Environmental Studies

Administered by the Environmental Studies Committee;
Philip Camill, Program Director
Eileen Sylvan Johnson, Program Manager; Rosemary Armstrong, Program Assistant
(See committee list, page 353.)

Joint Appointments with Biology: Associate Professor Philip Camill,
Associate Professor John Lichter
Joint Appointment with Chemistry: Associate Professor Dharni Vasudevan
Joint Appointment with Government: Distinguished Lecturer DeWitt John
Joint Appointments with History: Associate Professor Matthew Klingle,
Assistant Professor Connie Y. Chiang?
Joint Appointment with Philosophy: Associate Professor Lawrence H. Simon
Lecturer: Jill E. Pearlman
Adjunct Lecturers: Kara Wooldrik, Mellon Global Scholar in Environmental Studies
Ashish Kothari

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. **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. **ES 201 Perspectives in Environmental Science** (same as Biology 158 and Chemistry 105.)
4. **ES 202 Environmental Policy and Politics** (same as Government 214), or **ES 218 Environmental Economics** (same as Economics 218).
5. **ES 203 Environment and Culture in North American History** (same as History 242).
6. Senior seminar: A culminating course of one semester is required of majors. Such courses are multidisciplinary, studying a topic from at least two areas of the curriculum. This course is normally taken during the senior year. Courses currently satisfying this requirement include **ES 312, 318, 340, 357, 363**, and courses numbered **390** and above. 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* and two core courses in the disciplinary area outside a student’s major:
— for **natural science majors**: ES 202 Environmental Policy and Politics or ES 218 Environmental Economics, and ES 203 Environment and Culture in North American History;
— for **social science majors**: ES 201 Perspectives in Environmental Science and ES 203 Environment and Culture in North American History;
— for **humanities majors**: ES 201 Perspectives in Environmental Science, and ES 202 Environmental Policy and Politics or ES 218 Environmental Economics; and two additional ES courses numbered 200 or above, one of which should be outside a student’s major.

**First-Year Seminar**
For a full description of first-year seminars, see pages 147–57.

**15c. Frontier Crossings: The Western Experience in American History.** Spring 2009. **Matthew Klingle.**
(Same as *History 15.*)
Courses of Instruction

Introductory, Intermediate, and Advanced Courses

56a - INS. Ecology and Society. Fall 2008. VLADIMIR DOHOVNIKOFF.
   Presents an overview of ecology covering basic ecological principles and the relationship between human activity and the ecosystems that support us. Examines how ecological processes, both biotic (living) and abiotic (non-living), influence the life history of individuals, populations, communities, and ecosystems. Encourages student investigation of environmental interactions and how human-influenced disturbance is shaping the environment. Required field trips illustrate the use of ecological concepts as tools for interpreting local natural history. (Same as Biology 56.)

81a - INS. Physics of the Environment. Spring 2009. MARK BATTLE.
   An introduction to the physics of environmental issues, including past climates, anthropogenic climate change, ozone destruction, and energy production and efficiency. (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, DHARNI VASUDEVAN, and LAWRENCE SIMON.
   An interdisciplinary introduction to the variety of environmental problems caused by humanity and confronting us today. Provides an overview of the state of scientific knowledge about major environmental problems and potential responses of governments and people, an exploration of environmental issues, both global and regional, and an exploration of why societies often have such difficulty in reaching consensus on effective and equitable policies within existing political and economic institutions.

103a - INS. Marine Environmental Geology. Every fall. 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. Fall 2008. DAMON GANNON.
   The Gulf of Maine/Bay of Fundy system is a semi-enclosed sea bordered by three U.S. states and two Canadian provinces. It supports some of the world’s most productive fisheries and played a key role in European colonization of North America. Investigates how the species found in this body of water interact with each other and with the abiotic components of their environment. Topics will include natural history; geological and physical oceanography; characteristics of major habitats; biology of macroinvertebrates, fishes, seabirds, and marine mammals; biogeography; food webs; and fisheries biology. Examines how human activities, such as fishing, aquaculture, shipping, and coastal development affect the ecology of the region. Includes lectures, discussions of the primary literature, and field excursions. (Same as Biology 154.)
   Prerequisite: Biology 102, 104, 105, or 109.
201a - MCSR. INS. Perspectives in Environmental Science. Every spring. Spring 2009.
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 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.


Examines alternative ways to protect our environment. Analyzes environmental policies and the regulatory regime that has developed in the United States; new approaches such as free-market environmentalism, civic environmentalism, environmental justice, sustainable development; and environmental policies and politics in other countries, especially China. (Same as Government 214.)

Prerequisite: Environmental Studies 101 or permission of the instructor.


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.


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. The kinetics and mechanisms of organic compound transformation via hydrolysis, oxidation, reduction, and photochemical reactions are examined; environmental conditions and chemical structural criteria that influence reactivity 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 Chemistry 205 and Geology 205.)

Prerequisite: Chemistry 109.

