

## Environmental Studies Course Offerings and Descriptions (below table) for Spring semester 2021

### Guidelines double-counting courses between majors & Minors:

<https://www.bowdoin.edu/registrar/pdf/double-counting-rules.pdf>

### Please note the following policy changes this year:

#### Environmental Studies Credit D/F policy change for academic year 2020-2021:

Majors may take one concentration course or their introductory science course requirement Credit/D/Fail during the 2020-2021 academic year only.

- In extenuating circumstances, they can petition the Recording Committee for exceptions to this policy.
- This policy does not apply to Environmental Studies minors

**\*\* The deadline to submit official AP/IB scores for all students has been extended until December 31, 2020.** Normally, 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.

**\*ES AP/ IB credit:** Students with a score of five on the Environmental Science AP exam, or a minimum score of five on the Environmental Systems and Societies IB exam, can earn one general credit if the student completes ENVS 2201 Perspectives in Environmental Science with a minimum grade of B-. If the student declares a coordinate major in ES, has a score of five on the AP/ IB exam, and takes ENVS 2201 Perspectives in Environmental Science with a minimum grade of B-, the student is exempt from taking an introductory science course and does not need to replace it with another course.

Course #, mode/Block	Course Title/ Prerequisite	Faculty/ Requirements course may fulfill, Day/ time
ENVS/BIO 1090 Online Block 3	Understanding Climate Change Prerequisite: n/a	David Carlon Fulfills: a., ins MWF 12:00-1:20 pm
ENVS 1102/ EOS 1505A Online Block 1	Oceanography Prerequisite: n/a	Stefan Gary/ Cathryn Field Fulfills: a, ins, intro science course M 10:30-11:50 am W 7:00- 8:20 pm R 11:00-12:20 pm
ENVS 1102/EOS 1505B Online Block 2	Oceanography Prerequisite: n/a	Stefan Gary/ Cathryn Field Fulfills: a, ins, intro science course M 1:30-2:50 pm T 7:00-8:20 pm R 12:30-1:50 pm
ENVS 2004/ DCS 2335 Online w. in-person components Block 8	GIS & Remote Sensing Prerequisite: n/a	Eileen Sylvan Johnson Fulfills: a., MCSR T 12:30-1:50 pm R 8:00-9:20 am F 1:30-2:50 pm
ENVS 2201/ BIO 1158/ CHEM 1105 Online Block 7	Perspectives in Environmental Science Prerequisite: One of the following: BIOL 1101, 1109, CHEM 1091 – 2260, PHYS 1130, 1140, EOS 1105, 1305/ES 1104, 1505/ES 1102), 2005/ES 2221) 2115, 2335, 2345/ES 2270, 2365, 2525/ES	Phil Camill/ Mary Rogalski/Shana Stewart Deeds Fulfills: a., INS, MCSR, ES Core T 8:00-9:20 am W 3:00-6:00 pm F 10:30-11:50 am

