 3381 (c, IP) Nature, Wilderness, and Animal Rights in German Literature and Politics

Rebecca Jordan.

Non-Standard Rotation. Fall 2024. Enrollment limit: 15.

Examines the study and practice of literature and history as a tool to understand environmentalism and environmental politics in Germany and its relationship to other environmentalisms abroad. Considers concepts such as nature, wilderness, the country, and ecology and how they are represented in literature and the media to inform emerging global environmental discussions. Themes include: the relationship between environmental experiences and literary representation, concepts of the wilderness, the role of literature in environmental movements, science fiction, and animal rights. This course utilizes both fictional and nonfictional resources, as well as archival research and use of a broad range of technologies to promote environmental knowledge. Taught in German. (Same as: GER 3381)

Prerequisites: GER 2204 - 2969 or GER 3000 or higher or Placement in GER 3000 level.

ENVS 3902 (a) Earth Climate History

Trang Nguyen.

Every Spring. Spring 2025. Enrollment limit: 16.

The modern world is experiencing rapid climate warming and some parts extreme drought, which will have dramatic impacts on ecosystems and human societies. How do contemporary warming and aridity compare to past changes in climate over the last billion years? Are modern changes human-caused or part of the natural variability in the climate system? What effects did past changes have on global ecosystems and human societies? Students use environmental records from rocks, soils, ocean cores, ice cores, lake cores, fossil plants, and tree rings to assemble proxies of past changes in climate, atmospheric CO₂, and disturbance to examine several issues: long-term carbon cycling and climate, major extinction events, the rise of C₄ photosynthesis and the evolution of grazing mammals, orbital forcing and glacial cycles, glacial refugia and post-glacial species migrations, climate change and the rise and collapse of human civilizations, climate/overkill hypothesis of Pleistocene megafauna, climate variability, drought cycles, climate change impacts on disturbances (fire and hurricanes), and determining natural variability versus human-caused climate change. (Same as: EOS 3020)

Prerequisites: EOS 2005 (same as ENVS 2221).

Previous terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

ENVS 3904 (a) Catalysis in Sustainable Chemical Processes

Brandon Tate.

Non-Standard Rotation. Spring 2025. Enrollment limit: 16.

Catalysis is a versatile tool in the development of sustainable chemical processes and renewable alternatives to fossil fuels and petrochemicals. The introduction of catalysis to an industrial chemical process provides opportunities for improved energy efficiency, reduced waste, conservation of scarce natural resources, lower costs, and greater selectivity, potentially facilitating chemical transformations that are otherwise inaccessible. This course covers essential concepts in transition state theory and chemical kinetics and the application of catalysis to outstanding problems in global chemical sustainability. Approaches to the design, characterization, and optimization of inorganic, organic, and biological catalysts are discussed in the context of applications including chemical energy storage, carbon capture and utilization, biomass conversion, sustainable plastics and polymers, and environmental remediation. (Same as: CHEM 3055)

Prerequisites: CHEM 2250.

Previous terms offered: Fall 2022.

ENVS 3905 (a, INS) Environmental Fate of Organic Chemicals

Non-Standard Rotation. Enrollment limit: 16.

More than 100,000 synthetic chemicals are currently in daily use. In order to determine the risk posed to humans and ecosystems, the extent and routes of chemical exposure must be understood and anticipated. Addresses the fate of organic chemicals following their intentional or unintentional release into the environment. Why do these chemicals either persist or break down, and how are they distributed between surface water, ground water, soil, sediments, biota, and air? Analysis of chemical structure used to gain insight into molecular interactions that determine the various chemical transfer and transformation processes, while emphasizing the quantitative description of these processes. (Same as: CHEM 3050)

Prerequisites: CHEM 2250.

Previous terms offered: Fall 2020.

ENVS 3908 (b, IP) Private Actors, Public Goods: Corporate Social Responsibility (CSR) in Comparative Perspective

Shana Starobin.

Every Year. Fall 2024. Enrollment limit: 16.

