

# ENVIRONMENTAL STUDIES AND SCI (ES)

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## ES 100 - Environmental Concerns in Perspective

Credits: 3

An interdisciplinary, multiple-perspective approach to the study of environmental concerns. In this course, students study the interaction of human beings and their social, political, and economic institutions with the natural environment. Issues such as air pollution, water pollution, and land management are discussed from the perspectives of both the natural sciences and the social sciences. Local, regional, national, international, and historical perspectives on these issues are also discussed.

## ES 105 - Field Studies in Environmental Science

Credits: 4

An interdisciplinary scientific approach to the study of human-dominated landscapes and environmental issues. The primary context for the course is water movement through watersheds and landscapes and how human development can influence the resources and ecosystem services that natural systems provide, with an overall goal of understanding the structure, function, and management of ecosystems. We examine and study several regional watersheds, streams, and lakes, including Loughberry Lake, the primary drinking water supply for Saratoga Springs. Water supply and budgets, water chemical characteristics, and the natural and built structure of the surrounding landscapes will be analyzed from an ecological and biogeochemical perspective. The course involves laboratory and field work, emphasizes the scientific methodologies and communication, and exposes students to common techniques and methods used in environmental science.

**Prerequisites:** QR1 or MA 100 or placement at the FQR level or placement at the AQR level.

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Fundamental QR and Scientific Inquiry requirements.

## ES 205 - Ecosystem Science and Analysis of Forested Landscapes

Credits: 4

A critical and quantitative study of the ecology and management of forested watersheds at the local and global scale. Students will examine historical and contemporary issues in environmental science through the lens of forest structure, function, and disturbance. Field labs and field trips will address the ecology and history of regional forest and aquatic ecosystems, watersheds, and landscapes, including those of the North Woods and the Adirondacks. One weekend field trip is required.

**Prerequisites:** ES 100 and ES 105 or BI 108 and placement at the AQR level or completion of an FQR course or QR1; also, the student must have completed or be currently enrolled in CH 125; or consent of the instructor.

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Applied QR requirement.

## ES 206 - Environmental Engineering and the Science of Sustainability

Credits: 4

An application of ecological and ecosystem-based concepts and principles to the design of regenerative solutions for water-, waste-, soil-, and energy-related environmental problems. Using natural science methods as a foundation, students will critically evaluate and construct systems for a range of applications, including waste water treatment, brownfield restoration, composting, anaerobic digestion, and biofabrication. The overall goals of the course are to appreciate the complexity of environmental problems and potential solutions and to understand how discoveries in the primary scientific literature can be applied to design more efficient and sustainable closed-loop systems.

**Prerequisites:** ES 100 and BI 108 and placement at the AQR level or completion of an FQR course or QR1.

**Note(s):** Three hours of lecture, three hours of lab per week. Fulfills Applied QR requirement.

## ES 207 - Regenerative Environmental Systems

Credits: 4

An application of basic ecological concepts, theoretical principles, and advanced analytical techniques to regenerative systems design and assessment. Using an interdisciplinary solutions-oriented framework, we will explore the benefits and challenges of regenerative systems in both developing and developed nations for urban, terrestrial, and marine ecosystem management. Students will build their understanding during discussions, problem sets, and labs evaluating solutions to our most pressing environmental challenges.

**Prerequisites:** ES 100 and BI 108.

## ES 221 - Sustainable Development

Credits: 3

An examination of the concepts and practice of sustainable development as a process for resolving the tensions between economic development and the necessity to protect and preserve the global environment for future generations. Students will explore both domestic issues facing countries as they struggle to address their economic, social and environmental problems, and how their relationship with the rest of the international community influences their decisions. Students will explore the interplay among the pillars of sustainable development on both a local and global scale through the use of case studies (e.g., international fisheries).

**Prerequisites:** ES 100.

## ES 222 - Energy Systems and Sustainable Solutions

Credits: 3

An exploration of the fundamental physics of energy, the evolving designs and efficiencies of conventional and renewable energy production, and the comprehensive environmental impacts of various energy sources and systems. Students will analyze case studies in electricity generation, heating and cooling, and transportation, which will increase their understanding of the complexity of the factors that shape reasonable, more sustainable solutions to our growing energy demands.

