

ENVIRONMENTAL SCIENCE (ENVS)

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ENVS 101 The Scientific Basis of Environmental Issues (3 Credit Hours)

The foundational course in science is predicated on the view that understanding environmental issues and their underlying scientific principles will occupy a central role in our students' lives and will be critical in their development as informed and participating members of society. The overarching strategy of the course will be to frame environmental science in terms of a series of interacting systems to allow students to analyze a variety of environmental issues. This is a foundational Tier I class; it is prerequisite to all Tier II science core classes.

Knowledge Area: Foundational Scientific Knowledge

Course equivalencies: ENVS137/UCSF137/ENVS101

Outcomes:

1) Exhibit knowledge of the nature of the four Earth systems; 2) Draw inferences from evidence, constructing testable and falsifiable hypotheses and analyzing data; 3) Understand the role of energy and thermodynamics in ecosystems; 4) Understand and describe important cycles in nature

ENVS 137 Foundations of Environmental Science I (3 Credit Hours)

Pre-requisites: Restricted to Majors and Minors in the School of Environmental Sustainability

This course will introduce concepts that form the basis of environmental science, including elemental cycling, energy flow/transformation, and the interconnectivity among atmosphere, lithosphere, hydrosphere and biosphere, and within ecosystems. Ways in which knowledge of these concepts informs policy, management and social perception to produce positive change will also be examined.

Course equivalencies: ENVS137/UCSF137/ENVS101

Outcomes:

Recognize interconnections among scientific disciplines and how their principles are used to investigate and address environmental issues; understand physical, chemical and ecological principles underlying environmental science and how these interact

ENVS 200 Environmental Careers and Professional Skills (1 Credit Hour)

Pre-requisites: ENVS 101 or ENVS 137; Restricted to Majors and Minors in the School of Environmental Sustainability

Introduction to environmental professions and determining skills and individual traits best suited for professions in policy, science, business, community organizing, etc. Begin developing a professional network.

Outcomes:

Select appropriate internships, curriculum, projects to enhance knowledge, skills and experience; develop job hunting and communication skills specific to environmental fields, including resumes, cover letters, presentations

ENVS 203 Environmental Statistics (3 Credit Hours)

Pre-requisites: Restricted to Majors and Minors in the School of Environmental Sustainability

This course introduces basic statistics from probability through multiple regression, employing computer programs with ecological, environmental, and relevant social science examples and data sets.

Outcomes:

Programming/spreadsheet skills; data structure practices and diagnosis; data visualization; appropriate test selection; test execution and interpretation; introduction to qualitative data analysis

ENVS 204 Gender, Health & Environment (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

Exploration of connections between social justice and environmental health using scientific tools of analysis. Focus on experiences of those at intersection of marginalized social locations. Issues include impacts of modern disposable culture and how socially constructed gender roles affect exposure to environmental health risks while biological sex shapes their impacts.

Interdisciplinary Option: Bioethics, Environmental Studies

Course equivalencies: ENVS204/ESP 108

Outcomes:

Understanding the web of causality (relationships among scientific, medical, ecological, cultural, behavioral, economic, political, and ethical dimensions) of environmental health problems and how to ameliorate the disproportionate burden of risk

ENVS 207 Plants and Civilization (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

Examines the structure, function, ecology, and diversity of plants, their importance to human civilization, and the impact of societal decisions regarding their use and exploitation.

Knowledge Area: Tier 2 Scientific Knowledge

Interdisciplinary Option: Bioethics, Urban Studies

Course equivalencies: ENVS207/ESP 107

Outcomes:

Students will demonstrate an understanding of the critical role of plants in the biosphere, their physiological processes, adaptations for specialization, and linkages to humans including agriculture, pest control, and extraction/use of plant-derived products

ENVS 215 Ornithology (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

An introduction to the biology of birds including the topics of anatomy, physiology, behavior, ecology, and evolution. Includes some field trips to learn how to identify species and to collect behavioral information.

Course equivalencies: BIOL 215/ENVS 215

Outcomes:

Students will demonstrate an understanding of the biology of birds and be able to identify some of the commoner species of birds in our area

ENVS 218 Biodiversity & Biogeography (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course covers the creation and maintenance of biodiversity across taxonomic, temporal and spatial scales. It will provide an overview of the history of biogeography, increase understanding of the evolutionary processes that create biodiversity, the influence of biodiversity on ecosystem services, and the rapid biodiversity loss resulting from human actions.

Knowledge Area: Tier 2 Scientific Knowledge

Interdisciplinary Option: Bioethics, Urban Studies

Outcomes:

Students will gain knowledge of and appreciation for the biodiversity of life, its formation through the process of evolution, and the importance of biodiversity to ecosystem function and human welfare

ENVS 223 Soil Ecology (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course introduces the properties, functions, and conservation of soil. Topics include belowground ecosystem services, soil biodiversity, biogeochemical cycles, and conservation, human impacts to soils, and the socioeconomic implications of soil degradation. Lectures, laboratory/field soil testing, field trips, and presentations by experts in sustainable soil management are employed.

Knowledge Area: Tier 2 Scientific Knowledge

Interdisciplinary Option: Bioethics, Urban Studies

Outcomes:

Students will understand the properties, functions and methods of conservation/remediation of soils, learn how human activities affect soils and associated socioeconomic consequences, and develop analytical skills to assess soil health

ENVS 224 Climate & Climate Change (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course introduces students to basic principles and knowledge to explain climate change. Students will learn about natural and anthropogenic causes of climate change, the interactions between earth-atmosphere-ocean systems, climate feedback mechanisms, and impacts of climate change on the natural physical environment.

Knowledge Area: Tier 2 Scientific Knowledge

Interdisciplinary Option: Bioethics, Urban Studies

Outcomes:

Students will develop cognitive and mathematical skills to draw valid, logical conclusions regarding various observed phenomena such as observed changes in the climate system and observed impacts of climate change

ENVS 226 Science & Conservation of Freshwater Ecosystems (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

Freshwater ecosystems are threatened by water extraction, pollution, invasive species, and many other pressures. This course covers physical, chemical, and biological processes in freshwaters, and the benefits that humans derive from these ecosystems. Major issues for conservation will be covered at global and Great Lakes scales.

Interdisciplinary Option: Bioethics, Urban Studies

Outcomes:

Students will gain understanding of different types of freshwater ecosystems, their functioning and importance for human societies, and the range of pressures they currently face

ENVS 227R Ecology of the Mediterranean Sea (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course examines the ecology of the Mediterranean Sea and how human activity has shaped the present-day ecosystem. Students will learn fundamental ecological concepts including ecosystem functioning, energy flow, matter transformation, and elemental cycles and the human impacts on the Mediterranean environment, including discussion of impact reduction and remediation.

Knowledge Area: Tier 2 Scientific Knowledge

Interdisciplinary Option: Italian Studies

Outcomes:

Students will gain understanding of ecological processes/interconnections within the Mediterranean Sea ecosystem, of historical & current human-induced changes therein

ENVS 237 Foundations of Environmental Science II (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; Restricted to BA majors in the School of Environmental Sustainability

This course is the second in a three-course sequence required of all ENVS majors. It will provide the basic scientific grounding needed to intelligently discuss environmental policy and to prepare students for more advanced study in the environmental sciences. It focuses on physical science, especially thermodynamics, energy and climate change.

Outcomes:

Student will gain understanding of the physics dictating global climate dynamics and climate change, as well as the energetic of different energy sources and technological aspects of alternative energy sources

ENVS 238 Foundations of Environmental Science Lab (1 Credit Hour)

Pre-requisites: ENVS 237 (pre- or co-requisite); Restricted to BA majors in the School of Environmental Sustainability

A lab course designed to be associated with ENVS 237, this course is designed to introduce all ENVS majors to lab safety, basic lab techniques such as use of balances and microscopes, data analysis, and the application of these techniques to the study of environmental science.

