

# Environmental Sciences (IES)

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## **IES 127. Environmental/Justice Films. (3)**

This course is designed to introduce Social Justice and Sustainability Prodesse Scholars to a variety of environmental and social justice issues through cinema. The emphasis will be fictional feature films, not documentaries, but the feature films may be based on reality. Students will meet to watch films together and reflect on the messages they carry about environmental and social justice issues and how those messages are disseminated to the viewers. Students will explore the relationship between art and message. Cross-listed with FST 127 and SOC 127.

## **IES 177. Independent Studies. (0-6; maximum 10)**

### **IES 186. Sustainable Farming and Food. (3)**

Sustainable food systems deliver food security and nutrition to sustain human health in ways that are socially just and do not compromise ecological health. Through hands-on farming and food provision, this course teaches the connections among agricultural and food systems and the environment, the complexity of food systems, and the tremendous impact they have on human health and societal outcomes. Students will utilize the scientific method to identify environmental problems associated with farming practices, and to explore potential solutions. Students will practice applying the scientific approach while gaining actual farming experience on the Miami Sustainable Farm. EL. PA-2B. CAS-D.

### **IES 211. Energy and Policy. (3)**

Study of the relationships between energy technology and energy policy, with considerations of how policy and economic incentives influence the production and use of fossil fuels and renewable energy sources. Emphasis is on the regional and global impacts of different energy sources to natural resources and environmental quality.

### **IES 231. Italian Food Cultures in Context. (3)**

Examines food movements in Italy in a historical, literary and cultural perspective and compares the Italian case to the US discussing food production and consumption in light of the global environmental crisis. Includes hands-on experience with the local community. In English. IIB, EL. PA-4C, SI-01. CAS-B. Cross-listed with ITL 231.

### **IES 264. Environmental Literature. (3)**

How can literature, past and present, help us survive and thrive in a time of environmental crisis? This class will show you how reading and writing about human relations with the more-than-human world can enhance your abilities to perceive, understand, analyze, narrate, and respond to real-world environmental crises. Core texts and approaches will vary by faculty area of specialty; include texts from different disciplines, fields, genres, communities, and time periods; and consider intersections of race, class, gender, sexuality, and environment. IIB. PA-3B, SI-01. CAS-B, CAS-B-LIT. Cross-listed with ENG 264.

### **IES 274. Introduction to Environment and Sustainability. (3)**

Introduction to environmental and sustainability principles from social science and natural science perspectives. Critical analysis of environment and sustainability-related problems and resolution strategies. Review of foundational concepts and case studies, which may include environmental history, biotic and natural resources, energy and climate, planning and design, organizational management and policy, and sustainable development.

### **IES 275. Principles of Environmental Science. (3)**

Topics include causes and consequences of climate change; contamination of earth systems and pollution mitigation; use, abuse, and conservation of natural resources; agroecosystems, land use, conservation and preservation, planning and management and the value of biodiversity and wilderness. Emphasis is on the multidisciplinary nature of environmental problems and their solutions.

Prerequisites: at least one course from each of the following three categories is either pre- or co-requisite: 1) BIO 121, 131, 176, or 191 or BIO/MBI 115; and 2) CHM 111 or CHM 142 or CPB 244 or GLG 211; and 3) GLG 111, 121, or 141 or GEO 121 or 122.

### **IES 277. Independent Studies. (0-6; maximum 10)**

#### **IES 278. Introduction to Food Systems. (3)**

Introduces students to food from an interdisciplinary perspective exploring the interrelationships between food, agriculture, environment, and society. Course materials focus on food from a systems-based perspective, examining the origins, implications, and practices of our current food system, and exploring new approaches to sustainable agriculture, agroecology, and resilient food systems. IVA. EL. PA-2B. CAS-D.

#### **IES 278L. Understanding Food Systems Laboratory. (1)**

Laboratory course exploring the interrelationships between soil, water, plant resources, and other biotic components of agricultural ecosystems. IVA. PA-2B. CAS-D. Co-requisite: IES 278.

### **IES 340. Internship. (0-20)**

### **IES 377. Independent Studies. (0-6; maximum 10)**

#### **IES 411/IES 511. Environmental Protocols. (4)**

Lecture/field laboratory course will integrate the collection, analysis, management, evaluation and presentation of environmental measurements. One lab and two lectures per week. Appropriate for all environmental practitioners.

#### **IES 412/IES 512. Tropical Ecosystems of Costa Rica. (5)**

Introduces students to the structure and function of neotropical ecosystems, as well as to geological, biological, cultural, and economic forces affecting biodiversity in the tropics. This course is taught on-site in Costa Rica. There are additional costs beyond tuition. Cross-listed with: GEO/GLG 412.

