

SCHOOL OF ENVIRONMENTAL SUSTAINABILITY

Empowering the Next Generation of Environmental Leaders

Graduate programs in the School of Environmental Sustainability equip students with the knowledge and skills to find sustainable solutions to environmental challenges. At SES you can:

- Expand your professional impact and strengthen your interdisciplinary expertise through our Master of Science in Environmental Science and Sustainability program. Learn the skills needed to join the growing number of researchers and environmental science and sustainability specialists, while earning a degree that can advance your professional standing.
- Examine research questions in pressing environmental issues such as environmental conservation, environmental economics, invasive species, climate change, and sustainability.
- Analyze the intersection of environmental science, social justice, business practices, economic structures, and legal systems.
- Explore the United Nations' Sustainable Development Goals and Ecosystem Assessment Report that address global and interdisciplinary aspects of environmental sustainability in science and society.
- Design your own personal curriculum to gain practical knowledge and skills in this rapidly expanding career field.
- Learn from experts and researchers working together in a truly interdisciplinary team.

Program Outcomes

The SES graduate programs prepare students for careers in the sustainability field and to live integrated, environmentally sustainable lives with careers in positions such as:

- Research Associate
- Grants Manager
- Sustainable Supply Chain Manager
- Energy and Sustainability Researcher
- ESG Coordinator/Analyst
- Environmental Policy Analyst
- Project Manager
- Sustainability Manager
- Communications Manager
- Environmental Educator

SES graduates work in nonprofits, businesses, cultural and educational institutions, and government agencies such as:

- Midwest Energy Efficiency Alliance
- Natural Resources Defense Council
- EPA
- Environmental Defense Fund
- WWF
- Citizens Climate Lobby
- City of Chicago

- Chicago Botanic Garden
- The Field Museum

Graduate Programs

- Environmental Law and Policy Certificate (<https://catalog.luc.edu/graduate-professional/environmental-sustainability/environmental-law-policy-certificate/>)
- Environmental Science and Sustainability (MS) (<https://catalog.luc.edu/graduate-professional/environmental-sustainability/environmental-science-sustainability-ms/>)
- Geographic Information Systems (GIS) Certificate (<https://catalog.luc.edu/graduate-professional/environmental-sustainability/geographic-information-systems-certificate/>)
- Sustainability Assessment and Planning Certificate (<https://catalog.luc.edu/graduate-professional/environmental-sustainability/sustainability-assessment-planning-certificate/>)

Graduate & Professional Standards and Regulations

Students in graduate and professional programs can find their Academic Policies in Graduate and Professional Academic Standards and Regulations (<https://catalog.luc.edu/academic-standards-regulations/graduate-professional/>) under their school. Any additional University Policies supersede school policies.

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 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 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 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/ENVS480

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 486 Python Programming for GIS (3 Credit Hours)

Pre-requisites: Graduate Student Standing

This course aims to provide students with a comprehensive understanding of Python programming for Geographic Information Systems. Through a combination of lectures, hands-on exercises, and projects, students will develop the skills necessary to leverage Python in GIS applications, automate geospatial workflows, and analyze spatial data. ENVS 480 pre- or co-requisite

Outcomes:

Understand Python programming language, loops and conditional statements; acquire a foundation knowledge of GIS; apply Python programming skills to perform spatial analysis; develop Python scripts to automate common GIS tasks

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 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 490B Integral Ecology First Studies Program: Biodiversity (1 Credit Hour)

This course explores the environmental crisis of the loss of biodiversity. It covers the evolutionary origin of biodiversity, the importance and glory of biodiversity, and how ecosystem structure and function collapses when we reach the tipping point of species extinction. The course is intended for Jesuit men in formation in the First Studies Program, and is limited to them. No prerequisites are required.

Outcomes:

First Studies men will grasp the scientific concepts of biodiversity, explore the ethical and spiritual dimensions of biodiversity loss, and take actions to lessen the loss of biodiversity

ENVS 490C Integral Ecology First Studies Program: Climate Change (1 Credit Hour)

This course covers the science of climate change including the physical and chemical underpinnings of fossil fuels and greenhouse gases and their impact on trapping solar infrared radiation within the Earth's atmosphere and causing subsequent warming of the land and oceans. Warming of the planet increases the frequency and intensity of storms like hurricanes, cyclones, typhoons, it melts glaciers and causes sea levels to rise. Climate change is modifying the planetary distribution of precipitation which can produce water scarcity in some parts of the world, and leads to flooding and poor water quality in other locations. This course will study the scientific drivers of climate change, and the social and ethical ramifications of how the marginalized are disproportionately impacted. It will touch on environmental justice, water, land and food insecurity, and solutions to the climate crisis in first world countries as well as in developing countries. The course is intended for Jesuit men in formation in the First Studies Program, and is limited to them. No prerequisites are required.

Outcomes:

Understand the chemical composition of the three main classes of fossil fuels and connect the chemistry to greenhouse gases and the greenhouse effect; Explore the many ways in which climate change is impacting the planets' hydrologic cycle, the melting of polar ice caps and glaciers, rising sea levels, increased frequency and intensity of droughts, floods, wildfires and storm events worldwide; Understand the benefits and challenges of clean energy technologies, and where solar, geothermal, wind, biofuels and hydro are good solutions, and the geopolitical environment around clean energy technologies; Analyze key ethical challenges arising from climate change that human beings are confronting with in the world today and understand the moral principles, goals, and virtues important for guiding decisions about making a just transition to a clean energy economy; Discover ways in which spirituality has influenced the human understanding and use of fossil fuels, and recognize the importance of spirituality for responding constructively to today's climate crisis

ENVS 490W Integral Ecology First Studies Program: Water (1 Credit Hour)

This course covers the science of water - physical and chemical properties of water, how the hydrologic cycle distributes water across the planet, how climate change is modifying the distribution of water which can produce water scarcity in some parts of the world, and leads to flooding and poor water quality in other locations, and how the marginalized are disproportionately water insecure. It will touch on environmental justice and water insecurity, and some technologies for cleaning waste water and finishing drinking water in first world countries as well as in developing countries. The course is intended for Jesuit men in formation in the First Studies Program, and is limited to them. No prerequisites are required.

Outcomes:

First Studies men will explore the structure of the water molecule, the water cycle, and the changing water content in the atmosphere; Understand the sources of water, the distribution of water on Earth, and the effect of human activities on distribution cycles; Explore wastewater treatment plants and/or drinking water finishing plants in the city of Chicago to learn how water can be cleaned and reused for human consumption; Analyze key ethical challenges about water that human beings are confronting in the world today and understand the moral principles, goals, and virtues important for guiding water decisions; Discover ways in which spirituality has influenced the human understanding and use of water, and recognize the importance of spirituality for responding constructively to today's water crisis

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.