Environmental Studies

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Requirements for the Coordinate Major in Environmental Studies (ES)

Among Bowdoin’s major programs, the coordinate major is unique to the Environmental Studies Program. An environmental studies major must also have a disciplinary major, either in a departmental major such as biology, economics, history, etc., or in a program major such as Asian studies, gender and women’s studies, etc. Courses taken to satisfy the College’s distribution requirements or to fulfill the requirements of the second major may be double-counted toward the environmental studies major requirements, except as noted. A grade of C- or better must be earned in a course to fulfill the major requirement.

Completion of the ES major requires the following courses:

1. Introductory, interdisciplinary course: ES 101 Introduction to Environmental Studies, preferably taken as a first-year student.
2. One 100-level or higher course in biology, chemistry, geology, or physics.
3. One environmental science course: ES 201 Perspectives in Environmental Science (same as Biology 158 and Chemistry 105).
4. One environmental social science course chosen from: ES 207 Building Healthy Communities (same as Government 207); ES 221 Environmental Inequality and Justice (same as Sociology 221); ES 228 Natural Resource Economics (same as Economics 228); ES 263 International Environmental Policy (same as Government 263); ES 264 Energy, Climate, and Air Quality (same as Government 264); ES 240 Environmental Law.
5. One environmental humanities course: ES 203 Environment and Culture in North American History (same as History 242).
6. One senior seminar: A culminating course that provides an opportunity for exploration of a topic or a senior capstone course experience of one semester is required of majors. Such courses are multidisciplinary, studying a topic from at least two areas of the curriculum. It is preferable to take this course during the senior year. Please check with the department for an updated list of courses satisfying this requirement.
7. Beyond the core courses, students must choose a concentration (listed below):

**ES Disciplinary Concentrations:** For this option, ES coordinate majors must take three 100-level or above courses within one of the following concentrations:

- for *History, Landscape, Values, Ethics, and the Environment*, students choose from ES courses designated with a “c”
- for *Environmental Economics and Policy*, students choose ES courses designated with a “b”
- for the *Interdisciplinary Environmental Science Concentration*, students choose ES courses designated with an “a” (in addition, *Chemistry 210 Chemical Analysis* and *Chemistry 240 Inorganic Chemistry* count toward this concentration). ES majors are strongly advised to take one of the ES science courses outside of their departmental requirements. ES science majors should consult with their ES science advisor in identifying a science course outside their major.

**Student-designed Environmental Studies Concentration:** Students majoring in ES have the option of designing their own concentration consisting of three courses in addition to the core courses and senior seminars. Student-designed concentrations are particularly appropriate for students interested in exploring environmental issues from a cross-divisional perspective. Students must submit a self-designed concentration form (available from the program), explaining their plan of study to the program director by the first week of the first semester of the junior year, listing the three ES courses proposed, and explaining how the courses are related to the issue of interest to the student. Proposals must be approved by the program director.

**Requirements for the Minor in Environmental Studies**

The minor consists of five courses: *Environmental Studies 101*; two courses at the 200 level or higher, one of which should be outside a student’s departmental major; and two core courses in the disciplinary area as specified below:

- for *natural science majors*: ES 203 *Environment and Culture in North American History* (same as History 242) and one social science course from the following: ES 207 *Building Healthy Communities* (same as Government 207); ES 221 *Environmental Inequality and Justice* (same as Sociology 221); ES 228 *Natural Resource Economics and Policy* (same as Economics 228); ES 240 *Environmental Law*; ES 263 *International Environmental Policy* (same as Government 263); ES 264 *Energy, Climate, and Air Quality* (same as Government 264);
- for *social science majors*: ES 201 *Perspectives in Environmental Science* (same as Biology 158 and Chemistry 105) and ES 203 *Environment and Culture in North American History* (same as History 242);
- for *humanities majors*: ES 201 *Perspectives in Environmental Science* (same as Biology 158 and Chemistry 105), and one social science course from the following: ES 207 *Building Healthy Communities* (same as Government 207); ES 221 *Environmental Inequality and Justice* (same as Sociology 221); ES 228 *Natural Resource Economics and Policy* (same as Economics 228); ES 240 *Environmental Law*; ES 263 *International Environmental Policy* (same as Government 263); ES 264 *Energy, Climate, and Air Quality* (same as Government 264).
First-Year Seminar
For a full description of first-year seminars, see pages 149–60.

15c. Frontier Crossings: The Western Experience in American History. Fall 2009. MATTHEW KLINGLE.
   (Same as History 15.)

