

# ENVIRONMENTAL STUDIES (ENST)

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## **ENST 1500 Introduction to Environmental Science 3 s.h.**

Basic environmental science literacy for informed citizens as inhabitants and stewards of Earth. The use of science and the scientific method to understand, assess, and manage the environment to improve human health, conserve energy and resources, preserve nature, and sustain quality of life.

**Gen Ed:** Environ Sustain, Natural Science, Social and Personal Awareness.

## **ENST 1500L Introduction to Environmental Science Lab 1 s.h.**

The use of the scientific method to explore various fields in environmental science including water quality, risk assessment, biodiversity and mineral uses. This field and laboratory work supplements ENST 1500.

**Prereq. or Coreq.:** ENST 1500.

## **ENST 1502 Environmental Sustainability 3 s.h.**

This course will introduce students to the science of sustainability. It includes an overview of the origins of the concept of environmental sustainability and the development of sustainability science as an independent discipline and investigates the methodologies used by scientists to develop sustainable systems. The course also will explore the sustainability of technological advances in global food production. Topics include the origins of agriculture, soil energy and conservation, industrial vs. organic agriculture, integrated pest management, genetically modified organisms (GMOs), and biofuels. An overview of various renewable and non-renewable energy resources, their distribution, availability, patterns of use, and impact on the environment will be addressed. Students will evaluate relative energy efficiencies, as well as political and economic impacts on energy.

**Prereq.:** None.

## **ENST 1503 Environmental Field Biology 4 s.h.**

Instrumental analysis of samples from aquatic systems involving automated calorimetry, atomic absorption spectrophotometry, gas chromatography, ion chromatography and high-performance liquid chromatography. Students will learn basic analytical techniques and apply them in group projects investigating real world water quality problems. Three hours lecture, two hours lab.

**Prereq.:** ENST 1500.

## **ENST 1504 Environmental Occupational Health and Safety 3 s.h.**

Provides an overview of the field of occupational health, with a focus on the impact that chemical, physical, and biological agents have on the public's health and the environment. Presents information related to the recognition, evaluation and control of the chemical, physical and environmental factors that can impact human health. Establishment and maintenance of safety programs are discussed. Collection, analysis and interpretation of safety data are considered. Approaches to safety used by international, national and local governmental agencies are reviewed, as well as recognition, evaluation, and control of occupational safety and health hazards (chemical, physical) that may cause injury and/or illness or cause significant discomfort to employees, or residents of the community.

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## **ENST 1506 Environmental Principles of Water Resources 4 s.h.**

This course will cover the components of a water-quality study within the focus of a watershed. Design concepts for environmental studies, aspects of data analysis, key chemical and biota indicators will be discussed. This course will also cover issues with potable water resources, including the treatment of drinking water and the post-treatment of waste water. Other topics covered will include the impacts of both urban water runoff and agricultural uses of water with a thorough review of the Clean Water Act that governs such policy, as well as Section 404 of the CWA permitting discharge to waters of the United States, including wetlands.

**Prereq.:** none.

## **ENST 1508 Environmental and Natural Resource Policy 3 s.h.**

Historical, ethical, economic, legal, and policy aspects of environmental science are analyzed with an emphasis on their interrelationships. Various strategies of pollution abatement are considered.

**Prereq.:** none.

## **ENST 1509 Hazardous Waste 3 s.h.**

This course will cover both solid, liquid, and hazardous waste. Technology, health, and policy issues associated with solid waste and hazardous materials are examined. Methods of managing solid and hazardous waste are introduced, and regulations are presented where appropriate. The characteristics of hazardous and solid waste materials, health frameworks, and the distribution of contaminants in the environment are reviewed. The course is extremely broad in scope spanning laws, regulations, treatment technologies, and risk assessment. While treatment technologies are presented and basic process design information is covered, the course is designed for breadth, not depth, in process design and hazardous waste management. The objective of the course is to provide a comprehensive and historical overview of hazardous waste management, drawing from both scientific and engineering principles, and prepare our students to be well-qualified and competitive in the responsibility of engineering design and permitting in the field of hazardous waste management.

**Prereq.:** None.

## **ENST 1510 Green Infrastructure 3 s.h.**

This course will focus on green infrastructure as it pertains to increasing eco-friendly alternatives to outdated infrastructure with the preservation of water and soils as the major goal. Green infrastructure including urban planning, small community planning of green spaces, rain gardens, eco-roofs, and porous pavement, will mimic the natural water cycle and provide additional social, economic, and environmental benefits. This online course features case studies, demonstration projects, and interactive tools to prepare both novice and experienced professionals with the knowledge and resources they need for successful green infrastructure implementation. A particular area of focus will be the relationship between green infrastructure for improving hydrology and riparian corridors as part of comprehensive green space planning for recreation and cultural resources. The course will look at a wide range of systems including water, transportation, and food systems.

