

# ENVIRONMENTAL SCIENCE (ENS)

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## ENS 500H Field Study in Natural History and Conservation of the Hudson Valley (3 credits)

This intensive field course will focus on the techniques and tools environmental scientists use to study current issues in conservation. Students will assess the local environment by collecting, analyzing, and interpreting data from local field sites and then use this information to develop environmental stewardship strategies. The course will be based on a mixture of traditional textbook readings and peer-reviewed literature. Classes will consist of lectures, field activities, and group discussions. Students will learn to identify local ecological communities including indicator plant and animal species as well as threats to these groups and associated management strategies.

**Course Rotation:** PLV: Spring

## ENS 500J Topics: Habitats of the Hudson Valley: Identification and Assessment (3 credits)

This intensive field course will focus on the techniques and tools environmental scientists use to study current issues in conservation. Students will assess the local environment by collecting, analyzing, and interpreting data from local field sites. Classes will consist of short lectures, field activities, and group discussions. Students will learn to identify local ecological communities including indicator plant and animal species as well as threats to these groups. Participants should feel comfortable spending long periods outdoors in a variety of weather conditions as well as hiking through uneven terrain.

**Course Rotation:** PLV: FALL.

## ENS 500K Flora and Fauna of the Hudson Valley (3 credits)

This intensive field course will focus on teaching students the basics of identifying local plants and animals. Students will also learn the natural history of plants and animals including habitat selection, predators and prey, threats, and conservation status. Classes will consist of short lectures, extensive field activities, and group discussions. Participants should feel comfortable spending long periods outdoors in a variety of weather conditions as well as hiking through uneven terrain.

**Course Rotation:** Spring

## ENS 501 Environmental Assessment and Environmental Impact Statement (EIS) Preparation (4 credits)

This course provides students with the skills to allow them to evaluate baseline site environmental conditions and to determine how these conditions will be impacted by various projects. Students will learn how to obtain environmental information and do field research. Environmental regulations that require the preparation of environmental impact statements will be discussed. Students will be presented with "real world" scenarios by environmental consultants, town planners and environmental lawyers. A class project will involve preparation of a Draft Environmental Impact Statement of a mock scenario.

## ENS 505 Conservation Biology (3 credits)

This course discusses the broad area of conservation in terms of biological principles and field and laboratory methods used in modern conservation biology. Current problems in conservation are also discussed.

**Course Rotation:** NY and PL: Spring.

## ENS 506 Wildlife Ecology (3 credits)

This course provides an overview of the field of wildlife ecology. Topics discussed include population ecology, dispersal, behavior, food resources, habitat resources, interspecies interactions, and sustainability.

**Course Rotation:** NY,PLV:Fall, Spring: Odd years

## ENS 511 Plant Ecology and Conservation (3 credits)

This course examines the relationship between plants and the environment they share with other organisms. Topics discussed include patterns of distribution and abundance and factors affecting them. Discussions on photosynthesis and resources emphasize the distinctive manners by which plants interact with their environment. Conservation issues, human use of plants by both indigenous cultures and economically as food, medicines and building materials are discussed.

**Course Rotation:** NY:PLV;Spring

## ENS 520 Ecology of Freshwater Ecosystems (3 credits)

This course will introduce students to the structure and functioning of freshwater aquatic ecosystems through lectures, discussions, and laboratory and field exercises. Students will learn how energy and matter move through aquatic ecosystems and how human activities have affected these pathways. An emphasis will be placed on sampling and analysis to assess the condition of these ecosystems. Sampling will be conducted at sites throughout Westchester County to provide students field experience with a diversity of aquatic ecosystems.

**Course Rotation:** Fall.

## ENS 526 Geographical Information Systems in Environmental Science (3 credits)

This course allows students to have a better concept of how data about spatial information can be used to analyze and solve environmental questions. GIS is an integrated computer-based system designed to capture, store, edit, analyze and display geographic information. Students will learn how to use this system in the research and future work.