**Prerequisites:** ES 100 and placement at the AQR level or completion of an FQR course or QR1.

**Note(s):** Fulfills Applied QR requirement.

**ES 223 - Environmental Justice**

Credits: 3

An exploration of local, national, and international case studies that highlight the origin of environmental racism. Environmental justice examines the disproportionate impact that marginalized populations bear from environmental hazards, vulnerability, and inequalities in enforcement of regulations. Students will dissect the research and policy challenges to incorporate environmental justice into environmental law, collaborative problem solving, and advocacy/mobilization tactics used to alleviate health, ecological, economic, and equity issues facing communities.

**Prerequisites:** ES 100 and SSP 100.**Note(s):** Fulfills the Bridge Experience requirement.**ES 224 - Political Ecology**

Credits: 4

Political Ecology is the study of the relationships between the political, social, and economic factors and environmental issues. This course introduces students to the array of broad political and socio-economic forces that shape the human relationships with the environment through various questions: Who has power over the environment? How is nature constructed and destructed? How do existing policies and stakeholder interactions affect the use of environment by society? How do resource conflicts arise and become resolved? How is environmental knowledge used and abused? These forces are multiple and interact in complex ways over a set of interlocking scales from local to global. We will address these issues by covering several case studies, both from the United States and the world. It is a civic engagement, service learning class.

**Prerequisites:** ES 100 and SSP 100.**Note(s):** Fulfills Bridge Experience requirement.**ES 225 - Human Rights and Development**

Credits: 3

An exploration of rights-based development approach with a focus on Sustainable Development Goals. Students use conceptual approaches and knowledge from diverse disciplines including history, economics, gender studies and environmental studies to analyze human development between the North and the South, and within countries; mutual benefits of political and economic rights-embedded development; and alternatives. Students work on case studies with local and/ or global focus, including poverty reduction strategies, maternal health, women immigrants, hunger and genetically engineered food, and climate justice.

**Prerequisites:** SSP 100 and ES 100 or permission of the instructor.**Note(s):** Fulfills Bridge Experience requirement.**ES 227 - Plastic Planet: The Promise and Perils of Polymers**

Credits: 3

An examination of the variety of modern plastics, their basic chemical and physical properties, and the scale of society's dependence on them. From this foundation, we will analyze impacts to public health and ecosystem functioning, along with policies that regulate plastics and the bioplastics that might provide more sustainable alternatives. Plastics are present in every facet of our lives, and their contributions to advances in medicine, transportation, construction, and electronics have provided huge societal benefits. Those benefits come at a cost, however; plastics derive from limited fossil fuels, leach toxic chemicals, litter our landscapes, and imperil marine life. How have plastics come to dominate our lives, and what are the human health and ecosystem effects of this domination?

**Prerequisites:** ES 100.**ES 241 - Adirondack Wilderness Experience**

Credits: 4

The Adirondack Park is the birthplace of the American concept of wilderness and land conservation. It is the second oldest park in the U.S. and the largest publicly protected area in the contiguous United States, larger than Yellowstone, Everglades, Glacier, and Grand Canyon parks combined. Today, it is on the cutting edge of how to turn the abstract principles of environmental sustainability into a set of feasible political, economic, and ecological principles. This class will examine the natural setting of the park, the environmental impact of humans on the park, the evolution of popular views of the wilderness, the attempts to balance development and preservation, the prospects of bio-regional level governance, and the major challenges to ecological, social, and economic success in the Adirondack Park. The emphasis of the course is on experiential learning and will involve various hikes and/or canoe trips into the wilderness itself.

**Note(s):** Summer only.**ES 252 - Topics in Environmental Studies**

Credits: 1-4

An interdisciplinary examination at the intermediate level of a subject area in environmental studies not available in existing course offerings. Specific topics vary by instructor, discipline, program, and semester.

**Prerequisites:** Permission of instructor.**Note(s):** The course, in a different subject area, may be repeated for credit.**ES 271 - Independent Study in Environmental Studies and Science**

Credits: 1-4

An opportunity for qualified students to pursue intermediate level independent study or research in environmental studies under the supervision of an appropriate faculty member. The written study proposal must be approved by the Environmental Studies Program before registration for the course. The student must produce a major research paper approved by the faculty sponsor and the ES Program.