**Prereq.:** none.

## **ENST 1511 Social-Ecological Systems and Sustainability 3 s.h.**

This course will cover the unprecedented environmental challenges largely as a consequence of unsustainable interactions with nature. In this course, we will explore themes related to the essentiality of biodiversity to ecosystem services, working with nature, biophilic design, permaculture and multifunctional agricultural landscapes, and collaborative decision-making, and use the tools of systems thinking and dynamics to explore linked socio-ecological systems. The class will explore the unintended environmental consequences of modern life after historical industrialization. The unintended consequences at the expense of natural resources, energy, and pollution-intensive food production, and the economic system's failure to work effectively within a socio-ecological system will be explored. Using evidence-based science, students will identify actionable strategies for sustainability.

**Prereq.:** none.

**ENST 1515 Waste Management 3 s.h.**

This course is designed to enable the learner to understand the main sources from where waste is derived, to appreciate the problems associated with waste disposal, to analyze waste reduction methods during the production phase and during the disposal cycle of a product, and to be aware of the move towards waste minimization techniques and the resulting overall benefits these will provide society. The student will acquire a range of practical skill and knowledge to be able to apply waste reduction methods in their own environment and also to an industrial/business enterprise.

**Prereq.:** None.

**ENST 2600 Foundations of Environmental Science 3 s.h.**

A survey of the principles and issues of environmental studies including basic ecology, biodiversity, hazardous and solid waste management, sustainable development, energy production and conservation, environmental ethics, air, water and soil pollution.

**ENST 2600L Foundations of Environmental Science Laboratory 1 s.h.**

Laboratory and field investigations identified in ENST 2600. Emphasis on the scientific method, problem solving and critical thinking skills in environmental assessment techniques, active exploration of environmental concerns and their solutions. Three hours per week. Field trips may require additional time past the scheduled lab time.

**Prereq. or Coreq.:** ENST 2600.

**ENST 2606 Global Perspectives in Alternative Energy Sources 3 s.h.**

This course will provide a global perspective to society's present needs and future energy demands. This course will provide an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources, their technology and application. The course will examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal and hydroelectrical power.

**Prereq.:** none.

**ENST 2620 Freshman/Sophomore Seminar 1 s.h.**

This one credit hour course will focus on various disciplines of environmental science. Invited speakers will present on various topics in environmental science and students will engage in scientific literature searching. Active portions of the course will include online database literature searches, scientific writing, citation methods, and basic instruction in using Microsoft Word, Excel and PowerPoint.

**Prereq.:** Freshman or sophomore standing.

**ENST 2650 Independent Study 1-3 s.h.**

The introductory study of problems or issues in Environmental Studies or a review of the literature relating to a specific environmental topic. May be repeated for different topics for a total of 6 s.h.

**Prereq.:** Permission of the director.

**ENST 3700 Environmental Chemistry 4 s.h.**

Study of the fundamental chemical principles underlying common environmental problems, including water pollution, toxicology, chemical biotransformation and degradation. Chemistry of pesticides, petroleum hydrocarbons and heavy metals are also investigated.

**Prereq.:** ENST 2600 and CHEM 1516.

**Coreq.:** ENST 3700L.

**ENST 3700L Environmental Chemistry Lab 0 s.h.**

Students will investigate various analytical and instrumental techniques used in the examination of chemicals in environmental media (soil, water, biota). Includes proper handling, storage and precautions in the laboratory and the environment. Taken with ENST 3700.

**ENST 3730 Air Quality 3 s.h.**

Sources, dispersions, consequences and abatement of air pollutants emanating from industry and transportation. Topics also include the history, legislation, standards and economics of air pollution.

**Prereq.:** CHEM 1515.

**ENST 3750 Seminar 1 s.h.**

Guest lecturers will examine current topics in environmental issues, including current research, application of technology, management strategies to reduce environmental impact, environmental ethics, policy, etc.

**Prereq.:** ENST 2600.

**ENST 3751 Water Quality Analysis 3 s.h.**

Introduction to physical, chemical, and biological measurements of water quality. Sample collection and laboratory analysis of natural waters, drinking water, and wastewater. Interpretation of environmental data. Two hours lecture and three hours laboratory per week. Identical to CEEN 3751.