Outcomes:

Students will understand and demonstrate safe lab practices and learn to use basic lab equipment to take and analyze environmental science data

ENVS 260 Environmental Journalism (3 Credit Hours)

Pre-requisites: Department Consent Required

The mission of environmental journalism is to raise public awareness about environmental news and issues. It is about being ethical, accurate, fair, and clear, whether reporting, investigating, or advocating for change.

Course equivalencies: X-ENVS 260/ COMM 260

Outcomes:

Students will be able to find, report, and present challenging stories around this topic, in print and in broadcast writing

ENVS 267 Bird Conservation and Ecology (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 102

This engaged-learning course provides an introduction to the theory and practice of avian conservation, ecology and management. Field trips for viewing birds in the wild, observing behavior and collecting data on habitat assessments are highlighted. Students participate in a community service project to gather data for avian conservation and management

Course equivalencies: X-ENVS 267/BIOL 347

Outcomes:

Students will become skilled in critical reasoning and some bird monitoring techniques, and demonstrate an understanding of the many facets of bird conservation

ENVS 270 Environment of China (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137

This course provides a systematic introduction to major environmental issues in the context of recent social and economic development in China.

Course equivalencies: X-NTSC270/ASIA272/INTS270

ENVS 273 Energy and The Environment (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

The concept of energy developed from antiquity through the present day and applied to national and worldwide energy use patterns, the technologies supporting their use, as well as the societal impact and environmental consequences of energy usage.

Interdisciplinary Option: Bioethics, Environmental Studies, Peace Studies

This course satisfies the Engaged Learning requirement.

Course equivalencies: X-NTSC273/ESP 273/PAX 273

Outcomes:

Students will become skilled in critical reasoning and methods of inquiry, demonstrate an understanding of critical concepts and knowledge: heat and energy, the laws of thermodynamics, and current and future technologies and their impact

ENVS 274 Chemistry of the Environment (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; and CHEM 101; Restricted to Majors and Minors in the School of Environmental Sustainability

Introduction to chemical principles in the natural and altered environment. This course covers the fundamentals of organic and inorganic chemistry in the context of the pressing environmental issues: air pollution, stratospheric ozone depletion, climate change, water pollution, and environmental contaminants.

Interdisciplinary Option: Bioethics, Urban Studies

Course equivalencies: X-CHEM312/ENVS 274/ESP 312

Outcomes:

Understand chemistry behind environmental problems; predict solubility, reactivity, storage in environmental compartments; understand different chemical models used to determine fate and transport of chemicals in the environment

ENVS 275 Chemistry of the Environment Lab (1 Credit Hour)

Pre-requisites: ENVS 101 or ENVS 137; and CHEM 101; and ENVS 274 (pre- or co-requisite); Restricted to Majors and Minors in the School of Environmental Sustainability

Basic techniques for chemical analysis of environmental samples, including air, water and soil. Learn to use electronic data acquisition systems and further develop scientific writing skills.

Interdisciplinary Option: Bioethics

Course equivalencies: CHEM 313/ENVS 275

Outcomes:

Plan experiments, develop good lab techniques, conduct accurate chemical analyses on environmental samples, interpret chemical data, short and long reports describing work and interpreting significance of results

ENVS 278 Hydrology (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

Study of processes which cycle water between oceans, atmosphere, and land surface. This course examines precipitation, evaporation, infiltration, transpiration, groundwater and surface water flow. Understanding these processes is fundamental to managing our resources in the face of mounting environmental challenges and natural resource pressures.

Outcomes:

Understanding of key physical processes and multidirectional complex interactions between different components of the water cycle; ability to apply fundamental equations of conservation to quantify flows

ENVS 279 Climate and History (3 Credit Hours)

Pre-requisites: Department Consent Required

Explores the role of climate in history, from the emergence of homo sapiens to recent anthropogenic climate change. Major topics include the social impact of climate variability, sources of resilience, origins of scientific knowledge, and the use of historical knowledge in the present.

Course equivalencies: X-HIST279E/ ENVS279

Outcomes:

Students will analyze examples of climate shaping history, learn different ways that scholars have treated this relationship, and reflect on how this knowledge might be useful today

ENVS 280 Principles of Ecology (3 Credit Hours)

Pre-requisites: ENVS 237 or CHEM 101; Restricted to Majors and Minors in the School of Environmental Sustainability

The purpose of this course is to foster an in-depth understanding of ecology, the study of relationships between organisms and the environment at organizational scales ranging from genes, individuals, and populations to communities, ecosystems, and landscapes. Topics include population dynamics, species interactions, community dynamics, food webs, ecosystem functions, and landscape ecology with a strong emphasis on scientific inquiry and data interpretation.

Interdisciplinary Option: Bioethics

Outcomes:

Students will understand key concepts and principles concerning ecological processes in nature at the gene, individual, population, community, ecosystem and landscape scales and apply knowledge of ecological concepts to current environmental challenges

ENVS 281C Environmental Sustainability & Science in China (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course provides students with an understanding of how sustainable systems work and how the structure and function of these systems is altered by human activities. Students will gain first-hand experience studying environmental issues in China [air/water pollution, loss of biodiversity, and climate change] through lectures & field trips.

Interdisciplinary Option: Chinese Language & Culture

This course satisfies the Engaged Learning requirement.

Outcomes:

Students will develop an in-depth understanding of human-environment relations in China and gain an appreciation for the interconnectivity of components, human included, of the natural world

ENVS 283 Environmental Sustainability (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

Examines the impact of humans as consumers on the environment and how these interactions affect the probability of establishing sustainability for human and non-humans on Earth.

Interdisciplinary Option: Bioethics, Environmental Studies, Urban Studies

This course satisfies the Engaged Learning requirement.

Course equivalencies: X-ENVS283/ESP180

Outcomes:

Students will become skilled in critical reasoning and methods of inquiry, and demonstrate an understanding of knowledge critical to the field including current human consumptive practices and their effects on the health and well-being of living organisms

ENVS 284 Environmental Justice (3 Credit Hours)

This course examines how policy interacts with race and class to affect differentially people's access to a clean, safe, productive environment; Reviews history of the environmental justice movement, and community, policy, and legal responses; Develops students' ability to work across diverse social groups to advance environmental justice and sustainability. *Interdisciplinary Option:* Bioethics

Outcomes:

Students will understand forces that have led to people of different race and class being differentially affected by environmental benefits, and the burdens and strategies for addressing environmental injustices

ENVS 286 Principles of Ecology Lab (1 Credit Hour)

Pre-requisites: ENVS 203; ENVS 238 or CHEM 111; and ENVS 280 (pre- or co-requisite); Restricted to BA Majors in the School of Environmental Sustainability

This course will allow students to develop experience and skills employed in ecological studies, with an emphasis on field work, laboratory analysis, and hypothesis testing. Topics for lab exercises will correspond closely with material from Ecology (ENVS 280) lecture. Course does not satisfy requirements for BIOL major.

Outcomes:

Students will understand basic ecological principles, apply these to design experiments, develop skills in data analysis and interpretation, and learn techniques used to characterize ecosystem properties and human environmental impacts

ENVS 286S Principles of Ecology Lab (1 Credit Hour)

Pre-requisites: ENVS 203, ENVS 238 or CHEM 111; and ENVS 280 (pre- or co-requisite); Restricted to BS Majors in the School of Environmental Sustainability

Course content includes lab skills and analytical techniques commonly employed in ecological studies; emphasizes sampling, research design, field work, laboratory technique, data analysis, project development, hypothesis testing, and scientific report writing.

Outcomes:

Understand ecological principles, apply knowledge to ecological experiments, observational studies, and entry-level mathematical models; assess biotic responses to the abiotic environment and to anthropogenic impacts

ENVS 288 Applied Interdisciplinary Data Analysis (3 Credit Hours)

Pre-requisites: (ENVS 280 or BIOL 265) and (STAT 103 or STAT 203) Restricted to students in SES majors. This course teaches students to approach environmental problem-solving from a systems perspective by understanding the complex adaptive nature of socio-ecological. It introduces analytic techniques used in the natural/social sciences, and provides opportunity to analyze and connect data from various disciplines (e.g., ecology, economics, sociology) to address pressing environmental concerns.