From fair trade chocolate to Kimberly Process certified diamonds, voluntary sustainability initiatives increasingly "govern" complex trans-border trade – to minimize environmental damages and human rights abuses exacerbated by globalization, especially when states prove incapable or unwilling to do so. Intensive in reading, research, and discussion, adopts a commodity-centered lens to examine transnational trade in comparative perspective. Students explore how global value chains – like "fast fashion" from Bangladesh and cell phones from China – defy conventional notions of political, geographic, and ecological boundaries and prompt a shift from "government" to "governance." (Same as: GOV 3430)

Prerequisites: Two of: ENVS 1101 and either ENVS 2302 or ENVS 2304 (same as GOV 2915) or ENVS 2330 (same as GOV 2910) or ENVS 2403 (same as HIST 2182) or GOV 2300 - 2599.

Previous terms offered: Fall 2023, Fall 2020.

ENVS 3911 (b) Communicating Climate Change

Ayana Johnson.

Non-Standard Rotation. Spring 2025. Enrollment limit: 16.

How, as the climate crisis accelerates, can we help people understand the risks and solutions and welcome them into shaping the future? How do we not only inform, but de-jargonize, engage, and entertain? Addressing climate change is not only a technical challenge, but a political and cultural one—and fundamental to it all is communication. From hope to fear, from facts to jokes, how do we talk about a crisis when we are in the middle of it and the stakes are so high? In this course, students will grapple with these questions, and learn to analyze and create key forms of effective climate communication, including op-eds and memes, TED talks, and TikToks. We can't do anything real about climate, we can't build a big enough team, we can't mobilize at the needed speed and scale, unless we face this existential challenge head on—collectively and with clarity—grounded in science and focused on solutions.

Prerequisites: ENVS 1090 or ENVS 1101 or ENVS 2201 (same as BIOL 1158 and CHEM 1105) or EOS 1020 or EOS 1105 or EOS 1505 (same as ENVS 1102) or EOS 2005 (same as ENVS 2221).

Previous terms offered: Spring 2024.

ENVS 3914 (a, MCSR) Applied GIS & Remote Sensing

Eileen Sylvan Johnson.

Non-Standard Rotation. Spring 2025. Enrollment limit: 16.

Provides students with advanced experience in geographic information systems (GIS) and remote sensing in environmental studies, with a focus on environmental study applications. Students will develop and pursue a semester project in spatial analysis in an area of their choosing, with an option to pursue a community-based project. Topics include research design, field collection, data creation and processing, analysis, and visualization. The course examines the ways that GIS and remote sensing are increasingly used at different scales from the local (e.g., parcel level) to global (e.g., international level) and examines the equity dimensions of spatial analysis. This course is intended for students with prior experience working with geographic information systems and/or conducting spatial analysis. (Same as: DCS 3214)

Prerequisites: ENVS 2004 (same as DCS 2335 and URBS 2004) or ENVS 2301 (same as DCS 2340 and URBS 2301) or ENVS 2331 (same as DCS 2331) or EOS 2375 or DCS 2550 or DCS 3301.

Previous terms offered: Spring 2024.

ENVS 3917 (b) Rebel Ecology: Black and Native Struggles for Land and Life Against Extraction

Allison Guess.

Every Year. Fall 2024. Enrollment limit: 12.

Considers Dr. Guess's (2021) concept and theory of a "rebel ecology" by asking, more broadly, what other socioecological models exist? Weaves together a study of differing, yet often converging or synergistic traditions of Black/Womanist eco-feminism that often confront the social constructions of race, gender, class and sexuality, dominant religion as a means of social control, imperialism, capitalism and colonialism; Indigenous ecologies and perspectives on resistance to capitalist extraction, genocide, imperialism and colonialism; as well as eco-socialism, which often frames ecology in terms of a mode of production beyond or outside of capitalism and the prison industrial complex. Given ongoing struggles against the extraction of land and labor, the urgent calls raised in the "climate strike," the COVID-19 pandemic, Black-led pandemic rebellions, and long(er) histories of land-based peoples, globally, opposing environmental degradation, broadly defined. (Same as: AFRS 3517, LACL 3517)

ENVS 3918 (b) Environmental and Natural Resource Economics

Non-Standard Rotation. Enrollment limit: 18.

Seminar. Analysis of externalities and market failure; models of optimum control of pollution and efficient management of renewable and nonrenewable natural resources such as fisheries, forests, and minerals; governmental vs. other forms of control of common-pool resources; and benefit-cost analysis of policies, including market-based and non-market valuation. Permission of instructor required during add/drop for students who have credit for Economics 2218. (Same as: ECON 3518)

Prerequisites: Two of: ECON 2555 and ECON 2557.