**Course Rotation:** PLV; Spring: Odd Years

## ENS 600 Independent Study in Environmental Science (3-4 credits)

ENS 600A Independent Study in Environmental Science (A) (3-4 credits)

ENS 600B Independent Study in Environmental Science (B) (3-4 credits)

ENS 600C Independent Study in Environmental Science (C) (3-4 credits)

ENS 605 Ethics and Leadership (3 credits)

This course is designed to make students aware of their responsibility as professionals in leadership and administrative positions in our complex society. Individual values and normative choices associated with the implementation of public policy will be discussed. Social, legal and economic realities will be examined in light of philosophical arguments. Case studies and current examples relevant to government, health care, environmental science and nonprofit organizations will be used as practical applications of ethical precepts and conduct.

ENS 610 Environmental Science I (3 credits)

An interdisciplinary two-course sequence involving investigation of biological, chemical and physical processes of particular importance in dealing with environmental problems. Processes and interactions that include all earth systems involving terrestrial, aquatic, and atmospheric components will be covered in this course.

**Prerequisites:** Undergraduate Basic Sciences.

ENS 611 Environmental Science II (3 credits)

An interdisciplinary two-course sequence involving investigation of biological, chemical and physical processes of particular importance in dealing with environmental problems. Processes and interactions that include all earth systems involving terrestrial, aquatic, and atmospheric components will be covered in this course.

ENS 620 Environmental Analytical and Instrumental Method (0-4 credits)

Review of classical wet and modern instrumental analytical chemistry. Emphasis will be given to the use of atomic and molecular spectroscopic, chromatographic, and electroanalytical and instrumentation for environmental applications, focusing on those aspects of analysis which influence precision and accuracy of the data obtained.

ENS 622 Quantitative Methods in Environmental Science (0-4 credits)

This one semester lecture course focuses on improving the level of student understanding in quantitative analysis tools in environmental science. Students will survey principles of sampling methodology, testing protocols, analytical tools, data evaluation and statistics, as applied to environmental problems. This will prepare the students as leading scientists and researchers for their future career in Environmental Sciences. Demonstrations of experiments and exercises, with emphasis on environmental applications, will cover quantitative analytical methodologies such as titration, extraction, UV-VIS, Fluorescence, IR, AA, GC, HPLC, GC-MS, etc.

**Course Rotation:** PLV;Fall

ENS 623 Research and Statistical Methods (3 credits)

This course covers issues related to the proper manner in which develop and conduct a research project. Statistical issues related to environmental evaluations will be discussed, including minimal detectable levels proper sample size, and determination of proper methods for evaluation of data, using both parametric and nonparametric procedures.

**Prerequisites:** Undergraduate Basic Sciences.

ENS 624 Environmental Policy and Politics (3 credits)

Understanding the complex adaptive systems of environmental impairment and protection is an interdisciplinary effort that converges in the study of environmental policy. This course examines environmental politics and its underlying ethical considerations with an emphasis on the American political system. Students will receive a broad introduction to key concepts, actors, stakeholders, and issues related to environmental policymaking. Course material focuses on the role of government organizations- at the federal, state, and local level- institutional processes, and nongovernmental entities. Throughout the semester, we will discuss substantive environmental policy issues, such as water and air pollution, waste and biodiversity; land use, climate change, and population. At the conclusion of the semester, students should have an understanding of the historical, cultural, institutional, and ideological forces shaping environmental policy and regulations in the United States.

ENS 625 Environmental Science Communication (3 credits)

This course is designed to instruct in and develop strategies for effective communication of scientific issues. It involves discussions of how to communicate science, both orally and in written form, to expert and audiences. This will include evaluation of case studies involving presentations that are considered to be effective and those that are not, and will provide guidelines on how to avoid pitfalls that afflict many public speakers on scientific issues. Students will prepare both oral and written reports that will be critiqued for effective communication.

ENS 629 Topics in Marine Pollution (3 credits)

**Course Rotation:** NY:PLV; Spring

ENS 650 Environmental Law (3 credits)

A survey of U.S. environmental laws and regulations as applied to public policy. Introduction to international environmental laws, as well as common law and procedural principles as they relate to environmental challenges. A framework for understanding environmental politics will be developed. The goal is to have the student appreciate certain principles of constitutional and administrative law as they relate to the reduction of environmental risk. Historical roots of environmental attitudes and values with economic and convenience factors in mind are introduced.