Outcomes:

Students will be able to describe characteristics of complex adaptive systems, become familiar with analytical approaches suited to different sub-disciplines, and apply numerous analytical techniques to real data sets

ENVS 297 North American Environmental History (3 Credit Hours)

Pre-requisites: Department Consent Required

This course surveys the environment and environmentalism in United States history, from the transformation of New England into a farm ecology, the expansion of the cotton South, the settlement of the West, to the rise of industrial cities, suburban sprawl, and the globalization of the economy.

Course equivalencies: X-ENVS297/HIST297E

Outcomes:

Students will be able to demonstrate historical knowledge of environmental thought and ecological science, to draw links between environmental concerns and public policies, and to develop critical thinking and communication skills

ENVS 298 Special Topics (1-12 Credit Hours)

Specific titles and contents vary from semester to semester. Variable credit hours.

ENVS 298L Special Topics with Lab (1-4 Credit Hours)

Specific titles and contents vary from semester to semester. Includes lab component.

ENVS 300 Introduction to Public Health (3 Credit Hours)

Pre-requisites: Restricted to Majors and Minors in the School of Environmental Sustainability; Junior or Senior Standing; Department Consent Required

Public health is the science of preventing disease and protecting and promoting the health of populations and communities. Through interactive exercises and application of concepts, this course considers its history; ethical principles; scientific foundation and tools; biomedical bases; socioeconomic and behavioral factors; environmental issues; and relationship to medical care.

Course equivalencies: X -PUBH 300/ ENVS 300

Outcomes:

Describe the history, core concepts, functions, and methods of public health; Define health disparities and explain how they are produced; Synthesize public health information and communicate it effectively

ENVS 301 Environmental Health (3 Credit Hours)

Pre-requisites: Restricted to Majors and Minors in the School of Environmental Sustainability; Junior or Senior Standing; Department Consent Required

This course is designed as an introduction to the field of environmental health, including regulations, research, disease prevention, and advocacy.

Interdisciplinary Option: Bioethics

Course equivalencies: X-ENVS301/PUBH301/MBPH401

Outcomes:

Students will be able to outline approaches for assessing and controlling environmental hazards that affect community health and discuss major local, national, and global health challenges

ENVS 303 Introduction to Epidemiology (3 Credit Hours)

Pre-requisites: Restricted to Majors and Minors in the School of Environmental Sustainability; Junior or Senior Standing; Department Consent Required

Epidemiology is the study of the distribution and determinants of disease in populations and remains the basic science of public health. This methodology is unique to epidemiology, and in some cases, has even been appropriated by other fields. The objective of this course is to familiarize students with the range of tools used to conduct epidemiologic analysis, including design and measures of association. This course will be taught as an online course combined with an intensive interactive session with faculty and students one weekend in Spring.

Course equivalencies: X- PUBH 303/ENVS 303/MPBH 403

ENVS 310 Introduction to Environmental Law & Policy (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137

This introduction to environmental law surveys some critical federal environmental statutes, rules, and regulations in the United States; important case law decided under those statutes; interaction between federal, state, and local jurisdictions; and impacts on air, land, water, and natural resources.

Outcomes:

Understands how the natural environment is controlled, managed and promoted through the legal system

ENVS 311 Natural Resources and Land Use Law & Policy (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; and ENVS 310 (recommended)

Focus on legal and policy processes used to govern pollution, water use, endangered species, toxic substances, and environmental impact and risk.

Outcomes:

Students will understand how the natural environment is controlled, managed and promoted through the legal system and how land use laws and policy impact social and economic issues

ENVS 312 Water Law & Policy (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; and ENVS 310 (recommended)

This course looks at how the law allocates and protects one of our most crucial natural resources – water. Understanding development and regulation of water ownership and use and how those decisions impact current environmental and socio-economic issues.

Outcomes:

Understand how key laws and policies impact protection and use of water in the United States; understand key legal concepts that shape the management of our water resources

ENVS 313 Energy Law & Policy (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; and ENVS 310 (recommended)

This course looks at the laws that shape traditional energy production and the growing regulation of renewable and sustainable energy.

Outcomes:

Understand how key laws and policies impact production and use of energy; and how energy is controlled by federal and local regulations and policies

ENVS 319 Winter Ecology (3 Credit Hours)

Pre-requisites: BIOL 265 or ENVS 280 or permission of instructor

Students will immerse themselves in the winter environment and learn about habitats on, in, and under snow, both terrestrial and aquatic, organisms that live in these habitats and their physiological, behavioral and morphological adaptations for survival. Students will gain an understanding of research on winter ecosystems.

Course equivalencies: X-ENVS 319/BIOL 329

Outcomes:

Students will gain understanding of habitats and organisms present during winter in temperate ecosystems and gain experience with field techniques employed when studying these ecosystems

ENVS 320 Conservation Biology (3 Credit Hours)

Pre-requisites: ENVS 280 and ENVS 286/s; or BIOL 265 and 266

Students will learn to apply ecological and evolutionary biological principles to the preservation of wild plant/animal species, and to the preservation/management of ecosystems. Conservation approaches and challenges for all types of ecosystems, will be covered, with emphasis on contemporary threats to biodiversity, including habitat fragmentation, invasive species, and climate change.

Outcomes:

Students will understand how the science of ecology can be used to address issues in species/ecosystem conservation, and recognize that consideration of human actions is essential to address conservation problems

ENVS 321 Conservation Biology Lab (1 Credit Hour)

Pre-requisites: ENVS 280 and ENVS 286/s; or BIOL 265 and 266; and ENVS 320 (pre- or co-requisite)

Students will apply principles learned in ENVS 320 to conservation problems in the Chicago region and elsewhere, through visits to conservation sites and discuss concerns/initiatives with land managers and policy makers. They will develop skills in species identification, ecosystem delineation and description, and the use of field equipment and methods.

Outcomes:

This course will provide practical field and lab experience in population, community and ecosystem conservation; Students will learn how the principles of Conservation Biology are applied, and the associated challenges

ENVS 322 Invasive Species (3 Credit Hours)

Pre-requisites: ENVS 280 or BIOL 265

Invasive species are one of the greatest global threats to biodiversity, ecosystem function, economies, and human health. Species become invasive when moved beyond native range, become established, and cause harm. This course covers how species are moved, how and when they become established, and potential harm they can cause.

Outcomes:

Understanding that because invasive species are moved by humans, and because many of their impacts are felt by humans, they are an inherently multi-disciplinary problem

ENVS 323 Environmental Microbiology (3 Credit Hours)

Pre-requisites: BIOL 101, BIOL 102, CHEM 101, and (CHEM 102 or ENVS 274)

This course introduces the significant role of microorganisms in numerous environmental and human-engineered processes. It covers microbiology and its basic methods to orient students to this field of science and the importance of microbial diversity relevant to agriculture, public health, and ecological restoration.

Course equivalencies: ENVS 323/ENVS 423

Outcomes:

Students will learn to isolate and characterize environmental microorganisms; Students will investigate the role of microorganisms in nutrient cycling, remediation of soils, and transmission of existing and emerging pathogens

ENVS 325 Sustainable Agriculture (3 Credit Hours)

Pre-requisites: ENVS 280 or BIOL 265

This course provides an introduction to the environmental, social, and economic implications of sustainable agriculture. Students will learn the origins, major concepts, and current issues of sustainability in agriculture. Ecological concepts and principles applied to manage sustainable food production to support community health and economic justice will be explored.

Outcomes:

Students will be able to explain the characteristics of the US agricultural system, the inter-relation among components of sustainable agriculture, and steps necessary to develop a sustainable agricultural system

ENVS 326 Agroecosystems (3 Credit Hours)

Pre-requisites: ENVS 280 and ENVS 286/s; or BIOL 265 and 266; and ENVS 223 (recommended)

In this hands-on course, students will build knowledge and skills in agriculture and ecology through work in greenhouse, laboratory, classroom, and field settings. Students will build on foundations of Environmental Science and Biology by examining challenges of food production, management decisions, and environmental change facing agroecosystems both locally and abroad.