**Prereq.:** CEEN 3736 OR ENST 2600; CHEM 1515.

**ENST 3751L Water Quality Analysis Lab 0 s.h.**

Laboratory experience in the analysis of natural waters, drinking water and wastewater. Emphasizes procedures for the collection and interpretation of data on current environmental problems. Three hours laboratory per week. Must be taken concurrently with ENST 3751. Identical to CEEN 3751L.

**Prereq.:** Must be taken concurrently with ENST 3751 (Note: already in course description).

**ENST 3752 Soil Quality and Analysis 3 s.h.**

Soil is an important environmental medium that must be analyzed to assess quality standards. Students develop the ability to conduct laboratory experiments and to critically analyze and interpret soil data. Furthermore, this course contributes to the background knowledge students need to assess environmental impact and risk, sustainability, health and safety.

**Prereq.:** CHEM 1515 and CHEM 1515L or equivalent.

**ENST 3775 Research Methods for Undergraduate 1 s.h.**

This course introduces the student to the fundamental and practical aspects of conducting research. The course emphasizes the scientific method, research methodologies, literature review, writing research proposals and the presentation of research results. Students will gain valuable experience in identifying a problem, developing a research plan and summarizing results. This course must be taken prior to engaging in undergraduate research.

**Prereq.:** junior or senior standing.

**ENST 3780 Environmental Research 1-4 s.h.**

A research project that involves problem identification, hypothesis formation, experimentation, data analysis and interpretation. The research may be either basic or applied.

**Prereq.:** Junior standing in ENST and permission of the director.

**ENST 3781 Environmental Sampling Methods 3 s.h.**

Sampling design, including number and types of samples and procedures for taking representative samples of air, water, soil and contents of storage and shipping containers. Two hours of lecture, three hours of laboratory.

**Prereq.:** ENST 2600 and STAT 2601 or equivalent.

**ENST 3784 Research Experience in Environmental Science 4 s.h.**

This capstone course will give student the experience in the planning and execution of a research project. Graduate schools and research establishments consider an undergraduate student research experience as extremely valuable. Research provides students with an opportunity to work with faculty and graduate students on more advance research topics. Research furthers our knowledge of basic environmental science and helps us find solutions to environmental problems. The process improves student skills in gathering data, brainstorming ideas, evaluating data, and discussing the results to others through written and oral presentations. Environmental research can be focused on fieldwork, computer simulation, or laboratory analysis.

**Prereq.:** Senior standing, Environmental Science major, ENST 3751 or ENST 3752.

**ENST 3790 Internship/Cooperative 1-4 s.h.**

Students work under the direction of a faculty supervisor in a governmental agency or in the private sector as environmental specialists. An activities log and summary report are required. The course may be repeated.

**Prereq.:** Junior standing in ENST and permission of the director.

**ENST 4822 Water Pollution Control 3 s.h.**

Sources and prevention methods of water pollution, human activities and natural conditions that influence water quality, protection methods and regulations of water quality, contamination and remediation of groundwater. 3 s.h.

**Prereq.:** GEOL 1505 or ENST 2600.

**ENST 4840 Topics 1-3 s.h.**

Independent study of special topics not included in available courses. Students do extensive reading in, and write a formal report on, a specific area of Environmental Studies.

**Prereq.:** Junior standing or consent of instructor.

**ENST 5800 Environmental Impact Assessment 3 s.h.**

Analysis of the potential environmental effects resulting from the construction of buildings, highways, parking lots, mines, reservoirs, and waste disposal facilities. Standard procedures are taught for evaluating and reporting the environmental impact of these activities.

**Prereq.:** ENST 5860 and senior standing.

**ENST 5810 Environmental Safety 3 s.h.**

The proper use of environmental monitoring instruments and personal protective gear. Participation in a series of realistic, hands-on simulation exercises that address a variety of waste clean-up situations. Topics include chemical and physical hazards of chemical compounds and toxicology and adverse effects of chemical exposure. Class meets three hours per week. Successful completion of the course earns OSHA Hazwoper 40 hour training certificate.

**Prereq.:** ENST 2600, equivalent experience or permission of instructor.

**ENST 5820 Sustainability, Climate Change, and Society 3 s.h.**

This course explores environmental, economic, and social aspects of sustainable development, with an emphasis on economy and society. Through topics such as water, food, and climate change, we examine the role of humans and institutions in sustainable development and possibilities for reconfiguring relationships between our institutions and the natural world.