#### **IES 419/IES 519. Environment, Society & Justice. (3)**

Interdisciplinary studies of the underlying social aspects of environmental problems and issues. Topics include the unequal distribution of hazardous waste sites, the environmental impacts of war, vulnerability to disaster, the social construction of the environment, population growth, environmental movements, the political economy of the environment, and ecological modernization. Cross-listed with SJS.

**IES 429/IES 529. Environmental Communication. (3)**

Examines theories, principles, and methods for communicating environmental concepts and scientific information verbally, textually and visually to a range of audiences and stakeholders. Students will work with scientists, peer communities, clients, and focus groups to develop effective and appropriate environmental communications across mediums. Projects may include producing scientific posters, writing reviews of research projects on an environmental problem, preparing oral presentations, creating visual story of scientific work, interviewing scientists for a general news story, writing environmental proposals, and facilitating focus groups.  
Cross-listed with ENG/JRN.

**IES 431/IES 531. Principles and Applications of Environmental Science. (3)**

Analysis of the relationship of human beings to the environment, specifically assessment of their impact on the environment as a whole. Attempts to outline the evolution and present status of many environmental problems, presents possible solutions, and attempts to predict our future relationship with nature.  
Prerequisite: IES 275.

**IES 440/IES 540. Contemporary Topics in Environmental Sciences. (1-3; maximum 3)**

An examination of historical and current world environmental conditions.

**IES 441/IES 541. Environmental Public Health. (3)**

This course is a study of the effects of human-made and natural physical, biological, and chemical agents on human health. The course explores the interaction of population health, demographics, and environmental determinants of disease. The course covers the basic principles of epidemiology, exposure, risk characterization, disease pathogenesis, and diagnostic testing, as well as the public works and regulatory controls used to limit exposure.  
Cross-listed with KNH 441/KNH 541.

**IES 450/IES 550. Environmental Law. (3)**

Introduction to the origins of environmental law; discussion of regulatory agencies; regulation of water pollution, hazardous substances, solid waste, land use, and air pollution.  
Prerequisite: upper-level undergraduate or graduate status.

**IES 474. Sustainability in Practice. (3)**

Application of sustainability principles to social and environmental problem solving, in an inter-disciplinary and project-based setting. Collaborative design of innovative strategies for addressing and resolving environmental concerns. Reflection on practical challenges of implementing sustainability principles in practice.  
Prerequisite: IES 274 or permission of instructor.

**IES 477. Independent Studies. (0-6; maximum 10)****IES 494/IES 594. Sustainability Perspectives in Resources and Business. (3)**

Provides students with interdisciplinary perspectives of sustainability in business and resource management through consideration of the economic, social, and environmental value of organizations. The course covers principles, case studies, and best practices used by organizations in several areas of sustainability, such as energy efficiency and alternatives, waste management and recycling, ecosystem services, product redesign and life cycle management, resource management, and sustainability planning and reporting.  
Cross-listed with BUS 494.

**IES 598. IES Orientation Field Trips. (1)**

The environmental orientation field trips are an important part of the IES program. They provide an opportunity for the incoming graduate students to see and experience things of environmental relevance that would be difficult without the field trips which extend over a three day period.

Prerequisite: Admission to IES.

**IES 605. Introduction to the Professional Service Project. (2)**

Major environmental project of concern to a local government, nonprofit organization or other entity in southwest Ohio is assigned to a group of students working as a team. Students begin the problem-solving process and lay out their study design for spring semester.

Prerequisite: IES 611.

**IES 610. Professional Service Project. (4)**

Major environmental project of concern to a local government or nonprofit organization in southwest Ohio is assigned to a group of students working as a team. The team is expected to develop solutions to the problem during winter and spring terms.

Prerequisite: IES 605 and IES 611.

**IES 611. Environmental Problem Solving and Analysis. (2)**

Interdisciplinary methodologies employed in solving environmental problems, with emphasis on problem definition and scoping, stakeholder involvement, developing and analyzing alternatives, and implementation of solutions.

Prerequisite: admission to IES or permission of instructor.

**IES 640. Internship. (0-12; maximum 6)****IES 642. Amazon: Avian & Tropical Ecology. (5)**

In the Amazonian Neotropical regions of Peru, reality has attained mythic proportions: more than 400 species of mammal, 1,300 bird species, 3,000 fish, 40,000 plants, and 2.5 million insect species. And still counting. Why is this area of South America the most diverse on the planet? How have the varied human groups that inhabit this region adapted to their unique environments? And perhaps the most relevant question for life on Earth, what is the future of the Amazon? Students travel to the Peruvian Amazon rainforest and work with educators, researchers, and local communities to better understand the evolution and maintenance of biodiversity in this region, and to experience firsthand the effects of human interventions in the Amazon, from deforestation and urbanization to restoration efforts by local groups. Prior to and following the field experience in the Amazon, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.