**Prerequisites:** ES 100.**Note(s):** Only 3 credits in total from ES 271, ES 299, ES 371, or ES 399 may count toward the major or minor.**ES 281 - Disease and the Environment**

Credits: 3

An introduction to the study of the relationship between disease and the environment. We will study the epidemic of cholera in industrial Britain, the evidence linking smoking to lung disease, the relationship between exposure to lead and developmental problems in children, and other important cases in the history of epidemiology that yielded a link to environmental causes. We will continue using a "case study" approach to examine current issues in environmental disease. Students will be encouraged to learn problem-solving and technical skills as they work together to prepare their own group case.

**Prerequisites:** QR2.**ES 299 - Professional Internship in Environmental Studies and Science**

Credits: 1-4

An internship opportunity for students whose curricular foundations and curricular experience have prepared them for professional work related to the major field. With faculty sponsorship and Environmental Studies Program approval, students may extend their educational experience in environmentally related interdisciplinary areas such as environmental consulting, environmental advocacy, environmental law, and environmental outreach.

**Note(s):** Only three credits in total from ES 271, ES 299, ES 371, or ES 399 may count toward the major or minor. Must be taken S/U. Not for liberal arts credit.

**ES 301 - Urban Ecology**

Credits: 4

**ES 302 - Environment and Development in the Middle East**

Credits: 4

An interdisciplinary study of the natural and human environment in the Middle East, addressing major development and environmental topics, including impacts of oil and other natural resource use; modernization and large dam projects; population growth and access to water, energy and food; and climate change and other transboundary environmental issues. Students will explore the complex characteristics of Middle East environmental issues at both the regional and global scales through the examination of case studies from the region.

**Prerequisites:** one gateway course (ES 100, IA 101, PL 101, PL 103, SO 101 or AN 101) and one 200-level course (any 200-level ES course, PL 239, PL 241, PL 231, or SO 223).

**Note(s):** Global Cultural Perspectives requirement.

**ES 303 - The Politics of Food, Agriculture, and Social Justice**

Credits: 4

An examination of the global agro-food system and the politics of food consumption. Students will study the environmental problems and social inequalities that arise from the dominant forms of production and distribution of food and explore alternative strategies that promote social justice and environmental sustainability.

**Prerequisites:** One gateway course from ES 100, IA 101, PL 101, PL 103, SO 101, AN 101, or HP 242 and one 200-level ES course or PL 231 or SO 223 or AN 231 and SSP 100.

**Note(s):** Fulfills Bridge Experience requirement.

**ES 305 - Environmental Education**

Credits: 4

An exploration of environmental education in the U.S., as well as the various pedagogical tools, programs, and resources that are available for the global dissemination of environmental education. Students will examine innovations and philosophies behind experiential and authentic environmental education; sustainability education; research on environmental education (pro-environmental knowledge, attitudes, and behaviors); environmental service learning; adventure education; garden-based learning, and place-based learning. Students will design a curriculum and multi-unit lesson plan that they will teach to children and/or adults in partnership with a community stakeholder. This 4-credit service-learning course requires students to work for 30 hours in community schools, nonprofit organizations, and nature centers delivering environmental education lessons. Off-campus travel to service sites is a requirement.

**Prerequisites:** ES 100 or permission of instructor.

**Note(s):** Fulfills Social Sciences requirement.

**ES 306 - U.S. Public Lands and Oceans: Policy, Law, Management, and Current Events**

Credits: 3

An investigation of the policies, laws, and philosophies governing the management of U.S. public lands and oceans. State and federal agencies manage, and at times mismanage, public lands and oceans for their diverse recreational, economic, and environmental values. Students will examine the science and cultural forces that influence the management of tribal, state, and federally owned public resources. We will interview active stakeholders in the public lands and oceans policy arena, which include a diversity of activists, agencies, tribes, non-governmental organizations, researchers, and industries.

**Prerequisites:** One gateway course (ES 100, IA 101, PL 101, SO 101, PL 231) or permission of instructor.

**Note(s):** Fulfills Social Sciences requirement.

**ES 307 - Global Environmental Governance**

Credits: 3

An examination of the role of governments, scientific bodies, and non-governmental organizations in global environmental decision-making, and their use of science, law, economics, and ethics as political tools to create powerful representations of environmental problems or decisions over others. Students will investigate who produces global environmental knowledge about the world, and what that knowledge means in terms of intervention global environmental decisions. They will also explore the relationship between scientific/institutionalized and local knowledge productions, global politics, knowledge as a form of power, and power and the politics of intervention.