Outcomes:

Students will develop understanding of agricultural systems as related to sustainable practices, develop skills in ecological analysis of these systems, and demonstrate proficiency in communicating scientific information to diverse audiences

ENVS 327 Food Systems Analysis (3 Credit Hours)

Pre-requisites: ENVS 203

This course links conceptual and practical considerations of food-system assessment and develop a base of tools for practitioners. It examines major elements of the assessment process: systems thinking and conceptual frameworks; the food system from consumer and producer perspectives; identifying leverage points that might be influenced to affect positive change.

Outcomes:

Students will understand inter-relationships among environment, food supply, markets, American diets, and health, learn to analyze assessment methods for food-system sectors, and examine conceptual frameworks for food-system analysis

ENVS 330 Restoration Ecology (3 Credit Hours)

Pre-requisites: ENVS 280 and ENVS 286/s; or BIOL 265 and 266

This course provides a theoretical and practical basis for the increasing global efforts to reverse damage caused by humans to ecosystems and species, emphasizing the many perspectives (e.g., ecological, social, political, engineering) that must be considered to develop, implement, and assess restoration projects across a range of ecosystem types.

Outcomes:

Students will apply knowledge from ecology and other disciplines to the practice of ecosystem restoration, and learn to integrate information from multiple disciplines, and stakeholder input, to design/manage restoration projects

ENVS 331 Restoration Ecology Lab (1 Credit Hour)

Pre-requisites: ENVS 280 and 286/s; or BIOL 265 and 266; and ENVS 330 (pre- or co-requisite)

Students will apply principles learned in ENVS 330 to restoration sites in Chicago and beyond. They will visit restoration sites and discuss strategies and initiatives with land managers and policy makers. Students will develop skills in ecological-site description, and in the analytical methods required to determine success of restoration projects.

Outcomes:

Students will gain an understanding of how the science of restoration ecology is applied in practical settings and learn methods used in restoration and assessment of actual restoration projects

ENVS 332 Industrial Ecology (3 Credit Hours)

Industrial ecology combines Business, Environment, & Engineering to shift industrial processes from linear (open loop) systems, where resources move through the system to become waste, to circular (closed loop) systems where waste becomes inputs for new processes. Students will learn life cycle assessment (LCA) to measure environmental impacts.

Course equivalencies: ENVS 332/ENVS 432

Outcomes:

Students will understand how business and industry can create zero waste systems, how a circular economy works, and the tools of industrial ecology, including life cycle assessment

ENVS 333 Introduction to the Circular Economy (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; or MGMT 201 for Quinlan School of Business students

This course introduces principles and concepts of a circular economy that can support a more sustainable future. The course reviews circular design, materials management, business models, supply chains, policy, financing, metrics, and applications. This course may include speakers and/or field trips to learn about companies with circular business practices.

Outcomes:

Explain circular economy; identify applications of circularity; understand role of policy, finance, and design in system-wide change; understand social, environmental, economic impacts of linear economic system

ENVS 335 Ecological Economics (3 Credit Hours)

Pre-requisites: ECON 201

Ecological Economics is a trans disciplinary course that takes a systems approach to the relationship between planetary stewardship, social justice, and the economy to design a prosperous and desirable future for humans on a finite planet. Ecological economics fuses economic theory and sustainability science to generate new solutions for today's challenges. Topics include sustainable scale, just distribution, efficient allocation and relationships between economic

Outcomes:

Understanding of ecological economics history, conceptual foundations, principles, tools, indicators, and applications

ENVS 336 Design for Circular & Sustainable Business (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137; or MGMT 201 for Quinlan School of Business students

This project-based course focuses on solving complex human sustainability challenges through the application of sustainable design methods at the product and process level. Students will learn and apply biomimicry, circular, and human-centered design methods to develop conceptual and prototype solutions. Understand and apply: (1) circular design methods (2) biomimicry design methods; and (3) human-centered design (design thinking) methods.

Outcomes:

Understand the role of design in creating a sustainable future

ENVS 338 Climate Change and Human Health (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101; Restricted to Majors and Minors in the School of Environmental Sustainability; Junior or Senior Standing

This course provides an introduction overview of the health consequences associated with climate change and the local, federal, and global response to mitigate these negative health outcomes. During the course students will be expected incorporate course content and develop a realistic response public health plan to climate change for a locality of their choosing.

Outcomes:

1) Outline fundamental public health concerns that have been associated with climate change; 2) Identify and critique future steps forward to reduce public health concerns of climate change

ENVS 340 Natural History of Belize (3 Credit Hours)

Pre-requisites: For SES majors and minors, ENVS 101 or ENVS 137; For BIOL majors and minors, BIOL 102 and BIOL 112; For ANTH or GLST majors and minors, Junior or Senior Standing

This Study Abroad field course is designed to build on the foundations learned in Ecology, Environmental Science, and Anthropology classes by examining the biodiversity and tropical ecosystems of Belize, by exploring the cultural traditions of some of its peoples, particularly the Mayans; and learn how local communities are involved in protecting and sustaining ecological and natural sites through community based conservation and sustainability practices.

Course equivalencies: X - ENVS 340 /BIOL 340

Outcomes:

Provide a working understanding of the structure, function, and ecology of tropical ecosystems; their importance to local communities; and the social dimensions of environmental issues, especially those related to justice

ENVS 345 Conservation and Sustainability of Neotropical Ecosystems (3 Credit Hours)

Pre-requisites: ENVS 280 or BIOL 265; Instructor Consent Required

This course provides an introduction to conservation ecology in Neotropical ecosystems via classroom sessions and experiential learning activities during a Spring-Break field trip to Belize. Students will gain experience in environmental monitoring and biological survey methods. Ecosystems studied: coral reefs, mangrove forests, subtropical rain and dry forests, savannas, rivers, wetlands.

Course equivalencies: X- ENVS 345/ BIOL 349

Outcomes:

Students will gain an understanding of tropical climates, neotropical terrestrial/aquatic ecosystems and applied conservation and environmental practices such as nature reserve design and management, community-based resource management, ecotourism, and ecoagriculture

ENVS 350A Solutions to Environmental Problems: Water (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

'STEP: Water' is an interdisciplinary and hands-on course in which students learn about a relevant and complex environmental problems pertaining to water and then develop and implement projects that address the problem on campus and in the local community. This course satisfies the Engaged Learning requirement.

Outcomes:

Students will develop understanding of water-related environmental problems, demonstrate skills/knowledge needed to address those problems, and develop skills to recognize/articulate future possibilities for environmental leadership and civic engagement

ENVS 350B Solutions to Environmental Problems: Biogas (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

'STEP: Biogas' is an interdisciplinary and hands-on course in which students learn about a relevant and complex environmental problems pertaining to biogas production, processing and transport and then develop and implement projects that address the problem on campus and in the local community.

Outcomes:

Students will develop understanding of environmental problems related to biogas, demonstrate skills/knowledge needed to address those problems, and develop skills to recognize/articulate future possibilities for environmental leadership and civic engagement

ENVS 350C Solutions to Environmental Problems: Climate Action (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101; and ENVS 224 (recommended)

Consideration of environmental, political, economic, historical, and cultural contexts of climate change. Examination of actions occurring at varying geographic scales to mitigate and/or adapt to climate change impacts. Problem- and solution-based learning of how to invest resources effectively to deal with a changing climate and its consequences. This course satisfies the Engaged Learning requirement.

Outcomes:

Develop understanding of environmental problems related to climate change, demonstrate skills/knowledge needed to address those problems and recognize/articulate future possibilities for environmental leadership/civic engagement

ENVS 350F Solutions to Environmental Problems: Food Systems (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

'STEP: Food Systems' is an interdisciplinary and hands-on course in which students learn about a relevant and complex environmental problems pertaining to food production, processing and transport and then develop and implement projects that address the problem on campus and in the local community.