**Prereq.:** junior, senior or graduate level standing.

**ENST 5830 Toxicology and Risk Assessment 3 s.h.**

A study of environmental toxicology of chemicals, primarily anthropogenic pollutants, and their effect on humans and ecosystems. Includes transportation of pollutants in the environment, biochemical reactions, toxicity testing methods, and dose-response assessment. Continues with an introduction in the process of estimating risk and the perception of those risks including how risk is used to set environmental standards.

**Prereq.:** ENST 1516 and 9 sh >3700 in ENST, CHEM, BIOL, GEOL or CEEN, junior, senior or graduate standing.

**Gen Ed:** Capstone.

**ENST 5860 Environmental Regulations 3 s.h.**

An examination of federal and state regulations that relate to cleanup of abandoned waste sites, management of waste from current waste generators, development of new hazardous products and chemicals, safety and health issues, and control of pollution into air and water.

**Prereq.:** ENST 2600 or equivalent.

**ENST 6900 Advanced Environmental Studies 3 s.h.**

A study of the principles and issues of environmental science, health, technology, and affairs. Topics will include contaminant chemistry; terrestrial and aquatic ecology; risks to human health; waste management; conservation; and sustainable development, energy, and pollution. Local, regional, and global issues will be studied.

**ENST 6901 Sources of Contamination 3 s.h.**

A study of the sources and fate and transport of air, water, and soil contaminants that have potential to adversely affect human health and the environment. Topics will include measurement of environmental parameters, data collection and reporting, interpretation of results, compliance issues, and economic implications.

**ENST 6905 Teaching Methods in Geology and Environmental Science 2 s.h.**

A required course for all Department of Geological and Environmental Sciences graduate teaching assistants. This course will provide guidance and instruction in teaching introductory laboratories in the department.

**ENST 6920 Environmental Compliance 3 s.h.**

Regulatory compliance concerning operations of environmental and health and safety departments. RCRA permitting (NPDES and air emissions), landfilling, Right to Know, waste generation, storage, shipping (manifests and placarding), disposal of wastes, MSDS, OSHA regulations, safe work practices, hiring consultants (technical and legal), writing requests for proposals, and documenting and report writing.

**Prereq.:** ENST 5860, ENST 6900, or equivalent.

**ENST 6921 Industry/Institutional Management for the Environmental Professional 3 s.h.**

A comprehensive background in management principles and operations relating to the environmental professions. Topics include budgeting, staffing, scheduling, leadership, and quality assurance/control. The student will learn to write, evaluate, and implement technical and cost proposals for contracts and grants, scopes of work, operations plans, sampling and analysis plans, health and safety plans, job descriptions, resumes, statements of qualifications, mission statements, meeting agendas (for professionals and the general public), and other written and oral communications (reports, memoranda, memoranda of understanding, policy briefs, press releases, fact sheets, requests for information).

**Prereq.:** ENST 6900 or equivalent.

**ENST 6931 Ecological Risk Assessment 3 s.h.**

The student will examine environmental risks to nonhuman populations. Topics will include the study of measurements of adverse effects due to one or more stressors by examining population communities and ecosystems. Also, the class will study the following issues: threatened and endangered species, wetlands, endocrine disruption, multiple stressors, sediment and soil toxicity, conservative screening versus site-specific studies, and natural resource damage claims.

**Prereq.:** ENST 6900 and ENST 5830 or equivalent.

**ENST 6990 Thesis 1-6 s.h.**

Hours arranged. Applicable to master's degree in environmental studies. Research selected and supervised by departmental advisor and approved by graduate faculty of environmental studies program and graduate dean. May be repeated.

**ENST 6995 Introduction to Environmental Science Research 2 s.h.**

This course introduces the student to the fundamental and practical aspects of research, especially as they apply to environmental sciences. The course emphasizes research methodologies and ethics, how to review the literature, how to write a research proposal, and how research results are presented. The course will include presentations of the faculty research interests.

**Prereq.:** graduate standing or permission of instructor.

**ENST 6999 Special Topics in Environmental Science 1-3 s.h.**

Environmental science topics selected by faculty from fields of current research interest or of special emphasis. May be repeated with a different topic up to a total of six semester hours.

**Prereq.:** Permission of director.

**ENST 6999M ST Master Project/Report 1-3 s.h.**

Course for graduating masters student to prepare for writing their thesis and presenting. May be repeated with a different topic up to a total of six semester hours.

**Prereq.:** Permission of director.