Introductory, Intermediate, and Advanced Courses
[79a - INS. Agriculture: Ancient and Modern. (Same as Biology 79.)]
[81a - INS. Physics of the Environment. (Same as Physics 81.)]

100a - INS. Environmental Geology and Hydrology. Every spring. PETER LEA.
An introduction to aspects of geology and hydrology that affect the environment and land use. Topics include watersheds and surface-water quality, groundwater contamination, coastal erosion, and landslides. Weekly labs and field trips examine local environmental problems affecting Maine rivers, lakes, and coast. (Same as Geology 100.)

101. Introduction to Environmental Studies. Every fall. DEWITT JOHN, LAWRENCE SIMON, AND DHARNI VASUDEVAN.
An interdisciplinary introduction from the perspectives of the natural sciences, the social sciences, and moral philosophy to the variety of environmental problems confronting us today. Provides an overview of the state of scientific knowledge about major environmental problems, both global and regional, an analysis of the ethical problems they pose, potential responses of governments and individuals, and an exploration of both the successes and the inadequacies of environmental policy. Topics include air pollution, fisheries, and chemicals in the environment as well as global population, climate change, energy, and sustainability.

102a - INS. Introduction to Oceanography. Fall 2009. COLLIN ROESLER.
The fundamentals of geological, physical, chemical, and biological oceanography: tectonic evolution of the ocean basins, thermohaline and wind-driven circulation, chemical cycles, primary production and trophodynamics with emphasis on oceans’ role in climate change. Weekly labs will apply the principles in the setting of Casco Bay and the Gulf of Maine. (Same as Geology 102.)

103a - INS. Marine Environmental Geology. Spring 2010. EDWARD LAINE.
An introduction to the aspects of marine geology and oceanography that affect the environment and marine resources. Topics include estuarine oceanography and sediments, eutrophication of coastal waters, primary productivity, waves and tides, sea-level history, glacial geology of coastal Maine, harmful algal bloom, and an introduction to plate tectonics. Weekly field trips and labs examine local environmental problems affecting Casco Bay and the Maine coast. A one-day weekend field excursion is required. (Same as Geology 103.)

[154a. Ecology of the Gulf of Maine and Bay of Fundy. (Same as Biology 154.)]

201a - MCSR. INS. Perspectives in Environmental Science. Every spring. Spring 2010. JOHN LICHTER AND DHARNI VASUDEVAN.
Functioning of the earth system is defined by the complex and fascinating interaction of processes within and between four principal spheres: land, air, water, and life. Leverages key principles of environmental chemistry and ecology to unravel the intricate connectedness of natural phenomena and ecosystem function. Fundamental biological and chemical concepts are used to understand the science behind the environmental dilemmas facing societies as a
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Consequence of human activities. Laboratory sessions consist of local field trips, laboratory experiments, group research, case study exercises, and discussions of current and classic scientific literature. (Same as Biology 158 and Chemistry 105.)

Prerequisite: One 100-level or higher course in biology, chemistry, geology, or physics.


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. Assignments include a research-based service learning term project. (Same as History 242.)

Prerequisite: Environmental Studies 101 or permission of the instructor.


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. The productive use of GIS technology in the physical and social sciences, environmental management, and regional planning is investigated through a variety of applied exercises and problems culminating in a semester project that addresses a specific environmental application.

205a - INS. Environmental Chemistry. (Same as Chemistry 205 and Geology 205.)


An examination of the biodiversity crisis facing Africa and methods for slowing down or reversing the rapid loss of species and ecosystems that Africa is experiencing. Explores the social, cultural, historical, economic and political contexts of the relationship between African peoples and the continent’s living natural resources, as well as the past, present, and future of biodiversity. (Same as Africana Studies 204.)


Examines efforts by communities and regions to build strong local economies, safeguard important environmental values, protect public health, and address issues of economic and social justice. In many communities, metropolitan areas, and rural regions, state and local government officials work with other leaders to set ambitious goals for economic and environmental sustainability and to develop specific plans for sustainable development. These efforts cross political, institutional, and sectoral barriers, thus challenging and sometimes re-shaping state and local politics as well as American federalism. Examines how local leaders can work in complex settings to set goals and mobilize federal, private, and non-profit resources to achieve specific, cross-cutting objectives. (Same as Government 207.)

Prerequisite: One course in environmental studies or government.