This course satisfies the Engaged Learning requirement.

Outcomes:

Students will develop understanding of environmental problems related to food systems, demonstrate skills/knowledge needed to address those problems, and develop skills to recognize/articulate future possibilities for environmental leadership and civic engagement

ENVS 351 Introduction to Sustainability Concepts & Impacts (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

Examines environmental, economic, social and political impacts of sustainable practices on general public and global and local organizations. Provides students with understanding of importance to corporations and other entities of measuring, monitoring, and reporting resource use to customers and stakeholders.

Outcomes:

Explaining basic concepts of sustainability and how they relate to operations and goals of institutions and organizations; interaction of social, economic, and ecological systems to influence sustainability challenges and solutions

ENVS 352 Sustainability Assessment & Reporting I (3 Credit Hours)*Pre-requisites:* ENVS 351

Fundamental concepts and methodology of measuring and reporting environmental sustainability impacts in the areas of energy, air, buildings and transportation.

Outcomes:

Ability to assess and report sustainability metrics related to energy, air, buildings, and transportation

ENVS 353 Sustainability Assessment & Reporting II (3 Credit Hours)*Pre-requisites:* ENVS 351

Fundamental concepts and methodology of measuring and reporting environmental sustainability impacts in the areas of water, land, food and waste. Environmental and social impacts of water use and sources, land use practices, food sourcing and production, and waste production and recovery.

Outcomes:

Ability to assess and report sustainability metrics related to water, land, food, and waste

ENVS 354 Sustainability Plan Development & Reporting (3 Credit Hours)*Pre-requisites:* ENVS 351, ENVS 352, and ENVS 353

Capstone course in the four course sequence on Sustainability Assessment & Planning. Using concepts and methodology to create a comprehensive sustainability plan including stakeholder engagement, life cycle analyses, set resource baselines, short- and long-term sustainability goals, budgets and draft sustainability plan for a representative entity.

Outcomes:

Learn best practices to inspire and engage partners and stakeholders to advance environmental sustainability in different types of organizations; Ability to create a comprehensive sustainability plan for organizations and institutions

ENVS 363 Sustainable Business Management (3 Credit Hours)*Pre-requisites:* ENVS 101 or ENVS 137; or MGMT 201 for Quinlan School of Business students

Course introduces students to the emerging field of sustainability in business and the growing focus on the social, environmental, and economic performance of businesses. The course presents the scientific, ethical, and business cases for adopting sustainability. This course fulfills a MGMT elective.

Course equivalencies: ENVS 363/ENVS 463*Outcomes:*

Understand the dimensions of sustainability; understand economics for sustainability; understand the tools and techniques to apply sustainability in each functional area of the business

ENVS 364 Sustainability Management in the Global Context (3 Credit Hours)*Pre-requisites:* ENVS 101 or ENVS 137; or MGMT 201 for Quinlan School of Business students

This study abroad course takes students to international destinations to learn about business and sustainability management in the global context. Students hear presentations from local experts on sustainability in government, nonprofit, & for-profit entities, visit entities that have adopted sustainability practices, & visit local cultural sites. Fulfills MGMT elective.

Course equivalencies: ENVS 364/ENVS 464*Outcomes:*

Students will understand sustainability perspectives outside the US, practical examples of circular operations and strong sustainability, and global, regional, and local sustainability concerns

ENVS 367 Mammalogy (3 Credit Hours)*Pre-requisites:* ENVS 280 or BIOL 265

This course will focus on the ecology, evolution, behavior, and conservation of the class, Mammalia. Students will gain insight how this unique group evolved over time and became the dominate lineage over the Tertiary period. Furthermore, we will investigate how mammals hold special social and cultural relationship with humans, and why we have such complicated relationships with mammals, from revering them in religious contexts, to keeping them in our homes, to consuming them as nutrition.

Outcomes:

Working knowledge and mastery of the traits, evolutionary timescale, ecology, and conservation of mammals; Students will also gain experience collecting data (on museum samples as well as observations of living samples) to learn current techniques scientists and conservationists use to advance our understanding of this group

ENVS 369 Field Ornithology (3 Credit Hours)*Pre-requisites:* ENVS 280 and ENVS 286/s; or BIOL 265 and 266; and BIOL 215 (recommended)

Field ornithology is an intensive 3-week engaged-learning course at the Loyola University Retreat and Ecology Campus during the peak of the migratory season intended to provide an introduction to the theory and practice of field ornithology. Emphasis will be on field identification and song recognition, census techniques, and avian behavior.

Course equivalencies: X- ENVS 369/BIOL 348*Outcomes:*

Students will become skilled in critical reasoning, field techniques, and scientific investigation that demonstrate an understanding of knowledge and techniques used in field ornithology

ENVS 380 Introduction to Geographic Information Systems (3 Credit Hours)*Pre-requisites:* Restricted to Junior and Senior standing

Geographic Information Systems (GIS) is a mapping tool that allows users to create interactive searches, analyze spatial information, edit data and maps, and present the results visually. The course includes lecture, laboratory, and project components. Students will learn basic GIS skills and applications and work on projects with community organizations.

Interdisciplinary Option: Urban Studies*Course equivalencies:* ENVS380/UNIV410*Outcomes:*

Describe the conceptual/theoretical and practical/technological background of GIS; Describe ethical issues germane to GIS; Prepare/analyze GIS data in research; Apply GIS in community-service projects

ENVS 381 Advanced GIS Applications (3 Credit Hours)*Pre-requisites:* ENVS 380 and Restricted to Junior and Senior standing

Students in this course will learn tools required to solve complex environmental problems and gain experience with spatial analysis, network analysis, 3-D analysis, GIS modeling, geostatistics, and other ArcGIS extensions. Students will also learn about internet-based mapping for dissemination of spatial data.

Outcomes:

Understand various spatial relationship concepts and their applications; identify and address common methodological challenges; understand how to use spatial data to make sound arguments in spatial problem solving and planning/policy

ENVS 382 Remote Sensing (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101; Restricted to Juniors and Seniors

Science of obtaining information about objects or areas using data from remote sensors on satellites or mounted on aircraft that can detect energy reflected from Earth. Topics include data collection; digital image processing, assessment, evaluation, and enhancement; display alternatives and visualization; electromagnetic radiation principles and radiometric correction; and geometric correction.

Outcomes:

Understand concepts, data, and methods of remotely sensed geographic data; Learn how to obtain and analyze remote sensing data, produce thematic maps, learn landscape patterns, and methods to decipher them

ENVS 383 Human Dimensions of Conservation (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course will increase student knowledge of the social, political, economic, psychological, and cultural dimensions that influence the success of conservation projects and develop skills in conducting human dimensions-inquiry using surveys, interviews, observation, and/or participatory methods. It will contribute to preparation for employment in the conservation field and/or graduate study.

Outcomes:

Students will understand the importance of treating the human dimensions of conservation problems with the same scientific rigor customarily given to the ecological dimensions

ENVS 384 Conservation Economics (3 Credit Hours)

Pre-requisites: ECON 201

Explores resource conservation issues using economic principles. Topics include management of forests, wildlife and mineral resources; the demand for parks and outdoor recreation; the debate between environmental preservation and conservation; valuation of ecosystem services; the economics of biodiversity and endangered species; and policies to promote conservation in agriculture.

Outcomes:

Students will learn how natural resource use is affected by economic values, how to critically evaluate natural resource management problems, and evaluate models of dynamic resource extraction and user preferences

ENVS 385 Introduction to Global Health (3 Credit Hours)

Pre-requisites: ENVS 101 or ENVS 137 or BIOL 101

This course introduces students to epidemiological and policy aspects of global health with a focus on health disparities at the international level.

