

# ENSC: ENVIRONMENTAL SCIENCE

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## ENSC 1000 Earth Science (4 Credits)

The natural physical environment undergoes constant change that impacts human populations and natural ecosystems around the world. To better understand the dynamic interactions driving these patterns of change, Earth scientists employ a system science approach to the study of the dynamic interactions within and among the 4 spheres of the Earth: geosphere, hydrosphere, atmosphere, and biosphere. In this study, students examine Earth system dynamics including the rock cycle, tectonic activity, stream and ocean dynamics, and weather and climate systems. Students explore methods by which geological and climate histories have been reconstructed to establish a record of long term environmental change. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services (Disability.Services@sunyempire.edu) in advance of registration to determine if this course is appropriate and what alternatives may be available.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

## ENSC 1002 Energy: The Issues & the Science (4 Credits)

This course will discuss fundamental energy science principles. Students will examine the origin and flow of energy through the system, what it does, and its ultimate fate. Topics will include origins of energy resources, and the science of energy. Fundamental energy resources such as fossil fuels, nuclear, geothermal, tidal, solar, and wind will be examined along with their issues and related technologies. The course will look at current issues in energy involving economics, public policy, and environmental concerns through the scientific method. Students will be challenged to critically examine the use of energy in our society. This course was previously SMT-271544 Energy: The Issues and the Science.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

## ENSC 1004 Global Climate Change (4 Credits)

There is little doubt that the Earth's climate is changing due to the influence of human activities. In this course, students will explore the evidence that climate change is occurring, how human activities have affected this process, the primary forces influencing the Earth's climates, and what steps can be taken to adapt to or mitigate these changes. This course requires students to examine, critique, and analyze global climate change using the scientific method and disciplinary approaches from social, political, and economic studies. They will also research climate solutions requiring analysis, synthesis, and evaluation. This course was previously SMT-272114 Global Climate Change.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

## ENSC 1006 Introduction to Ecology & Sustainability (4 Credits)

This study provides an introduction to the principles of ecology, and an overview of biological adaptation and sustainable development. Emphasis will be on using the scientific method to learn about the organization and function of ecosystems, the interactions of human social systems with them, and how social institutions and processes contribute to, or conflict with, sustainability. Specific topics will include general ecology, population ecology, energy, pollution, global climate change, conservation, and land use issues. The course will integrate longstanding ecological principles with a more recent focus on achieving ecologically sustainable development. This course was previously SMT-271504 Introduction to Ecology and Sustainability.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

## ENSC 1200 Environmental Science (4 Credits)

This study provides an introduction to the theories, principles, and concepts which are broadly related to the functioning of natural environmental systems and which are essential for understanding specific issues related to human use of resources and human interaction with the environment. The topics covered include the laws of matter and energy; ecosystems; evolutionary theory; species characteristics and speciation; population biology; climate and biomes; and air, water, soil, and energy resources. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services (Disability.Services@sunyempire.edu) in advance of registration to determine if this course is appropriate and what alternatives may be available.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

## ENSC 1998 Individualized Studies in Environmental Science (ENSC) (1-8 Credits)

Students have the opportunity to develop individualized studies with their mentor in Environmental Science (ENSC). Registration for this class must be approved by the student's mentor.

## ENSC 2000 Principles of Environmental Sustainability (4 Credits)

This is an interdisciplinary study designed to introduce key concepts of environmental sustainability. Students will be introduced to the definitions of sustainability, systems thinking, and the skills needed to analyze human-environment interactions from a sustainability perspective. Students will learn how the biophysical world works, covering topics such as: ecosystem organization and functions; material cycles; ecological diversity and complexity; and the rate of ecological change. They will also consider the environmental impacts of human activities such as agriculture, fishing, extraction, manufacturing and building and propose sustainable solutions. The learning activities emphasize real-world problem-solving and critical thinking.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

## ENSC 2998 Individualized Studies in Environmental Science (ENSC) (1-8 Credits)

Students have the opportunity to develop individualized studies with their mentor in Environmental Science (ENSC). Registration for this class must be approved by the student's mentor.