	2251), 2535, 2585/ES 2282 or ES 1101	
ENVS 2250/ EOS 2020 Online Block 6	Earth, Ocean & Society Prerequisite: n/a	Emily Peterman Fulfills: a. INS M 7:00-8:20 pm W 1:30-2:50 pm F 3:00-4:20 pm
ENVS 2251/ EOS 2525 Online Block 2	Marine Biogeochemistry Prerequisite: Two of- EOS 1100 - 1999 or either ENVS 1102 or 1104 or ENVS 1515 and EOS 2005/ES 2221)	Michele Lavigne/ Elizabeth Halliday Walker Fulfills: a M 1:30-2:50pm, T 7:00-8:20 pm R 12:30-1:50 pm
ENVS 2302/ ECO 2218 Online Block 7	Environmental Econ & Policy Prerequisite: ECON 1050 or ECON 1101 or Placement in ECON 1102 or Placement in earned ECON 1101 or Placement in ECON 2000 Level	Erik Nelson Fulfills: b., MBSR T 8:00-9:20 am, W 3:00-4:20 pm F 10:30-11:50 am
ENVS 2308/ GOV 2470 Online Block 1	International Environmental Policy Prerequisite: n/a	Allen Springer Fulfills: b. IP M 10:30-11:50 am W 7:00-8:20 pm R 11:00 am-12:20 pm
ENVS 2313/ GOV 2482/ LAS 2513 Online Block 3	Food, Environment & Development Prerequisite: ENVS 1101 or ENVS 2330/GOV 2910	Shana Starobin: Fulfills: b., IP, area of focus MWF: 12:00-1:20 pm
ENVS 2314/ GOV 2902 Online Block 5	Talking to Farmers and Fishermen: Social Science Field Methods for Environmental Policy Research Prerequisite: ENVS 2330/GOV 2910 or ENVS 2313/GOV 2482/ LAS 2513)	Shana Starobin Fulfills: b, ESD M 3:00-6:00 pm W 10:30-11:50 am R 7:00-8:20 pm
ENVS 2321 Online w. in-person components Block 7/10	Troubled Waters: Fishing in the Gulf of Maine: Prerequisite: ENVS 1101	Anne C.J. Hayden  T 8:00-9:20 am W 3:00-4:20 pm F 10:30-11:50 am
ENVS 2340/ GOV 2470/LAS 2540 Online Block 7/10	Global Political Ecology Prerequisite: n/a	Tulio Zille Fulfills: b., ESD, IP T 08:00 AM - 09:20 AM W 3:00 PM - 4:20 PM F 10:30 AM - 11:50 AM
ENVS 2377/ GOV 2577 Online w. In-person component including discussion sections and meetings for group projects. Block 4	Arctic Politics Prerequisite: n/a	Laura Henry Fulfills: b., IP MWF 9:00-10:20 am
ENVS 2403/ HIST 2182 Online Block 2	Environment & Culture in N. American History Prerequisite: ENVS 1101	Matthew Klingle Fulfills: c., ESD, ES Core M 1:30 PM - 2:50 PM T 7:00 PM - 8:20 PM R 12:30 PM - 1:50 PM
ENVS 2432/ HIST 2160 Online Block 5	History of the American West Prerequisite: n/a	Connie Chiang Fulfills: C., ESD M 3:00 PM - 4:20 PM W 10:30 AM - 11:50 AM R 7:00 PM - 8:20 PM

ENVS 2444/ HIST 2006 Online w. in-person components Block 1	City, Anti-city, Utopia: Building Urban America Prerequisite: n/a	Jill Pearlman Fulfills: c., (and Urban Studies minor) M 10:30 AM - 11:50 AM W 7:00 PM - 8:20 PM R 11:00 AM - 12:20 PM
ENVS 2477/ HIST 2607 Online Block 4	Maine: A Community & Environmental History Prerequisite: n/a	Sarah McMahon Fulfills: c TR 9:30-10:50 am
ENVS/BIO 3308 Online Block 3	Research in Ecology, Evolution & Marine Biology Prerequisite: Two of either BIOL 1102, or 1109 and either BIOL 2315, 2316, 2319, 2325, 2330, 2210, or 2327	Justin Baumann Fulfills: a.INS MWF 12:00-1:20 pm
ENVS 3902/ EOS 3020 Online Block 1	Earth Climate History Prerequisite: EOS 2005/ES 2221) or ENVS 2221	Phil Camill Fulfills: a, ES Senior Seminar M 10:30 AM - 11:50 AM W 7:00 PM - 8:20 PM R 11:00 AM - 12:20 PM
ENVS 3920/ ANTH 3210 Online Block 3	Animal Planet: Humans & Other Animals Prerequisite: ANTH 2000-2969	Susan Kaplan MWF 12:00-1:20 pm Fulfills: b, ES Senior Seminar
ENVS 3921/ ECON 3521 Online w. in-person components. Upper Level Seminar 2	Economic of Land Use Prerequisite: See classfinder	Erik Nelson Fulfills: b., ES Senior Seminar TR 2:00-3:20 pm
ENVS 3930/ BIO 3309 Online Block 2	Ecotoxicology: Pollution Impacts on ecosystems & Human Health Prerequisite: BIOL 2000 - 2969 or CHEM 2000 - 2969 or EOS 2000 - 2969 or ENVS 2201/BIOL 1158/CHEM 1105)	Mary Rogalski Fulfills: a., INS, ES Senior Seminar M 1:30 PM - 2:50 PM T 7:00 PM - 8:20 PM R 12:30 PM - 1:50 PM
ENVS 3957/ EOS 3050/ PHYS 3810 Online w. in-person components Block 6	Physics of Climate Prerequisite: PHYS 2150 or PHYS 2810/ES 2253/EOS 2810 or PHYS 3000	Mark Battle Fulfills: a., ES Senior Seminar M 7:00 PM - 8:20 PM W 1:30 PM - 2:50 PM F 3:00 PM - 4:20 PM
ENVS 3963/ GOV 3610 Online w. in-person components. If the situation permits, I hope to be able to incorporate several in-person litigation exercises into the course. Block 2	Advanced Seminar in International Relations: Law, Politics & the Search for Justice Prerequisite: n/a	Allen Springer Fulfills: b, IP, ES Senior Seminar M 1:30 PM - 2:50 PM T 7:00 PM - 8:20 PM R 12:30 PM - 1:50 PM
ENVS 3998 Online w. in-person components Block 4	The City Since 1960 Prerequisite: ENVS 2004/DCS 2335 or ENVS 2301/DCS 2340 or ENVS 2403/HIST 2182 or ENVS 2431/ARTH 2430 or ENVS 2444/HIST 2006 or ENVS 2445 or ENVS 2470/ARTH 2470 or AFRS 2220/GWS 2222/SOC 2220 or AFRS 2626 or AFRS 3230/HIST 3230 or GOV 2309 or HIST 1321 or HIST 2660/GSWs 2266) or HIST 2802/ASNS 2585 or SOC 2202	Jill Pearlman Fulfills: c, ES Senior Seminar (& Urban Studies minor) TR 9:30-10:50 am