Interdisciplinary Option: Bioethics

Course equivalencies: X-HSM210/PUBH314/ENVS385

Outcomes:

Understand approaches to existing and emerging health problems and the relationships between health, poverty, and development

ENVS 387 Principles of Ecotoxicology (3 Credit Hours)

Pre-requisites: ENVS 280 or BIOL 265; and ENVS 274

This course will provide information on how pollutants affect ecosystems and how we might ameliorate their negative effects in our world. The emphasis of this course will be the fate and effects of pollutants in the ecosystem. The effects will be from molecular level to individual organism, community, and ecosystem levels.

Interdisciplinary Option: Bioethics

Outcomes:

This course will provide students with scientific knowledge in the cause and effects of pollutants in ecosystems and to prepare them for graduate study/future career

ENVS 388 Applied Environmental Statistics (3 Credit Hours)

Pre-requisites: ENVS 203 or STAT 103; Restricted to Junior and Senior standing

Tools and methods for analyzing combined social and ecological datasets. Emphasis on learning advanced quantitative statistics and applying this to project work. Students required to include both ecological and social data analysis in their projects - working with computer programs and output written in R/R-Studio, and interpreting output from these programs.

Outcomes:

Understand and be able to articulate fundamental statistical concepts; interpret software output and published articles; communicate results; describe data, articulate relevant hypotheses, know statistical tests which may be correctly applied

ENVS 389 Ecological Risk Assessment (3 Credit Hours)

Pre-requisites: ENVS 274 and ENVS 275

This course covers the area of potential effects of pollutants to ecosystems and practices on risk assessment for pollutants based on exposure and effect data in the literature. Different approaches for assessing the potential ecological impacts and risks of pollutants in support of environmental management will be discussed and practiced.

Outcomes:

Learn toxic effects of pollutants, acquire, organize, and synthesize monitoring and effect data using advanced analysis methods and skills in support of environmental impact and risk assessment via case studies

ENVS 390 Integrative Seminar (3 Credit Hours)

This course requires students to focus on a specific environmental issue or theme, integrating multidisciplinary perspectives, through individual or group presentations, discussion, and analysis of presentations by outside speakers.

Outcomes:

Students will demonstrate an understanding of the multi-faceted and interdisciplinary nature of environmental issues

ENVS 391 Environmental Research (1-3 Credit Hours)

Students may register for independent research on a topic mutually acceptable to the student and any professor in the department. Usually this research is directed to a particular course or to the research of the professor. Enrollment Conditions: Administrative Permission.

This course satisfies the Engaged Learning requirement.

Outcomes:

Students will be able to design and carry out the research that is original and meaningful, including data collection, analysis, and interpretation

ENVS 391C Independent Environmental Research (Capstone) (3 Credit Hours)

Pre-requisites: Senior standing and Instructor Consent

Fulfills capstone requirement for SES majors. Through independent research experience, examine how scientific, sociological, economic and political knowledge and perspectives interact and define environmental problems and solutions/mitigation efforts. Research projects must use a multi-disciplinary perspective in analysis and interpretation.

This course satisfies the Engaged Learning requirement.

Outcomes:

Design and carry out research that is original and meaningful, including data collection, analysis, and interpretation

ENVS 391L Independent Environmental Research-Lab (1-3 Credit Hours)

Students may register for independent research on a topic mutually acceptable to the student and any professor in the department. Usually this research is directed to a particular course or to the research of the professor. This version is used when funds must be drawn from a 'lab fees' budget line to conduct the research. Requires Administrative Permission to enroll.

Outcomes:

Students will be able to design and carry out research that is original and meaningful, including data collection, analysis, and interpretation

ENVS 395 Environmental Internship (3 Credit Hours)

Students seek out and engage in a semester- or summer-long internship with a civic, business, governmental, or academic group providing hands-on experience in work on environmental issues.

This course satisfies the Engaged Learning requirement.

Course equivalencies: ENVS395/ESP395/NTSC395

Outcomes:

Students will demonstrate, through daily activity logs and a comprehensive final report, a clear understanding of the environmental context and practical applications of their internship experience

ENVS 395C Environmental Internship (Capstone) (3 Credit Hours)

Pre-requisites: Senior standing and Department Consent

Fulfills capstone requirement for SES majors. Through internship experience, students reflect upon academic and extra-curricular activities in their degree program and learn how scientific, sociological, economic and political knowledge and perspectives interact and define environmental problems and solutions/mitigation efforts.

This course satisfies the Engaged Learning requirement.

Outcomes:

Guided reflection on relationship between coursework and internship experience, relate learning to specific activities and experiences in the internship, assess value of internship to future career plans

ENVS 398 Special Topics (3 Credit Hours)

Specific titles and contents vary from semester to semester.

ENVS 398B Environmental Science Topics for BIET Minor Capstone (3 Credit Hours)

Pre-requisites: Two Science courses and two Ethics courses

The interdisciplinary team-taught Bioethics capstone course examines a topic in bioethics from both scientific and ethical points of view.

Topics may include biotechnologies, concepts of race and gender, the environment, reproduction, and others. This course number provides a cross-listed elective for Environmental Science students when the Bioethics capstone's topic is environmental.

Interdisciplinary Option: Bioethics

Outcomes:

Students will understand the connection between ethical and environmental science issues with regard to the special topic in environmental science

ENVS 398L Special Topics with Lab (1-4 Credit Hours)

Specific titles and contents vary from semester to semester. Includes lab component.

ENVS 399 Directed Readings (1-3 Credit Hours)

Pre-requisites: Instructor Consent

Directed by an ESP faculty member, students will read, analyze, and discuss a publications focusing on different aspects of a specific environmental issue or theme.

Outcomes:

Students will demonstrate comprehension of, and the ability to apply information from, scientific literature and be able to synthesize information to produce a cogent, synthetic analysis of their topic based on these readings

ENVS 401 Sustainable Systems - Natural Science Perspectives (3 Credit Hours)

This required core course provides an integrated overview of environmental science and sustainability which connect to sustainable development and ecological economics goals to define a just and safe space for the equitable distribution of life's essential re-sources that does not exceed the Earth's capacity to provide and replenish them. Restricted to GRAD students.

Outcomes:

Students will be able to make logical connections between environmental science and sustainability and evaluate data and primary literature in learning best practices for making evidence-based decisions

ENVS 402 Sustainable Systems - Social Science Perspectives (3 Credit Hours)

This required core course examines theoretical perspectives on and practical examples of sustainable development at both global and local/regional scales. Restricted to GRAD students.

Outcomes:

Students learn concepts of sustainable development and system ,resilience, including history, contested meanings, strengths, and limitations of each; How change towards sustainability occurs at multiple scales using social sciences research

ENVS 410 Introduction to Environmental Law & Policy (3 Credit Hours)

This introduction to environmental law surveys some critical federal environmental statutes, rules, and regulations in the United States; important case law decided under those statutes; interaction between federal, state, and local jurisdictions; and impacts on air, land, water, and natural resources. Restricted to GRAD students.

Outcomes:

Understand how the natural environment is controlled, managed and promoted through the legal system

ENVS 411 Natural Resources and Land Use Law & Policy (3 Credit Hours)

Focus on legal and policy processes used to govern pollution, water use, endangered species, toxic substances, and environmental impact and risk. Restricted to GRAD students.

Outcomes:

Students will understand how the natural environment is controlled, managed and promoted through the legal system and how land use laws and policy impact social and economic issues

ENVS 412 Water Law & Policy (3 Credit Hours)

This course looks at how the law allocates and protects one of our most crucial natural resources – water. Understanding development and regulation of water ownership and use and how those decisions impact current environmental and socio-economic issues. Restricted to GRAD students.

Outcomes:

Understand how key laws and policies impact protection and use of water in the United States; understand key legal concepts that shape the management of our water resources

ENVS 413 Energy Law & Policy (3 Credit Hours)

This course looks at the laws that shape traditional energy production and the growing regulation of renewable and sustainable energy.

Restricted to GRAD students.

Outcomes:

Understand how key laws and policies impact production and use of energy; and how energy is controlled by federal and local regulations and policies

ENVS 420 Conservation Biology (3 Credit Hours)

Students will learn to apply ecological and evolutionary biological principles to the preservation of wild plant/animal species, and to the preservation/management of ecosystems. Conservation approaches and challenges for all types of ecosystems, will be covered, with emphasis on contemporary threats to biodiversity, including habitat fragmentation, invasive species, and climate change. Restricted to GRAD students.