**ENSC 3000 Meteorology (4 Credits)**

In this study, students will explore meteorological processes and phenomena as they build upon their basic knowledge of atmospheric science: physical, chemical, and biological characteristics of the atmosphere, air masses, cloud formation, weather patterns, severe weather, global climates, and geological/historical patterns of climate change. Students will study flows of energy and moisture which drive global, regional, and local weather patterns. They will explore ways weather is forecasted-the methods and technologies behind the analysis of atmospheric conditions and weather prediction. They will analyze patterns and dynamics of severe weather including: tornadoes, hurricanes, typhoons, flooding, drought, heat waves, and blizzards. Prerequisites: Earth Science, Introduction to Geology, or Environmental Science. Foundational knowledge about Earth's system processes gained in a lower level earth science or atmospheric science course.

**Attributes:** Liberal

**ENSC 3002 Global Climates (4 Credits)**

The Earth's climates provide the temperature and moisture contexts for life on Earth. In this course, students will study ways the Earth's astronomical position and the atmosphere's interactions with land surfaces, oceans, and aquatic/terrestrial organisms create the global climates to which entire ecosystems have adapted. Students will apply methods of climate classification and climate data analysis. Students will explore methods by which climate has changed throughout geological time and examine current trends in climate change. Particular emphasis will be placed on the impacts of climate change on weather patterns (trends towards the extremes), species/species populations, water availability, and food security. Foundational knowledge in the natural sciences is required. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services (Disability.Services@sunyempire.edu) in advance of registration to determine if this course is appropriate and what alternatives may be available. Prerequisites: Earth Science, Introduction to Geology, or Environmental Science, or equivalent.

**Attributes:** Liberal

**ENSC 3004 Dendrology (2 Credits)**

This course is an applied study in tree identification / classification (taxonomy) and habitat interpretation (forest composition and structure). Students will learn and apply diagnostic skills using a dichotomous key (focus on use of leaves, stems, and twigs in identification). They will explore the relationships between species characteristics-morphology, life history, etc.-and population and community patterns of distribution on a regional and global scale. Prerequisite (must complete before registering): Foundational knowledge gained in an introductory biology, environmental science, or ecology course, or equivalent.

**ENSC 3006 Natural Disasters (4 Credits)**

As human populations continue to increase, the probability of human encounters with natural hazards such as hurricanes, earthquakes, volcanic eruptions, flooding, mudslides, tornadoes, forest fires, blizzards, and tsunamis, also increases. This course explores the scientific processes behind natural disasters and examines the way disasters have impacted human populations—environmentally, culturally, economically, and politically—throughout history. The course heightens students' awareness of the impacts of more recent natural disasters on current populations around the world. Students explore ways inequities related to race, ethnicity, gender, access, and economy affect characteristics of disaster impact and apply their research to develop sustainable mitigation and recovery strategies. Highly Recommended (not required): Students should demonstrate proficiency in writing or critical thinking skills. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services (Disability.Services@sunyempire.edu) in advance of registration to determine if this course is appropriate and what alternatives may be available.

**Attributes:** Natural Science Gen Ed, \*Diversity Gen Ed, \*Natural Science Gen Ed, Liberal

**ENSC 3008 National Parks of the US: Geology Ecology & History (4 Credits)**

In 1916, the US government established the National Park Service in an effort to conserve unique and breathtaking landforms and ecosystems for the enjoyment of future generations. In this study, students explore North American geology, physical geography, and ecology through their examination of the national parks. Students will compare approaches to the conservation and management of natural environments. They will consider possible answers to the paradox: How do conservationists and park managers preserve natural areas which are constantly changing? Prior to taking this course, students must have taken an introductory earth science or environmental science study, or equivalent College writing or critical thinking study, or equivalent.

**Attributes:** Natural Science Gen Ed, \*Natural Science Gen Ed, Liberal

**ENSC 3200 Urban Ecology (4 Credits)**

Over half of the world's human population resides in urban areas. Within this context, research focused on urban socio-ecological systems becomes increasingly important; however, urban areas present natural and social scientists with unique challenges when conducting research. In this study, students will explore the broad, interdisciplinary field of Urban Ecology and the environmental issues and challenges facing growing urban populations. Examples of possible topics to be explored include: air quality, environmental justice, food accessibility, fragmentation, green spaces, light pollution, microclimates, sustainability, transportation, waste management, water resources, and urban ecosystems. Prerequisite (must complete before registering): An introductory environmental science or urban studies study, or equivalent.