An introduction to the physiological processes that enable plants to grow under the varied conditions found in nature. General topics discussed include the acquisition, transport, and use of water and mineral nutrients, photosynthetic carbon assimilation, and the influence of environmental and hormonal signals on development and morphology. Adaptation and
acclimation to extreme environments and other ecophysiological subjects are also discussed. Weekly laboratories reinforce principles discussed in lecture and expose students to modern research techniques. (Same as Biology 210.)

Prerequisite: Biology 102, 104, 105, or 109.


Study of the behavior of animals and plants, and the interactions between organisms and their environment. Topics include population growth and structure, and the influence of competition, predation, and other factors on the behavior, abundance, and distribution of plants and animals. Laboratory sessions, field trips, and research projects emphasize concepts in ecology, evolution and behavior, research techniques, and the natural history of local plants and animals. Optional field trip to the Bowdoin Scientific Station on Kent Island. (Same as Biology 215.)

Prerequisite: Biology 102, 104, 105, or 109.


Intended for students with a demonstrated interest in environmental studies, as an introduction to several modes of storytelling, which communicate ideas, historical narratives, personal experiences, and scientific and social issues in this increasingly important area of study and concern. Explores various techniques, challenges, and pleasures of storytelling, and examines some of the demands and responsibilities involved in the conveyance of different types of information with clarity and accuracy in nonfiction narrative. Engages student writing through the workshop method, and includes study of several texts, including The Control of Nature, Cadillac Desert, Living Downstream, and Field Notes from a Catastrophe. (Same as English 213.)

Prerequisite: Permission of the instructor.


An examination of sense of place through reading and creative writing. Students will read authors who write personally about place and also bring historical, scientific, or sociological perspectives to their work, such as Aldo Leopold, Rachel Carson, James Baldwin, Yi-Fu Tuan, and Elizabeth Bishop. Students will write both personal essays and essays centered on direct observation and reflection on the history and ecology of a particular place. Workshop discussion, critiques, and revision are an integral part. (Same as English 215.)

Prerequisite: Permission of the instructor.

[218b - MCSR. Environmental Economics and Policy. (Same as Economics 218.)]

219a - MCSR, INS. Biology of Marine Organisms. Every fall. Amy Johnson.

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 three hours of laboratory or field trip per week. One weekend field trip included. (Same as Biology 219.)

Prerequisite: Biology 102, 104, 105, or 109.

[221b - ESD. Environmental Inequality and Justice. (Same as Sociology 221.)]

[222b - ESD. Introduction to Human Population. (Same as Gender and Women’s Studies 224 and Sociology 222.)]
225a - MCSR, INS. Community, Ecosystem, and Global Change Ecology. Fall 2009. JOHN LICHTER.

Community ecology is the study of dynamic patterns in the distribution and abundance of organisms. Ecosystem ecology is the study of the flow of energy and cycling of matter through ecological communities. Global change ecology examines how human activities alter communities and ecosystems and how these changes play out at the global scale. Topics include the creation and maintenance of biodiversity, the complexity of species interactions in food webs, the role of disturbance in ecological processes, the importance of biodiversity in ecosystem processes, and human influences on global biogeochemical cycles and climate change. Laboratory sessions consist of local field trips, team research exercises, and independent field research projects. Current and classic scientific literature is discussed weekly. (Same as Biology 225.)

Prerequisite: Biology 102, 104, 105, or 109.

227c - MCSR. City and Landscape in Modern Europe. Spring 2010. JILL PEARLMAN.

Explores the evolution of the built environment in London, Paris, Vienna, and Berlin from the mid-nineteenth century to the present. Focusing on significant moments in the history of these cities, considers a variety of factors as determinants of urban form, including technological developments, industrialization, politics, economics, culture and design. Topics include the creation of capital cities, natural and public spaces, streets, housing, suburbanization, environmental problems, and current schemes for a sustainable urbanism. (Same as History 227.)

228b - MCSR. Natural Resource Economics and Policy. Fall 2009. GUILLERMO HERRERA.

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 (e.g., 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 Economics 228.)

Prerequisite: Economics 101.

231b - MCSR. Native Peoples and Cultures of Arctic America. Fall 2009. SUSAN KAPLAN.

For thousands of years, Inuit, Native American Indian, and Aleut peoples lived in the Arctic regions of North America as hunters, gatherers, and fishermen, harvesting resources from the sea, rivers, and land. Examines the characteristics of Arctic ecosystems and how they are being affected by climate change. Explores the social, economic, political, and religious lives of various Arctic-dwelling peoples in an effort to understand how people have adapted to this dynamic environment and to contact with various Western groups. (Same as Anthropology 231.)