**ENS 651 Research Methods for Ecological Field Studies (3 credits)**

This course provides an introduction to the manner by which biological data are collected, analyzed and reported for ecological field studies. The course will have both classroom and field components, and will explore areas such as territory and home range estimates, habitat evaluation, food habits, population viability analysis, population dynamics, GIS mapping, and genetic analyses.

**Course Rotation:** PL: Fall, odd years.

**ENS 690I Topics: Molecular and Cellular Biology (3 credits)**

This course provides a comprehensive introduction to cellular metabolism, including the molecular aspects of synthesis and regulation in the cell. Recombinant DNA and concepts of genetic engineering will be considered. Molecular biology as it applies to environmental issues will be presented.

**ENS 696A Topic: Field Entomology and Insect Ecology (1-9 credits)****ENS 696B Topic: Advanced Environmental Law and Policy (4 credits)****ENS 696C Topic: Limnology (4 credits)****ENS 696D Graduate Ecology (3 credits)**

Ecology is the study of the distribution and abundance of organisms in the natural world and of the processes that generate these patterns. This course will cover fundamental ecological concepts from a theoretical and empirical perspective, at the level of individuals, populations, communities, ecosystems, and the global environment. We will study how energy and materials move through ecosystems, succession, interactions among organisms such as parasitism, predation, competition, and mutualism, learn how organisms have adapted to challenges posed by their physical environment and explore how interactions between organisms and their physical environment shape our natural world. Material in the textbook will be extensively supplemented with information from the original literature. Assigned articles will form the basis of in depth, student-led, discussions following lecture. During the semester, schedules permitting, we will attend one or more seminars at the Institute of Ecosystem Studies in Millbrook, New York. A term paper is required.

**ENS 696E Limnology (4 credits)****ENS 696G Special Topics in Environmental Science: Environmental Project Design (3 credits)**

This course teaches the student how to design a project to address a specific environmental situation in the local environment. It will involve working closely with an engineer in a town department of environmental resources to solve a problem that cannot be addressed with the talents available in the town. The student will learn how to work within the framework of local government and budget constraints. A Pace graduate school instructor will supervise all the work. The course will receive a letter grade at completion.

**ENS 696H Topic: Globalization (4 credits)**

Course description: Globalization is very much a contested concept. Some emphasize the increasing interconnections between different player's economic, political and cultural and cultural fields while others stress the notion that globalization is essentially an effort to undermine the national sovereignty and authentic identities of nation states by transnational actors. Our primary mission in this course will be to sift through these various interpretations of what is meant by globalization, how to measure it and try to determine how widely spread it is. We will analyze the profound implications of these developments in such areas as trade, the natural environment and gender. The course will also pay special attention to the field of governance and the institutional structure to which globalization has given rise over the past two decades. It is hoped that the course will enable each of the participants to provide a clear and cogent response to the issue of whether globalization is a beneficial project in attaining a just, peaceful, sustainable and healthy environment

**ENS 696I Water Commodity/Water Habitat (3 credits)**

Introduction to the professional discipline of ecosystem management where the sustainability of a resource, such as water, is threatened because of a conflict over its use. At odds is use of a resource as a market/public commodity versus use for sustaining an ecological habitat- i.e., satisfying a rising demand for a better environment (functions) while achieving reliable water supply/hydropower reliability (services), known as the twofold ecosystem management goal.

**Course Rotation:** PLV: Spring

**ENS 696J Avian Ecology and Conservation (3 credits)**

This course will be an interactive discussion focused on avian ecology, behavior, and conservation that will also touch on some fundamental physiological and neurological processes underlying the lives of many species of birds. Topics such as sexual selection, reproduction, song learning and function, migration, effects of climate change, and approaches to conservation and management will be covered. The course will be based on a mixture of traditional textbook readings and critical evaluation of peer-reviewed literature. Classes will consist of short lectures, group discussions, student presentations, and learning to identify local bird species by sight and sound. The class will go on a Saturday or Sunday field trip to the Bronx Zoo to get a behind-the-scenes tour of the zoo's bird collection and bird exhibits, go on a birding walk along the Bronx River to look for spring migrants, and receive a field demonstration of mist-netting and bird banding.