**Attributes:** \*Natural Science Gen Ed, Liberal

**ENSC 3202 Forest Ecology (4 Credits)**

Forest Ecology is a branch of the ecological sciences which focuses on species, species populations, and species communities that inhabit forest ecosystems. Students examine forest ecosystem dynamics, as they explore forest ecosystems around the world. Students consider the impacts human activities have had on global forests, in terms of conservation, restoration, and deforestation. Topics covered include biodiversity, climate and climate change-influences on forest distribution, dendrochronology, ecological disturbance, endemism, extinction, evolution, fire ecology, fragmentation and urbanization, invasive species, migration, soil ecology, sustainability, and vegetation dynamics. Prerequisites: Biology I, Biology of Ecosystems, Environmental Science, Ecology, or equivalent.

**Attributes:** Liberal

**ENSC 3300 Soil Science (4 Credits)**

Students will build upon their basic knowledge of soil forming processes, soil properties, and soil classification. Students will explore the many ways plants in natural and managed ecosystems interact with the soil upon which they depend for sustenance and support. Students will examine the physical properties of soils which promote or inhibit plant growth and regeneration and the pathways through which water and nutrients cycle in the environment. Students will also consider the impacts human activities have on soil quality, health, and resiliency, with particular emphasis on degradation/erosion, restoration/remediation, and the development of sustainable soil management strategies.

Foundational knowledge in the area of Earth's systems gained in a lower-level earth or environmental science course is required. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services (Disability.Services@sunyempire.edu) in advance of registration to determine if this course is appropriate and what alternatives may be available. Prerequisites: Earth Science (ENSC 1000), Environmental Science (ENSC 1200), Introduction to Geology (GEOL 1200), or equivalent.

**Attributes:** Liberal

**ENSC 3302 Sustainable Living: Food & Energy (4 Credits)**

Sustainability has been a major topic of public discussion and debate in recent years. At the same time, media headlines regularly grab our attention to current national health issues such as obesity. This upper level course combines both topics by exploring how our eating habits and current energy consumption impact the natural world. Students will become familiar with current trends to move communities to a more sustainable way of living. Topics will include: natural resources (focused on land and energy); why sustainability; food systems; energy and transportation choices; challenges and opportunities. Foundational knowledge about environmental systems gained in a lower level earth science or environmental science course. Prerequisites: Environmental Science (ENSC 1200) or equivalent.

**Attributes:** Liberal

**ENSC 3304 Environmental Health (4 Credits)**

Environmental Health examines how the environment can impact people, including chemical contamination by pesticides, industrial discharges of toxicants, hazardous wastes, diseases, radiation, air pollution, water pollution, and food safety. The course will discuss relevant laws, regulations, and policies. Students will discuss: what can be done to minimize the impacts of environmental hazards on public health; how human activities are having large-scale impacts on the Earth through global climate change; and, practical guidelines for occupational health and safety. This course is appropriate for students interested in furthering their knowledge on issues related to health and environmental hazards regardless of their concentration. Foundational knowledge in biology as well as earth and environmental science are necessary to understand basic concepts underlying the fate and transport of chemicals and diseases. Prerequisites: Biology I with Lab (BIOL 1200), Biology II with Lab (BIOL 1201), AND Introduction to Geology (GEOL 1200) or Global Climate Change (ENSC 1004) or Environmental Science (ENSC 1200) or equivalents.

**ENSC 3600 Field Methods (4 Credits)**

This study provides students with practical experience conducting independent fieldwork on research topics related to environmental geosciences. Students participate in data collection and data analysis and explore processes of science research and presentation. Examples of field research topics related to the analysis of natural environmental systems from which students can select include, but are not limited to: air quality, climate, ecosystem dynamics, geology, invasive species, soils, stream dynamics, water quality, and weather. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services (Disability.Services@sunyempire.edu) in advance of registration to determine if this course is appropriate and what alternatives may be available.