**Prerequisites:** ES 100 and one other 200 level IA or ES class or permission of the instructor.

**ES 308 - Soil and Watershed Science for a Crowded Planet**

Credits: 4

An introduction to the ecology, geography, and management of the soil resource, with a focus on sustainable watersheds and the resource demands of an ever-expanding human population. Soil properties and processes are the foundation of ecosystem functioning and provide many of the ecosystem goods and services upon which all life on earth depends, including regulation of hydrologic cycles, climate, and global water and food security. Most regional to global-scale environmental challenges are related to soil. Students will acquire an understanding of soil properties in relation to watershed-scale processes and dynamics, sustainable management of the soil resource, and the consequences of policy decisions related to soil and water. Specific topics include nutrient availability in time and space, organic matter turnover, and the role of soil in the climate, water, and food systems. Field- and laboratory-based activities will focus on forest, agricultural, and urban watersheds of the upstate NY region.

**Prerequisites:** ES 205 or BI 241.

**ES 309 - Wicked Environmental Problems: Managing Global Climate**

Credits: 4

An in-depth exploration of global climate change, impacts, and management. Students will explore the science of our dynamic climate system and study the ways environmental managers can tackle this complex challenge in the real world. Lectures, field tours, and quantitative laboratory exercises investigate the science of global climate in a local context. Students will critically evaluate management strategies and explore solutions for climate change adaptation and mitigation.

**Prerequisites:** ES 205 or ES 206 or ES 207, or ES 100 and any 200-level natural science lab course.

**ES 352 - Advanced Topics in Environmental Studies and Sciences**

Credits: 1-4

An interdisciplinary examination at the advanced level of a subject area in environmental studies not available in existing course offerings. Specific topics vary by instructor, discipline, program, and semester.

**Prerequisites:** Permission of the director.

**Note(s):** The course, in a different subject area, may be repeated for credit.

**ES 367 - ES Junior Seminar**

Credits: 1

**ES 371 - Independent Study in Environmental Studies and Science**

Credits: 1-4

An opportunity for qualified students to pursue independent study or research in environmental studies under the supervision of an appropriate faculty member. The written study proposal must be approved by the Environmental Studies Program before registration for the course. The student must produce a major research paper approved by the faculty sponsor and the ES Program.

**Note(s):** Only 3 credits in total from ES 271, ES 299, ES 371, or ES 399 may count toward the major or minor.

**ES 374 - ESS Research Capstone: Design and Methods**

Credits: 2

The first half of the ESS Capstone sequence. Student teams will select a community-based, natural or social sciences environmental problem and learn how to launch a formal research project. Preparation includes drafting a research plan (purpose or hypothesis, literature review, and methods) and developing data collection and analysis plans. Teams will present their research proposals to the class and begin collecting data for their projects.

**Prerequisites:** *Senior standing and declared Environmental Studies or Environmental Science major and permission of the instructor.*

**Note(s):** Fulfills Senior Experience Coda requirement.

**ES 375 - ESS Research Capstone: Data Collection, Analysis, and Communication**

Credits: 4

A research capstone in Environmental Studies and Sciences. Student teams implement their research plans developed in ES 374 and learn data analysis techniques, and develop skills in manuscript writing, professional presentation, and communication of environmental issues. The research experience culminates in a formal public presentation to faculty, students, and community stakeholders. A portion of the course is also dedicated to professional development, including resume design, interview skills, internship, employment, and graduate opportunities.

**Prerequisites:** *ES 374.*

**Note(s):** Fulfills Senior Experience Coda requirement.

**ES 399 - Professional Internship in Environmental Studies and Science**

Credits: 1-9

Interdisciplinary professional experience at an advanced level for juniors or seniors with substantial academic experience in environmental studies. With faculty sponsorship and Environmental Studies Program approval, students may extend their educational experience in environmentally related interdisciplinary areas such as environmental consulting, environmental advocacy, environmental law, and environmental outreach. The intern must produce a research paper related to the area of the internship, on a topic approved by the faculty sponsor and on-site supervisor.

**Note(s):** Only 3 credits in total from ES 271, ES 299, ES 371, or ES 399 may count toward the major or minor. Must be taken S/U. Not for liberal arts credit.