Prerequisite: Anthropology 101 or 102.

232c - ESD. History of the American West. Spring 2010. CONNIE CHIANG.

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 the “frontier” myth in American culture. Students write several papers and engage in weekly discussion based upon primary and secondary documents, art, literature, and film. (Same as History 232.)

[233c. Architecture and Sustainability. (Same as Visual Arts 233.)]


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.


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 Art History 243.)


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. (Same as History 244.)


An in-depth investigation of the buildings of North America’s most celebrated architect, with emphasis on the major theme of his work—the complex relationship between architecture and nature. Examines Wright’s key projects for a diverse range of environments and regions while also placing the master builder and his works into a larger historical, cultural, and architectural context. Engages in a critical analysis of the rich historical literature that Wright has evoked in recent decades, along with the prolific writings of the architect himself.

Prerequisite: Environmental Studies 243 (same as Art History 243) or 244 (same as History 244), or one course in art history, or permission of the instructor.


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. (Same as History 247.)

Prerequisite: One course in history or permission of the instructor.

[250c - ESD. California Dreamin’: A History of the Golden State. (Same as History 250.])

[253a. Atmosphere and Ocean Dynamics. (Same as Geology 257 and Physics 257.)]
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[256c - IP. Environment and Society in Latin America. (Same as History 256 and Latin American Studies 256.)]

   What things in nature have moral standing? What are our obligations to them? How should we resolve conflicts among our obligations? After an introduction to ethical theory, topics to be covered include anthropocentrism, the moral status of nonhuman sentient beings and of non-sentient living beings, preservation of endangered species and the wilderness, holism versus individualism, the land ethic, and deep ecology. (Same as Philosophy 258.)

[263b. International Environmental Policy. (Same as Government 263.)]

   Examines how the federal government in the United States, as well as states, communities, businesses, and nonprofits, can address climate change and energy issues. Compares American policies and politics with efforts in other countries and examines the links between American policies and efforts in other nations. (Same as Government 264.)
   Prerequisite: One course in environmental studies or government, or permission of the instructor.

[266b. Find a Way or Make One: Arctic Exploration in Cultural, Historical, and Environmental Context. (Same as Anthropology 266.)]

267a - INS. Coastal Oceanography. Spring 2010. EDWARD LAINE.
   Principles and problems in coastal oceanography, with an emphasis on interdisciplinary inquiry. Topics include circulation and sediment transport within estuaries and on the continental shelf, impact of human systems on the marine environment, and issues and controversies of eutrophication and hypoxia in the coastal environment. (Same as Geology 267.)
   Prerequisite: One course in geology or permission of the instructor.

[268c - IP. African Environmental History. (Same as Africana Studies 267 and History 267.)]

274a - MCSR, INS. Marine Conservation Biology. Fall 2009. DAMON GANNON.
   Introduces key biological concepts that are essential for understanding conservation issues. Explores biodiversity in the world’s major marine ecosystems; the mechanisms of biodiversity loss at the genetic, species, and ecosystem levels; and the properties of marine systems that pose unique conservation challenges. Investigates the theory and practice of marine biodiversity conservation, focusing on the interactions among ecology, economics, and public policy. Consists of lecture/discussion, lab, field trips, guest seminars by professionals working in the field, and student-selected case studies. (Same as Biology 274.)
   Prerequisite: One of the following: Biology 154 (same as Environmental Studies 154), Biology 215 (same as Environmental Studies 215), Biology 219 (same as Environmental Studies 219), Biology 225 (same as Environmental Studies 225), Environmental Studies 101, Environmental Studies 201 (same as Biology 158 and Chemistry 105), or permission of the instructor.

275a - MCSR, INS. Groundwater. Spring 2011. PETER LEA.
   The interaction of water and geological materials within the hydrologic cycle, with emphasis on groundwater resources and quality. Qualitative and quantitative examination of the movement of groundwater in aquifers. (Same as Geology 275.)
   Prerequisite: One course in geology or permission of the instructor.
Everyone lives in a watershed, but how do watersheds function, both naturally and increasingly as impacted by humans? Examines the movement and modification of water through the landscape, emphasizing such topics as natural and human controls of water quality, streamflow generation and surface-groundwater interactions, watershed modeling, and approaches to watershed management. Students perform an integrated investigation of a local watershed, examining natural and human controls on hydrologic processes. (Same as Geology 276.)
Prerequisite: One course in geology or Environmental Studies 201 (same as Biology 158 and Chemistry 105).