**Attributes:** Liberal

**ENSC 3996 Special Topics in ENSC Special Topics in ENSC Special Topics in ENSC (2-4 Credits)**

**Attributes:** Liberal

**ENSC 3998 Individualized Studies in Environmental Science (ENSC) (1-8 Credits)**

Students have the opportunity to develop individualized studies with their mentor in Environmental Science (ENSC). Registration for this class must be approved by the student's mentor.

**ENSC 4200 Contemporary Environmental Issues (4 Credits)**

This interdisciplinary course examines a broad range of contemporary global environmental issues, such as biodiversity, pollution, population growth, and global warming, and focuses on how those big issues might affect us locally. It develops students' environmental literacy and enables them to take part in informed debate and action. It explores environmental materials in a variety of media and teaches students how to navigate these materials; how to analyze and evaluate information; how to balance information from a variety of scientific and non-scientific, objective and subjective sources; and how to develop arguments surrounding environmental problems. An understanding of basic environmental issues and concepts that would be gained in a lower-level ecology course is required. This course was previously SMT-274544 Contemporary Environmental Issues. Prerequisites: Introduction to Ecology and Sustainability (ENSC 1006) or Environmental Science (ENSC 1200) or Biology of Ecosystems (BIOL 2202) or equivalents.

**Attributes:** Natural Science Gen Ed, Liberal

**ENSC 4202 Biogeography (4 Credits)**

Biogeography is the study of the spatial and temporal distribution of plants, animals, and microorganisms. It is an interdisciplinary field of science which draws upon the theories and methodologies of ecology, historical geology, and physical geography to understand and to describe global, regional, and local patterns of life. Biogeographers study the ways patterns of species, populations, and communities vary from place to place and the ways those patterns have changed over geological and ecological spans of time. Biogeography has emerged as a field of study which informs conservation efforts and the design of effective natural reserves. Prerequisites: Biology I, or Environmental Science, or Ecology, or Biology of Ecosystems, or Introduction to Ecology and Sustainability Knowledge gained in an introductory biology, environmental science, physical geography, or ecology course or equivalent is required.

**Attributes:** Liberal

**ENSC 4600 Ecology & Earth Systems Field Research (4 Credits)**

This is a residency course that requires a three-day on-site meeting out in the field. Students will work collaboratively with a team of instructors on a scientific problem of their choice in the areas of ecology, biology, environmental science, earth science, and/or geology to design a research project, collect data and perform analysis, interpret results and prepare a written scientific paper of the work. The goal of this course is to provide students with an enriched learning experience based on skills necessary to undertake similar projects in their careers or future graduate program. Prerequisites: At least two of the following: Biology I and II; or Introduction to Cell Biology and Genetics, and Introduction to Organismal Biology or Introduction to Population Biology; or Ecology, or Biology of Ecosystems, or Introduction to Geology, or Environmental Science, or equivalent. Students should have foundational knowledge about ecology, biology, and/or earth sciences. Advanced level knowledge in any of these areas gained through 2000- and 3000-level courses is strongly recommended. This course is intended for students with concentrations in disciplines such as ecology, biology, geology, earth science, environmental science, and related fields.

**ENSC 4800 Environmental Science Capstone (4 Credits)**

The capstone course is a culminating experience which brings together the knowledge and experiences gained by a student throughout their undergraduate study. Students who undertake a capstone project in environmental science will work collaboratively with the tutor on a scientific problem of their choice as a final integrating experience in their degree plan. Students will develop and present a research project related to the environment or human interactions with the environment. Writing and presenting the thesis provides students with the skills necessary to undertake similar projects in their career field or future graduate program. Prerequisite (must complete before registering): Students need to have completed advanced level study in the environmental sciences. Note: Typically, this course is taken in a student's final year of study. This course contains elements which rely on vision and motor skills to complete. If you have a visual or motor impairment and are considering registering for this course, it is recommended that you reach out to Accessibility Resources and Services ([Disability.Services@sunyempire.edu](mailto:Disability.Services@sunyempire.edu)) in advance of registration to determine if this course is appropriate and what alternatives may be available.

**Attributes:** Liberal

**ENSC 4998 Individualized Studies in Environmental Science (ENSC) (1-8 Credits)**

Students have the opportunity to develop individualized studies with their mentor in Environmental Science (ENSC). Registration for this class must be approved by the student's mentor.