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.

216c. Telling Environmental Stories. (Same as English 213.)


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 Economics 218.)

Prerequisite: Economics 101.

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.

A critical examination of the relationships between social inequalities and environmental degradation, both in the U.S. and internationally. Through case studies and comparative literatures, surveys a variety of topics that reveal the complex interactions between social structures of power and environment, including the distribution of environmental hazards across race and class, natural resource rights and management, urban health and sustainability, and energy and environmental security. Also studies critically the development of a broad-based environmentalism of the poor, most notably environmental justice organizations and indigenous struggles over resources, as well as their coalitions and conflicts with mainstream environmental and other social movements. (Same as Sociology 221.)

Prerequisite: Sociology 101 or Environmental Studies 101, or permission of the instructor.

222b - ESD. Introduction to Human Population. (Same as Gender and Women’s Studies 224 and Sociology 222.)

An exploration of the interface between geological and biological processes. Focuses on the mutual effects of microorganisms and earth’s land, air, and water chemistry. Topics include biomineralization, origin and evolution of life, microbial energetics and diversity, and biological contributions to weathering, soil and rock formation, and the creation and remediation of environmental problems. Laboratories will include fieldwork, experiments, and light, fluorescence, and electron microscopy. (Same as Biology 223 and Geology 223.)

Prerequisite: One course in geology or biology, or permission of the instructor.

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.

Evolution of the built environment in four European cities from the mid-eighteenth century to the present. A variety of factors—geography, natural resources, politics, industrialization, transportation, planning, and architectural design—are considered as determinants of city form. Topics include the shaping of capital cities, housing parks, public spaces, boulevards and streets, urban infrastructure, and environmental problems. (Same as History 227.)
Courses of Instruction

228b - MCSR. Natural Resource Economics and Policy. Fall 2009 or Spring 2010. **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.d. Native Peoples and Cultures of Arctic America. (Same as Anthropology 231.)]

[232c - ESD. History of the American West. (Same as History 232.)]


Explores the critical components, principles, and tools of good sustainable design. Uses design exercises, readings, class discussion, field visits, and case studies to investigate why and how buildings can be designed in ways that are environmentally responsive and responsible. Issues include the relationship between sustainability and creative architectural form, as well as the importance of place and community in design. (Same as Visual Arts 233.)

[235c - ESD. Green Injustice: Environment and Equity in North American History. (Same as History 235.)]

238c. Natural Supernaturalism. Fall 2008. **DaVid Collings.**

Examines the Romantic attempt to blend aspects of the transcendental—such as the sublime, immortality, and divinity—with ordinary life, the forms of nature, and the resources of human consciousness. Discusses theories of the sublime, poetry of the English landscape, mountaintop experiences, tales of transfiguration, lyrics of loss, and encounters with otherworldly figures. Explores the difficulties of representing the transcendental in secular poetry and the consequences of natural supernaturalism for our understanding of nature. Focuses on the poetry of Wordsworth and Coleridge, along with writings by Milton, Burke, Kant, Percy Shelley, and Keats. (Same as English 238.)

Prerequisite: One first-year seminar or 100-level course in English or environmental studies.

240b. Environmental Law. Every other year. Fall 2009. **The Program.**

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 the relationship between economic development, biodiversity conservation, and people’s livelihoods as it is playing out in India. Development is having significant impacts on the environment and on rural communities, especially communities that depend on natural resources for their livelihood or where protected areas are set aside for nature. Addresses these local challenges as well as macroeconomic policies and globalization. (Same as Asian Studies 205.)

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.)

244c - VPA. City, Anti-City, and Utopia: Building Urban America. Fall 2010. JILL PEARLMAN.

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.)

245c. The Nature of Frank Lloyd Wright. Spring 2010. JILL PEARLMAN.

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. Fall 2008. MARK BATTLE.

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 Geology 257 and Physics 257.)

Prerequisite: Physics 104 or permission of the instructor.

256c,d - IP. Environment and Society in Latin America. Spring 2009. ALLEN WELLS AND NATHANIEL WHEELWRIGHT.

Examines the evolving relationship between the environment, politics, and culture in Central America and the Caribbean. Topics include the environmental impact of economic development; colonialism; the predominance of plantation monoculture, slavery, and other forms of coerced labor; and political instability. (Same as History 256 and Latin American Studies 256.)
Courses of Instruction

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.)

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 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.

Bowdoin faculty and students have been traveling to the Arctic since 1860, studying northern environments and cultures, and exploring unmapped regions. Their work is part of a longer history involving Westerners who have been exploring the Arctic for centuries, drawn by a desire to map the geography of the earth, claim lands and their resources, find new shipping routes, understand Arctic environments, and develop insights into the lifeways of northern indigenous peoples. Examines some of the social, economic, political, and scientific factors shaping Arctic exploration. The ways in which expeditions and specific explorers affected and continue to affect northern peoples, the general public, and the contemporary geopolitical landscape will be examined. Students will read published accounts and unpublished journals and papers, and will study archival photographs and motion picture films. (Same as Anthropology 266.)
Prerequisite: Anthropology 101 or 102.