Outcomes:

Students will understand how the science of ecology can be used to address issues in species/ecosystem conservation, and recognize that consideration of human actions is essential to address conservation problems

ENVS 422 Invasive Species (3 Credit Hours)

Invasive species are one of the greatest global threats to biodiversity, ecosystem function, economies, and human health. Species become invasive when moved beyond native range, become established, and cause harm. This course covers how species are moved, how and when they become established, and potential harm they can cause. Restricted to GRAD students.

Outcomes:

Understanding that because invasive species are moved by humans, and because many of their impacts are felt by humans, they are an inherently multi-disciplinary problem

ENVS 423 Environmental Microbiology (3 Credit Hours)

This course introduces the significant role of microorganisms in numerous environmental and human-engineered processes. It covers microbiology and its basic methods to orient students to this field of science and the importance of microbial diversity relevant to agriculture, public health, and ecological restoration. Restricted to Graduate Students in the ENSS-MS program.

Course equivalencies: ENVS 323/ENVS 423

Outcomes:

Students will learn to isolate and characterize environmental microorganisms; Students will investigate the role of microorganisms in nutrient cycling, remediation of soils, and transmission of existing and emerging pathogens

ENVS 425 Sustainable Agriculture (3 Credit Hours)

This course provides an introduction to the environmental, social, and economic implications of sustainable agriculture. Students will learn the origins, major concepts, and current issues of sustainability in agriculture. Ecological concepts and principles applied to manage sustainable food production to support community health and economic justice will be explored. Restricted to GRAD students.

Outcomes:

Students will be able to explain the characteristics of the US agricultural system, the inter-relation among components of sustainable agriculture, and steps necessary to develop a sustainable agricultural system

ENVS 426 Agroecosystems (3 Credit Hours)

In this hands-on course, students will build knowledge and skills in agriculture and ecology through work in greenhouse, laboratory, classroom, and field settings. Students will build on foundations of Environmental Science and Biology by examining challenges of food production, management decisions, and environmental change facing agroecosystems both locally and abroad. Restricted to GRAD students.

Outcomes:

Students will develop understanding of agricultural systems as related to sustainable practices, develop skills in ecological analysis of these systems, and demonstrate proficiency in communicating scientific information to diverse audiences

ENVS 427 Food Systems Analysis (3 Credit Hours)

This course links conceptual and practical considerations of food-system assessment and develop a base of tools for practitioners. It examines major elements of the assessment process: systems thinking and conceptual frameworks; the food system from consumer and producer perspectives; identifying leverage points that might be influenced to affect positive change. Restricted to GRAD students.

Outcomes:

Students will understand inter-relationships among environment, food supply, markets, American diets, and health, learn to analyze assessment methods for food-system sectors, and examine conceptual frameworks for food-system analysis

ENVS 430 Restoration Ecology (3 Credit Hours)

This course provides a theoretical and practical basis for the increasing global efforts to reverse damage caused by humans to ecosystems and species, emphasizing the many perspectives (e.g., ecological, social, political, engineering) that must be considered to develop, implement, and assess restoration projects across a range of ecosystem types. Restricted to GRAD students.

Outcomes:

Students will apply knowledge from ecology and other disciplines to the practice of ecosystem restoration, and learn to integrate information from multiple disciplines, and stakeholder input, to design/manage restoration projects

ENVS 432 Industrial Ecology (3 Credit Hours)

Pre-requisites: ENVS 363/463

Industrial ecology combines Business, Environment, & Engineering to shift industrial processes from linear (open loop) systems, where resources move through the system to become waste, to circular (closed loop) systems where waste becomes inputs for new processes. Students will learn life cycle assessment (LCA) to measure environmental impacts.

Course equivalencies: ENVS 332/ENVS 432

Outcomes:

Students will understand how business and industry can create zero waste systems, how a circular economy works, and the tools of industrial ecology, including life cycle assessment

ENVS 433 Introduction to the Circular Economy (3 Credit Hours)

This project-based course focuses on solving complex human sustainability challenges through the application of sustainable design methods at the product and process level. Students will learn and apply biomimicry, circular, and human-centered design methods to develop conceptual and prototype solutions. Restricted to graduate students.

Outcomes:

Understand role of design in creating a sustainable future; Understand and apply: (1) circular design methods; (2) biomimicry design methods; and (3) human-centered design (design thinking) methods

ENVS 435 Ecological Economics (3 Credit Hours)

Ecological Economics is a trans disciplinary course that takes a systems approach to the relationship between planetary stewardship, social justice, and the economy to design a prosperous and desirable future for humans on a finite planet. Ecological economics fuses economic theory and sustainability science to generate new solutions for today's challenges. Restricted to GRAD students.

Outcomes:

Understanding of ecological economics history, conceptual foundations, principles, tools, indicators, and applications; Topics include sustainable scale, just distribution, efficient allocation and relationships between economic

ENVS 436 Design for Circular & Sustainable Business (3 Credit Hours)

This project-based course focuses on solving complex human sustainability challenges through the application of sustainable design methods at the product and process level. Students will learn and apply biomimicry, circular, and human-centered design methods to develop conceptual and prototype solutions. ENVS 436 Restricted to graduate students.

Outcomes:

Understand the role of design in creating a sustainable future; Understand and apply: (1) circular design methods (2) biomimicry design methods; and (3) human-centered design (design thinking) methods

ENVS 438 Climate Change and Human Health (3 Credit Hours)

This course provides an introduction overview of the health consequences associated with climate change and the local, federal, and global response to mitigate these negative health outcomes. During the course students will be expected to incorporate course content and develop a realistic response public health plan to climate change for a locality of their choosing. Restricted to GRAD students.

Outcomes:

1) Outline fundamental public health concerns associated with climate change; 2) Identify and critique future steps forward to reduce public health concerns of climate change

ENVS 451 Introduction to Sustainability Concepts & Impacts (3 Credit Hours)

Examines environmental, economic, social and political impacts of sustainable practices on general public and global and local organizations. Provides students with understanding of importance to corporations and other entities of measuring, monitoring, and reporting resource use to customers and stakeholders. Restricted to GRAD students.

Outcomes:

Explaining basic concepts of sustainability and how they relate to operations and goals of institutions and organizations; interaction of social, economic, and ecological systems to influence sustainability challenges and solutions

ENVS 452 Sustainability Assessment & Reporting I (3 Credit Hours)

Pre-requisites: ENVS 451; GRAD students

Fundamental concepts and methodology of measuring and reporting environmental sustainability impacts in the areas of energy, air, buildings and transportation.

Outcomes:

Ability to assess and report sustainability metrics related to energy, air, buildings, and transportation

ENVS 453 Sustainability Assessment & Reporting II (3 Credit Hours)

Pre-requisites: ENVS 451; GRAD students

Fundamental concepts and methodology of measuring and reporting environmental sustainability impacts in the areas of water, land, food and waste. Environmental and social impacts of water use and sources, land use practices, food sourcing and production, and waste production and recovery.

Outcomes:

Ability to assess and report sustainability metrics related to water, land, food, and waste

ENVS 454 Sustainability Plan Development & Reporting (3 Credit Hours)

Pre-requisites: ENVS 451, 452, and 453; GRAD students

Capstone course in the four course sequence on Sustainability Assessment & Planning. Using concepts and methodology to create a comprehensive sustainability plan including stakeholder engagement, life cycle analyses, set resource baselines, short- and long-term sustainability goals, budgets and draft sustainability plan for a representative entity.

Outcomes:

Learn best practices to inspire and engage partners and stakeholders to advance environmental sustainability in different types of organizations; Ability to create a comprehensive sustainability plan for organizations and institutions

ENVS 463 Sustainable Business Management (3 Credit Hours)

Pre- or co-requisites: ENVS 410

To introduce students to the emerging field of sustainability in business and the growing focus on the social, environmental, and economic performance of businesses. The course presents the scientific, moral, business, & economic cases for adopting sustainability. This course fulfills a MGMT elective.