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 Biology 280.)
Prerequisite: Biology 210 or 225, or permission of the instructor.

Compares and contrasts the geography, climate, glaciology and sea ice, ocean biology, and exploration history of the Arctic and Antarctic regions with particular emphasis on the role of polar regions in global climate change. One weekend field trip required. (Same as Geology 287.)
Prerequisite: One course in geology or permission of the instructor.


Structured around a semester-long project providing students with a hands-on, capstone experience that applies prior coursework in the Environmental Studies major. Students work as a collaborative team to explore one issue and to develop a report/project useful to the community. The final project will be a culmination of student-led discussions, readings, meetings with stakeholders, field trips, original research and design, and data analysis. Potential issues to be examined may include carbon neutrality and campus sustainability at Bowdoin, climate change in Maine, conservation, land use, energy, community and urban design, public health, environmental justice, and transportation. Consult the Environmental Studies Program Web site for course topics offered each year. Current or prior enrollment in Environmental Studies 201, 202, or 203 is recommended. May be repeated for credit.
Prerequisite: Environmental Studies 101 or permission of the instructor.

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? 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 sediment and growth
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records (ocean, glacier, lake, coral, tree ring, and rodent middens) to assemble proxies for past changes in climate, atmospheric CO₂, and disturbance to examine several issues: long-term carbon cycling and climate, 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 of human civilizations, climate/overkill hypothesis of Pleistocene megafauna, climate variability, drought cycles, climate change impacts on fire, climate-related collapses of human civilizations, and determining natural variability vs. human-caused climate change. Prior enrollment in a 200- or 300-level environmental studies or geology course is recommended. (Same as Biology 302 and Geology 302.)

Prerequisite: One of the following: Biology 102, 104, 105, 109, or Geology 101.


More than 100,000 synthetic chemicals are currently in daily use. In order to determine the risk posed to humans and ecosystems, we need to understand and anticipate the extent and routes of chemical exposure. 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 is 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 Chemistry 305.)

Prerequisite: Chemistry 225.

312b. Cultures Weathering Environmental Change. (Same as Anthropology 312.)


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. Not open to students who have credit for Economics 218 or 228. (Same as Economics 318.)

Prerequisite: Economics 255 and 257.

327a. Global Change Ecology. (Same as Biology 327.)


Examines literature, primarily written after 1945, that depicts life in a world that is enduring, or has endured, a military, cultural, moral, or environmental disaster (such as global climate change). Discusses what transpires when time continues to pass but the future does not arrive, when the world renews itself only in marginal or unsuspected ways. Considers themes such as generalized and muted trauma; the possibilities of accepting or resisting global disarray; the estrangement of home or familiar histories; the radical disorientation of the self; and the adequacy of established literary genres to capture key themes. Discusses literary texts by such authors as Beckett, Levi, Abe, Dick, Ballard, Robinson, Coetzee, Sebald, Butler, and Boyle; movies such as Children of Men; and theoretical and critical writings on course themes. (Same as English 335.)

Prerequisite: One 200-level course in English or permission of the instructor.


An examination of the transnational history of North and South America over the past five hundred years. Students explore this through directed readings on specific themes including exploration and imperial conquest, trade, migration, labor, warfare, and biological exchange, culminating in an original research paper, based on primary and secondary source research, to meet the requirements of their major. (Same as History 349 and Latin American Studies 349.)


An in-depth study in the chemistry that affects atmospheric composition and global climate change. Topics include ozone depletion, tropospheric pollution, understanding past climates, and modern research techniques. (Same as Chemistry 350.)

Prerequisite: Chemistry 109 and either Chemistry 251 or Physics 229, or permission of the instructor.


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 will also be studied. (Same as Geology 357 and Physics 357.)

Prerequisite: Physics 229, 255, 256, or 300, or permission of the instructor.


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 Government 363.)

Prerequisite: Government 260, 261, or 263, or permission of the instructor.


Although we live in a world where global food abundance is at record highs, and prices are at historic lows, our modern food system has its share of challenges. Methods of food production, marketing, distribution, and consumption have spawned waves of criticism, including concerns about farm economics, food justice, worker safety, animal welfare, famine, ecological degradation, climate change, biotechnology, and public health. In the wake of these challenges, alternative systems of food production, distribution, and consumption are beginning to emerge. An interdisciplinary exploration of three questions: How do we produce and eat food? What major social and environmental consequences have arisen from food production and consumption? What should we produce and eat? Examines the historical origins agriculture, social and environmental problems arising from these transitions, and social movements oriented towards making our food system more ecologically sustainable and socially just. Current or prior enrollment in Environmental Studies 201, 202, and 203 is recommended.