**Course Rotation:** Spring

ENS 696M Urban Ecology (3 credits)

This course will provide students with a broad overview of the field of urban ecology. We will address what urban ecology is and investigate the process of urbanization. We will explore differences between urban and non-urban ecosystems and how 'ecosystem function' differs between the two. We will also discuss how structures such as individual species, alien species, and species richness respond to urbanization. This class will include the human aspect of urbanization. Specifically, we will explore human-wildlife interactions in urban environments, and how human health and wellbeing are influenced by urban ecosystems. As urban environments continue to grow, it is important to understand how best to integrate their complexities into the field of ecology and how best to conserve the biodiversity contained within these systems.

**Course Rotation:** PL: Fall, even years.

ENS 699 Special Topics in Environmental Science (4 credits)

This course will review basic biochemical concepts related to environmental issues. Specific studies will be discussed.

ENS 721 Advanced Environmental Testing (4 credits)

The analysis of environmental samples is studied from the acquisition of representative samples, through sample handling, chain of custody, sample storage, analytical method selection, analysis, data collection, reduction and treatment, method validation, and report writing. Interaction with client to discuss the data obtained is stressed. Includes field trips.

ENS 730 Environmental Microbiology and Biotechnology (0-4 credits)

This course will explore the relationships between microorganisms and the environment. Emphasis will be given to the fundamentals of biotechnology, the significance of microorganisms in its development, and the increasing importance of genetically engineered microorganisms to the restoration and preservation of the environment.

ENS 731 Field Botany and Vegetation Analysis (0-4 credits)

Methods for the identification of the local flora will focus upon the species diagnostic for specific ecosystems. Procedures for the analysis and description of vegetation will be described and utilized in the field.

**Prerequisites:** Note: Some Saturday field trips may be required.

ENS 770 Environmental Impact of Power Generation and Usage (4 credits)

The environmental impact of the various methods of power generation. Consideration of nuclear, fossil fuel, hydroelectric, wind, and solar generation of electric power. Impact of obtaining, using, and disposing of fuels. Control and minimization of pollution from chemicals and radioactive substances. Thermal pollution. Impact on land of power production and transmission. Consideration of the impact of normal procedures and of accidents.

ENS 772 Thesis Preparation (1 credits)

: The course is designed to prepare students for work on their Master's thesis. They will learn the objectives of and various steps involved with the thesis requirement. Discussion will include elements of a good written thesis and final oral defense. : PLV:Spring, Fall

ENS 780 Remote Sensing and Geographic Information Systems (0-4 credits)

This course provides students with the skills to allow them to evaluate baseline site environmental conditions and to determine how these conditions will be impacted by various projects. Students will learn how to obtain environmental information and do field research. Environmental regulations that require the preparation of environmental impact statements will be discussed. Students will be presented with "real world" scenarios by environmental consultants, town planners and environmental lawyers. A class project will involve preparation of a Draft Environmental Impact Statement of a mock scenario.

ENS 790 Environmental Science Seminar (1 credits)

Each student will identify an interdisciplinary problem in environmental science, survey the published literature that deals with potential solution for the problem, and present an oral report to the group, with an emphasis on stimulating group discussion.

ENS 792 Research in Environmental Science I (3 credits)

This is the required research course for all students in the program. Work may be laboratory or field-based. A thesis is required at completion of the research project.

**Course Rotation:** PL: Fall, Spring, and Summer.

ENS 793 Research in Environmental Science II (3 credits)

This is an optional second half of a research course for students in the program. Work may be laboratory or field-based. A thesis is required at completion of the research project.

**Course Rotation:** PL: Fall, Spring, and Summer.

ENS 798 Special Topics in Environmental Science (1-3 credits)

This course provides for an in depth analysis of a specific topic in the environmental sciences that is not part of the routine course offerings of the program or with in depth knowledge of a topic that was introduced in another course. The student will meet with the instructor on a regular basis to do independent library based research on the topic, and to develop at least one paper related to the subject matter of the course.

**Course Rotation:** NY and PL: Fall, Spring, and Summer.

**Prerequisites:** Instructor permission required. Registration open to Environmental Science majors only.

ENS 798A Topics (3 credits)