## Course descriptions

ENVS/ BIO 1090a., ins. Understanding Climate Change (Carlton)

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.

ENVS 1102/EOS 1505 a., INS. Oceanography (Gary/Field)

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.

ENVS 2004, DCS 2335 a. MCSR. GIS & Remote Sensing (Johnson)

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.

ENVS 2201/ BIOC 1158/ CHEM 1105 a.,INS, MCSR. Perspectives in Environmental Science (Camill/Rogalski/Stewart Deeds)

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.

ENVS 2250/ EOS 2020 a. ins. Earth, Ocean & Society (Peterman)

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.

ENVS 2251/ EOS 2525 a. Marine Biogeochemistry (Lavigne/ Halliday Walker)

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.

ENVS 2302/ ECON 2218 b., MCRS Environmental Economics & Policy (Nelson)

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.

ENVS 2308/ GOV 2482 b., IP, International Environmental Policy (Springer)

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.

ENVS 2313/ GOV 2482/ LAS 2513 b., IP, Food Environmental & Development (Starobin)

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.

ENVS 2314/ GOV 2902 b., ESD Talking to Farmers & Fishermen (Starobin)

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.

ENVS 2321 Troubled Waters: Fishing in the Gulf of Maine (Hayden)

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.

ENVS 2340/ GOV 2470 b., IP, ESD. Global Political Ecology (Zulle)

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).

ENVS 2377/ GOV 2577 b., IP. Arctic Politics (Henry)

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.

ENVS 2403/ HIST 2182 c. ESD. Environment & Culture in N. American History (Klinge)

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.

ENVS 2432/ HITS 2006 c., ESD History of the American West. (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 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.

ENVS 2444/ HIST 2006 c. City, Anti-city, Utopia: Building Urban America (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. Semester-long research paper required. Note: This course is part of the following field(s) of study: United States.

ENVS 2477/ HIST 2607 c. Maine: A Community & Environmental History (McMahon)

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.

## ENVS/BIO 3308 a., INS Research in Ecology, Evolution & Marine Biology (Baumann)

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.

## ENVS 3902/ EOS 3020 a. Earth Climate History (Camill)

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 CO<sub>2</sub>, and disturbance to examine several issues: long-term carbon cycling and climate, major extinction events, the rise of C<sub>4</sub> 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.

## ENVS 3920/ ANTH 3210 b. Animal Planet: Humans & Other Animals (Kaplan)

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.

## ENVS 3921/ ECON 3521 b. Economics of Land Use: Ecosystem Services & Biodiversity (Nelson)

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).

## ENVS 3930/ BIO 3309 Ecotoxicology: Pollution Impacts on ecosystems & Human Health (Rogalski)

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

ENVS 3957/ EOS 3050/ PHYS 3810 a. The Physics of Climate (Battle)

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.

ENVS 3963/ GOV 3610 b. IP Advanced Seminar in International Relations (Springer)

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.

ENVS 3998 c. The City Since 1960 (Pearlman)

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.

**Please note** that during the 2021-2022 academic year, **ENVS 2403/ HIST 2182 will be offered in Fall 2021** and **ENVS 2330 / GOV 2910 will be offered in Spring 2022**