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.

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.
276a - MCSR. Watershed Hydrology. Every fall. Fall 2008. PETER LEA.

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 Biology 158 (same as Chemistry 105 [formerly Chemistry 180] and Environmental Studies 201).


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, 225, or 327.

283c. Environmental Education. Fall 2008. KARA WOOLDRIK.

Examines the role of environmental education within environmental studies while providing students with the opportunity to gain hands-on experience within a local elementary school. Students read, research, analyze, discuss, and write about theoretical essays, articles, and books from the field of environmental education, in addition to theoretical material on pedagogy and lesson plans. Topics discussed include ecological literacy, the historical roots of environmental education, globalization, sustainable education, and policy implications of environmental education. In addition, students teach at least one hour weekly. Students develop lesson plans and reflect on their experience of teaching environmental education lessons.

Prerequisite: Environmental Studies 101.


[305a. Environmental Fate of Organic Chemicals. (Same as Chemistry 305.)]

312b. Cultures Weathering Environmental Change. Fall 2008. SUSAN KAPLAN.

The earth’s environment has changed in both subtle and dramatic ways over the last 20,000 years. Some changes have resulted from natural processes, while others have been triggered by human activities. Examines the complex relationships between cultures and environments using examples drawn from archaeological, ethnohistorical, and historical records. Why do some cultures adapt successfully to changes in marine and terrestrial conditions, shifts in resource availability, and catastrophic events, while others fail? What can we learn from these examples as we reflect on contemporary responses to environmental change? Case studies will be drawn from around the world. Students will work with archaeological, cultural, and paleoenvironmental data. (Same as Anthropology 312.)

Prerequisite: Anthropology 101, 102, or Sociology 101; and two 200-level courses in anthropology, archaeology, environmental studies, or sociology.

318b. Environmental and Resource Economics. Spring 2009. GUILLERMO HERRERA.

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,
Courses of Instruction

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.

Human activities over the last several centuries have transformed landscapes, altered biogeochemical cycles, and moved species from one continent to another. These changes have resulted in widespread species extinction and climate change. Emphasis is on the implications of ecosystem degradation, climate change, and species introductions for biodiversity and ecosystem services. Course consists of lectures and student-led discussions of current and classic primary literature. (Same as Biology 327.)

Prerequisite: Biology 158 (same as Chemistry 105 formerly Chemistry 180) and Environmental Studies 201, 215, or 219.


Seminar. From tenements to the projects, picturesque Borderlands to standardized suburbia, and on to recent efforts at affordable and sustainable housing, explores the history of home in North America for people of all social classes. Based on the premise that the places we live in, whether by choice or circumstance, offer powerful statements about human values and desires, political and social ideals and practices, changing ideas of family and gender, and private and public life. (Same as History 289.)

Prerequisite: Physics 229, 255, 256, or 300, 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.

[365c. Picturing Nature. (Same as Art History 365.)]


[391. Troubled Waters: Fishing in the Gulf of Maine.]

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.)
Offers students the opportunity to synthesize work done in geology courses, to critically read and discuss articles, to listen to speakers prominent in the discipline, and to write scientific essays. Specific topic varies by year; possible topics include Global Environmental Changes in the Oceans, Estuaries, and Mountain Belts. Required for the major in geology. Open to junior or senior geology majors or minors, or interdisciplinary majors in geology-chemistry and geology-physics. (Same as Geology 393.)
Prerequisite: Geology 101 and 202, and 275 or 276, or permission of the instructor.

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. Examines 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 158 (same as Chemistry 105 [formerly Chemistry 180] and Environmental Studies 201) or 215 (same as Environmental Studies 215).

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: Environmental Studies 202 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 or 258, or permission of the instructor.

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,d. Introduction to World Prehistory.** Fall 2008. **Scott MacEachern.**

**Anthropology 221b - ESD. The Rise of Civilization.** Fall 2008. **Scott MacEachern.**

**Humanities**

**Visual Arts 190c - VPA. Architectural Design I.** Fall 2008. **Wiebke Theodore.**

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**Film Studies**

*Associate Professor: Tricia Welsch, Chair*

*Department Coordinator: Emily C. Briley*

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.

**Requirements for the Minor in Film Studies**

The minor consists of five courses, four of which must be courses offered by the Department of Film Studies. One course must come from another department’s offerings, and at least one course must be at the 300 level or be an independent study. No more than two courses below the 200 level (including **Film Studies 101**) will count toward the minor. Courses in which D grades are received will not count toward the minor. Courses taken on a non-graded basis (Credit/D/Fail) will not count toward the minor.

**Required Courses:**

- **Film Studies 101**
- **Film Studies 201 or Film Studies 202** (both 201 and 202 may be counted toward the minor)