Course equivalencies: ENVS 363/ENVS 463

Outcomes:

Understand the dimensions of sustainability; understand economics for sustainability; understand the tools and techniques to apply sustainability in each functional area of the business

ENVS 464 Sustainability Management in the Global Context (3 Credit Hours)

Pre-requisites: ENVS 464; ENVS 463 recommended

This study abroad course takes students to international destinations to learn about business and sustainability management in the global context. Students hear presentations from local experts on sustainability in government, nonprofit, & for-profit entities, visit entities that have adopted sustainability practices, & visit local cultural sites.

Course equivalencies: ENVS 364/ENVS 464

Outcomes:

Students will understand sustainability perspectives outside the US, practical examples of circular operations and strong sustainability, and global, regional, and local sustainability concerns

ENVS 467 Mammalogy (3 Credit Hours)

Pre-requisites: Graduate students only

This course will focus on the ecology, evolution, behavior, and conservation of the class, Mammalia. Students will gain insight how this unique group evolved over time and became the dominate lineage over the Tertiary period. Furthermore, we will investigate how mammals hold special social and cultural relationship with humans, and why we have such complicated relationships with mammals, from revering them in religious contexts, to keeping them in our homes, to consuming them as nutrition.

Outcomes:

Working knowledge and mastery of the traits, evolutionary timescale, ecology, and conservation of mammals; Students will also gain experience collecting data (on museum samples as well as observations of living samples) to learn current techniques scientists and conservationists use to advance our understanding of this group

ENVS 469 Field Ornithology (3 Credit Hours)

Field ornithology is an intensive 3-week engaged-learning course at the Loyola University Retreat and Ecology Campus during the peak of the migratory season intended to provide an introduction to the theory and practice of field ornithology. Emphasis will be on field identification and song recognition, census techniques, and avian behavior. Restricted to GRAD students.

Outcomes:

Students will become skilled in critical reasoning, field techniques, and scientific investigation that demonstrate an understanding of knowledge and techniques used in field ornithology

ENVS 480 Introduction to Geographic Information Systems (3 Credit Hours)

Geographic Information Systems (GIS) is a mapping tool that allows users to create interactive searches, analyze spatial information, edit data and maps, and present the results visually. The course includes lecture, laboratory, and project components. Students will learn basic GIS skills and applications and work on projects with community organizations. Restricted to GRAD students.

Course equivalencies: ENVS380/UNIV410

Outcomes:

Describe the conceptual/theoretical and practical/technological background of GIS; describe ethical issues germane to GIS; prepare/analyze GIS data in research; apply GIS in community-service projects

ENVS 481 Advanced GIS Applications (3 Credit Hours)

Pre-requisites: ENVS 480

Students in this course will learn tools required to solve complex environmental problems and gain experience with spatial analysis, network analysis, 3-D analysis, GIS modeling, geostatistics, and other ArcGIS extensions. Students will also learn about internet-based mapping for dissemination of spatial data.

Outcomes:

Understand various spatial relationship concepts and their applications; identify and address common methodological challenges; understand how to use spatial data to make sound arguments in spatial problem solving and planning/policy

ENVS 482 Remote Sensing (3 Credit Hours)

Science of obtaining information about objects or areas using data from remote sensors on satellites or mounted on aircraft that can detect energy reflected from Earth. Topics include data collection; digital image processing, assessment, evaluation, and enhancement; display alternatives and visualization; electromagnetic radiation principles and radiometric correction; and geometric correction. Restricted to GRAD students.

Outcomes:

Understand concepts, data, and methods of remotely sensed geographic data; Learn how to obtain and analyze remote sensing data, produce thematic maps, learn landscape patterns, and methods to decipher them

ENVS 483 Human Dimensions of Conservation (3 Credit Hours)

This course will increase student knowledge of the social, political, economic, psychological, and cultural dimensions that influence the success of conservation projects and develop skills in conducting human dimensions-inquiry using surveys, interviews, observation, and/or participatory methods. It will contribute to preparation for employment in the conservation field and/or graduate study. Restricted to GRAD students.

Outcomes:

Students will understand the importance of treating the human dimensions of conservation problems with the same scientific rigor customarily given to the ecological dimensions

ENVS 484 Conservation Economics (3 Credit Hours)

Explores resource conservation issues using economic principles. Topics include management of forests, wildlife and mineral resources; the demand for parks and outdoor recreation; the debate between environmental preservation and conservation; valuation of ecosystem services; the economics of biodiversity and endangered species; and policies to promote conservation in agriculture. Restricted to Grad students.

Outcomes:

Students will learn how natural resource use is affected by economic values, how to critically evaluate natural resource management problems, and evaluate models of dynamic resource extraction and user preferences

ENVS 487 Principles of Ecotoxicology (3 Credit Hours)

This course will provide information on how pollutants affect ecosystems and how we might ameliorate their negative effects in our world. The emphasis of this course will be the fate and effects of pollutants in the ecosystem. The effects will be from molecular level to individual organism, community, and ecosystem levels. Restricted to GRAD students.

Outcomes:

This course will provide students with scientific knowledge in the cause and effects of pollutants in ecosystems

ENVS 488 Applied Environmental Statistics (3 Credit Hours)

Tools and methods for analyzing combined social and ecological datasets. Emphasis on learning advanced quantitative statistics and applying this to project work. Students required to include both ecological and social data analysis in their projects - working with computer programs and output written in R/R-Studio, and interpreting output from these programs. Restricted to Graduate students.

Outcomes:

Learn to analyze and apply data sets to social and ecological projects

ENVS 489 Ecological Risk Assessment (3 Credit Hours)

This course covers the area of potential effects of pollutants to ecosystems and practices on risk assessment for pollutants based on exposure and effect data in the literature. Different approaches for assessing the potential ecological impacts and risks of pollutants in support of environmental management will be discussed and practiced. Restricted to Graduate students.

Outcomes:

Learn toxic effects of pollutants, acquire, organize, and synthesize monitoring and effect data using advanced analysis methods and skills in support of environmental impact and risk assessment via case studies

ENVS 491 Independent Environmental Research (1-4 Credit Hours)

Students may register for independent research on a topic mutually acceptable to the student and any professor in the department. Usually this research is directed to a particular course or to the research of the professor. Post-baccalaureate students only.

Outcomes:

Dependent on the specific research project and goals

ENVS 495 Environmental Internship (3 Credit Hours)

Students seek out and engage in a semester -or summer-long internship with a civic, business, governmental, or academic group providing hands on experience in work on environmental issues. Post-baccalaureate students only.

Outcomes:

Students demonstrate, through daily activity logs and comprehensive final report, a clear understanding of the environmental context and practical applications of their internship experience

ENVS 496 Research (3-12 Credit Hours)

Restricted to GRAD students.

ENVS 498 Special Topics (1-12 Credit Hours)

Pre-requisites: Post-baccalaureate students only

Specific titles and contents vary from semester to semester. Variable credit hours.

Outcomes:

Dependent on the specific course content and goals

ENVS 498L Special Topics with Lab (1-4 Credit Hours)

Specific titles and contents vary from semester to semester. Includes a lab component. Variable credit hours. Post-baccalaureate students only.

Outcomes:

Dependent on the specific course content and goals

ENVS 499 Directed Readings (1-3 Credit Hours)

Directed by an SES faculty member, students will read, analyze, and discuss a publications focusing on different aspects of a specific environmental issue or theme. Post-baccalaureate students only.

Outcomes:

Students demonstrate comprehension, ability to apply information from scientific literature and synthesize information to produce cogent, synthetic analysis of their topic based on these readings

ENVS 595 Thesis Supervision (0 Credit Hours)

Students will make supervised progress towards completion of their theses. Restricted to SES, GRAD students.

ENVS 605 Master's Study (0 Credit Hours)

Restricted to GRAD students.