Previous terms offered: Spring 2024, Fall 2022, Fall 2021.

ENVS 3920 (b) Animal Planet: Humans and Other Animals

Non-Standard Rotation. Enrollment limit: 16.

Cultures around the world maintain different stances about non-human animals. People eat meat or avoid doing so. Religions advocate veneration, fear, or loathing of certain animals. Domesticated animals provide us company, labor, and food. Wild animals are protected, studied, photographed, captured, and hunted. Animals inhabit novels, are featured in art, and adorn merchandise. Students read ethnographies, articles, animal rights literature, and children's books; study museum collections; and examine animal themes in films and on the Web. Employing anthropological perspectives, students consider what distinguishes humans from other animals, how cultures are defined by people's attitudes about animals, and what might be our moral and ethical responsibilities to other creatures. (Same as: ANTH 3210)

Prerequisites: ANTH 2000 - 2969.

Previous terms offered: Spring 2021.

ENVS 3921 (b) The Economics of Land Use, Ecosystem Services, and Biodiversity

Erik Nelson.

Non-Standard Rotation. Spring 2025. Enrollment limit: 18.

Seminar. Analysis of the economic forces that shape land-use patterns, the relationship between land-use patterns and ecosystem service provision and biodiversity persistence, and the economic value of ecosystem service provision. Investigates methods for increasing ecosystem service values on the landscape and the economic cost of these methods. Analysis of land-use externalities and the failure of land-use patterns to generate maximum societal net benefits; neoclassical economic theory on land-use; methods for estimating market value of land; methods of non-market valuation; efficient land-use patterns from a societal perspective; methods for finding efficient land-use patterns; and governmental and non-governmental organization land conservation programs. Permission of instructor required during add/drop for all students; required at all times for students who have credit for Economics 2218 (same as Environmental Studies 2302) or 2228 (same as Environmental Studies 2228). (Same as: ECON 3521)

Prerequisites: Three of: either ECON 1050 or ECON 1101 or Placement in earned ECON 1101 or Placement in ECON 2000 Level and ECON 1102 or Placement in earned ECON 1102 or Placement in ECON 2000 Level and MATH 1600 or higher or Placement in MATH 1700 (M) or Placement in MATH 1750 (M) or Placement in MATH 1800 (M) or Placement in MATH 2020 or 2206 (M) or Placement in 2000, 2020, 2206 (M).

Previous terms offered: Fall 2023, Spring 2021.

ENVS 3930 (a, INS) Ecotoxicology: Pollution Impacts on Ecosystems and Human Health

Mary Rogalski.

Every Other Spring. Spring 2025. Enrollment limit: 15.

Chemical exposure can strongly impact both ecological communities and human health, often in complex and unexpected ways, yet limited data and scientific uncertainty make pollution regulation challenging. Examines pollution impacts on biological systems, from the organism to the ecosystem scale, with a focus on emerging research areas, including evolutionary ecotoxicology and the potential synergy of multiple environmental stressors. Investigates how society might use available toxicological data to protect ecological integrity and human health. Guest visitors explore political, historical, and social justice aspects, providing an interdisciplinary lens. Reading-, writing-, and discussion-focused seminar (Same as: BIOL 3309)

Prerequisites: BIOL 2000 - 2969 or CHEM 2000 - 2969 or EOS 2000 - 2969 or ENVS 2201 (same as BIOL 1158 and CHEM 1105).

Previous terms offered: Spring 2024, Spring 2022, Spring 2021.

ENVS 3938 (c) Consumed: The Nature of Consumerism

Non-Standard Rotation. Enrollment limit: 16.

Explores connections between consumerism and the environment in North America and internationally. Analyzes the evolution of consumerism from the sixteenth century to the present, the material effects of consumers upon nearby and distant locales, and the social and cultural conflicts entailed in consumption across from the local to the global. Topics include relationships between producers and consumers, transformations to industries like mining or fishing, the rise of the leisure and outdoor recreation, industrialization and its discontents, the natural food and health movements, shopping and mass consumption, and the paradoxes of modern environmentalism and consumerism. Writing-intensive, including several short papers and a longer project based on original archival and/or field research.

Prerequisites: Two of: ENVS 1101 and ENVS 2403 (same as HIST 2182).