Prerequisite: Environmental Studies 101 or permission of the instructor.


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. An interdisciplinary senior 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.


Examines philosophical, moral, political, and policy questions regarding various environmental issues. Possible topics include the ethics of climate change policy, our obligations to future generations, benefit-cost analysis vs. the precautionary principle as a decision-making instrument, and the relationship between justice and sustainability. (Same as Philosophy 392.)

393a. Advanced Seminar in Geology. (Same as Geology 393.)


Merrymeeting Bay, a globally rare, inland freshwater river delta and estuary that supports productive and diverse biological communities, is home to numerous rare and endangered species and is critical habitat for migratory and resident waterfowl, as well as anadromous fish. Explores the ecology and environmental history of Merrymeeting Bay in order to understand how its rare natural habitats might best be managed. Students participate in a thorough review of the scientific and historical literature related to Merrymeeting Bay, and help plan, conduct, and analyze a group study investigating some aspect of the ecology and/or environmental history of the bay, with the intent of submitting a manuscript for publication in an appropriate scientific journal. (Same as Biology 394.)

Prerequisite: Biology 215 (same as Environmental Studies 215) or Environmental Studies 201 (same as Biology 158 and Chemistry 105).


Examines a complex current environmental issue in depth. Explores the underlying social, economic, scientific, and cultural dimensions of the issue; reviews how this and related issues have been addressed so far by state and local governments as well as by the federal government; analyzes current policy-making efforts; and suggests lessons from this policy area about the capacity of public institutions to deal effectively with complex issues. Equal attention given to the substance of public policy, the political process, and implementation of past and proposed policies. Focuses primarily on the United States but will consider experiences in other nations as points of comparison and also any relevant international dimensions of the issue. (Same as Government 395.)

Prerequisite: One course in environmental studies or government, or permission of the instructor.


Exploration of advanced concepts in ecology and evolutionary biology, and the natural history of plants, animals, and ecosystems in winter in Maine. Structured around group research projects in the field. Each week, field trips focus on a different study site, set of questions, and taxon (e.g., host specificity in wood fungi, foraging behavior of aquatic insects, estimation of...
mammal population densities, winter flocking behavior in birds). Students learn to identify local winter flora and fauna, evaluate readings from the primary literature, analyze data from field research projects, and present their results each week in a research seminar. Field trip to the Bowdoin Scientific Station on Kent Island. (Same as **Biology 397**.)

**Prerequisite:** **Biology 215** (same as **Environmental Studies 215**) or **258**, or permission of the instructor.

**401–404. Advanced Independent Study and Honors in Environmental Studies.** The Program.

The following courses count toward the requirements of the Interdisciplinary Science Concentration, in addition to ES courses designated with an “a”:

- **Chemistry 210a - MCSR, INS. Chemical Analysis.** Every fall. **Elizabeth A. Stemmler.**
- **Chemistry 240a - MCSR, INS. Inorganic Chemistry.** Every spring. **Jeffrey K. Nagle.**

The art department invites Art/Environmental Studies independent studies. Contact art department faculty or the environmental studies program director.

Students may also choose from the following list of courses to satisfy requirements for the major in environmental studies. These courses will receive environmental studies credit with the approval of the director after consultation with the student and the instructor. It is expected that a substantial portion of the student’s research efforts will focus on the environment. In addition to the courses listed below, students may discuss other possibilities with the Environmental Studies Program. For full course descriptions and prerequisites, see the appropriate department listings.

**Social Sciences**

- **Anthropology 102b. Introduction to World Prehistory.** Spring 2010. **Scott MacEachern.**
- **Anthropology 221b - ESD. The Rise of Civilization.**

**Humanities**

- **Visual Arts 190c - VPA. Architectural Design I.** Spring 2010. **Wiebke Theodore.**

**Film Studies**

**Tricia Welsch, Department Chair**

**Emily C. Briley, Department Coordinator**

**Associate Professor:** Tricia Welsch

Film has emerged as one of the most important art forms of the twentieth century. Film studies at Bowdoin introduces students to the grammar, history, and literature of film in order to cultivate an understanding of both the vision and craft of film artists and the views of society and culture expressed in cinema. Bowdoin College does not offer a major in film studies.