Previous terms offered: Spring 2022.

ENVS 3957 (a) The Physics of Climate

Non-Standard Rotation. Enrollment limit: 35.

A rigorous treatment of the earth's climate, based on physical principles. Topics include climate feedbacks, sensitivity to perturbations, and the connections between climate and radiative transfer, atmospheric composition, and large-scale circulation of the oceans and atmospheres. Anthropogenic climate change also studied. (Same as: PHYS 3810, EOS 3050)

Prerequisites: PHYS 2150 or PHYS 2810 (same as ENVS 2253 and EOS 2810) or PHYS 3000.

Previous terms offered: Spring 2021.

ENVS 3963 (b, IP) Advanced Seminar in International Relations: Law, Politics, and the Search for Justice

Non-Standard Rotation. Enrollment limit: 15.

Examines the complex relationship between law and policy in international relations by focusing on two important and rapidly developing areas of international concern: environmental protection and humanitarian rights. Fulfills the environmental studies senior seminar requirement. (Same as: GOV 3610)

Previous terms offered: Spring 2024, Spring 2022, Spring 2021.

ENVS 3980 (c) The Nature of Health in the United States and the World

Non-Standard Rotation. Enrollment limit: 16.

Explores relationships between humans, environment, and health in the United States and North America in their global context from the sixteenth century to the present day. Overall focus is on how the history of health and the environment in the US connects to global and transnational history. Topics may include the evolution of public health interventions, biomedical research, and clinical practice; folk remedies and popular understandings of health; infectious and chronic diseases; links between landscape, health, and inequality; gender and reproductive health; occupational health and safety; the effects of agriculture, industrialization, and urbanization on human and ecological health; state and federal policies in the United States; and the colonial and transnational dimensions of public health and medicine. Students write a major research paper based on primary sources. Environmental Studies 1101, 2403, and at least one history course numbered 2000-2969 recommended. Note: This course is part of the following field(s) of study: United States. (Same as: HIST 3180)

Previous terms offered: Fall 2020.

ENVS 3982 (c) The Beach: Nature and Culture at the Edge

Non-Standard Rotation. Enrollment limit: 16.

Examines the development of the North American coastline, a place of dynamic environmental transformations and human interactions. Students consider physical changes on the coast, the coast as a zone for economic development and social conflict, and shifting perceptions of the shoreline. Topics may include: fisheries and whaling, conservation and political management, environmental disasters, resource extraction, industrialization and urbanization, tourism, beach and surfer culture, climate change and sea-level rise; and representations of the beach in art, literature, photography, film, and music. Students write a major research paper based on primary and secondary sources.

Prerequisites: ENVS 1101.

Previous terms offered: Fall 2023, Fall 2021.

ENVS 3998 (c) The City since 1960

Every Other Fall. Enrollment limit: 16.

Seminar. Focuses on important issues in the history of the American city during the past half century with some comparative excursions to cities beyond. Issues include urban renewal and responses to it, historic preservation, gentrification, high-rise syndrome, the loss and creation of public places, and the making of a humane and successful city today. Considers both the city's appearance and form and the social and cultural issues that help shape that form. Examines these issues in depth through primary and secondary source readings. Throughout the semester students pursue a research project of their own, culminating in a presentation to the class and a substantial (twenty-five page) paper. (Same as: URBS 3998)

Prerequisites: ENVS 2004 (same as DCS 2335 and URBS 2004) or ENVS 2301 (same as DCS 2340 and URBS 2301) or ENVS 2403 (same as HIST 2182) or ENVS 2431 (same as ARTH 2430 and URBS 2431) or ENVS 2444 (same as HIST 2006 and URBS 2444) or ENVS 2445 (same as URBS 2445) or ENVS 2470 (same as ARTH 2470 and URBS 2470) or AFRS 2220 (same as URBS 2620) or AFRS 2626 (same as URBS 2626) or AFRS 3230 (same as HIST 3230 and URBS 3230) or GOV 2309 or HIST 1321 (same as URBS 1321) or HIST 2660 (same as GSWS 2662 and URBS 2660) or HIST 2802 (same as ASNS 2585 and URBS 2802) or SOC 2202 (same as URBS 2202) or URBS 1000 - 2969 or URBS 3000 or higher.

Previous terms offered: Spring 2023, Spring 2021.