Cross-listed with BIO.

**IES 643. Australia: Great Barrier Reef. (5)**

One of the seven wonders of the natural world, the Great Barrier Reef lies in the clear blue waters off the northeast coast of Australia. This complex reef system is not only the world's greatest expanse of coral, it is the Earth's largest living structure, a massive, beautiful, and ancient biological phenomenon of bewildering diversity and immense ecological significance. This graduate course is offered jointly with Reef HQ Aquarium, Australia's National Education Centre for the Great Barrier Reef. We sleep near the corals in the aquarium itself, venturing forth on several excursions for direct research on the Great Barrier Reef, and hiking in some of Australia's unique terrestrial habitats. Discussion topics include marine science issues, citizen engagement in marine science and environmental stewardship. Prior to and following the field experience in Australia, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 644. Baja: Field Methods. (5)**

Students discover the rich waters and terrestrial ecosystems of Baja's UNESCO World Heritage site and biosphere reserve on the Sea of Cortez. Bahia de los Angeles is a unique ecoregion with remarkable marine and terrestrial environments. Students also explore Rancho San Gregorio, a family-owned ranch located in a small canyon where its isolation and climate make it a hotspot for desert investigations. Students gain proficiency in applying field methods to ecological questions and conservation practice. A premise of this course is that field methods are not only essential for ecological research, they can serve as the basis for participatory education, public engagement in science, and community-based environmental stewardship. Many groups, from teachers leading schoolyard ecology to parataxonomists involved in ethnobotanical research, share a need for reliable information obtained through robust field methods to build understanding and to promote informed action. Prior to and following the field experience in Baja, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 645. Belize: Approaches to Environmental Stewardship. (5)**

Students join our partner, the Belize Zoo, and explore diverse terrestrial, coastal, and coral reef communities of Belize, while learning about conservation programs on such species as harpy eagles, jaguars, manatees, and howler monkeys. Possible investigations include monitoring manatee population dynamics, human influence on coral reefs, aquatic mangrove species sampling, and species behavior studies at the Belize Zoo. Discover the power of inquiry to generate knowledge and inspire conservation. All students will have the chance to conduct an investigation of the local ecosystem, asking their own questions, collecting data, and presenting conclusions. Prior to and following the field experience in Belize, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 646. Borneo: Primate Conservation. (5)**

Borneo's primate community is exceptionally rich, including proboscis monkeys, which occur only in Borneo, leaf monkey, macaque, gibbons, tarsier and slow loris. Of greatest conservation concern is the orangutan, which occurs naturally on only two islands in the world, Borneo and Sumatra, and is under increasingly severe pressure, primarily from habitat loss. The orangutan, the only great ape in Asia, may completely vanish from the wild within two decades. Partnered with the Woodland Park Zoo, we will join researchers from the NGO Hutan and the Danau Girang Field Centre, and villagers of the Kinabatangan region who are responsible for model community-based efforts to preserve orangutans, Bornean pygmy elephants, and other species. In addition to exploring primatological field methods, students will work with local groups and develop new ways to engage communities worldwide in saving orangutans and other wildlife. Prior to and following the field experience in Borneo, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 647. Guyana: Local Wisdom & Conservation. (5)**

Guyana's rain forests are part of the Guiana Shield considered one of the last four Frontier Forests in the world. Guyana is famous for its relative abundance of iconic Amazonian species such as jaguars, arapaima (a "living fossil" and one of the largest freshwater fishes in the world), harpy eagles, giant anteaters, giant river otter, and the giant water lily. Guyana is also culturally and ethnically diverse. We will spend most of our time with the Makushi, an indigenous group that has lived in these forests and savannas for thousands of years. The Makushi and their lands face a striking transition as the forces of development provide new opportunities and challenges, the greatest perhaps being the rapid extinction of traditional knowledge. Conscious of the value of indigenous and non-indigenous knowledge, Guyana's Makushi people are becoming masters of straddling both worlds. Prior to and following the field experience in Guyana, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 651. Mongolia: Steppe Ecology & Civic Media. (5)**

Students travel to Mongolia, the "Land of Blue Sky." The birthplace of the Mongol Empire, the largest contiguous empire in human history, Mongolia is now a vibrant democracy and home to an open wilderness that has few parallels in the modern world. We will explore the great steppes, and especially engage in the conservation story of two key steppe species: Pallas' cats and Przewalski's horse. Pallas' cats are important steppe predators whose conservation provides insights into the challenges facing the survival of small wild cats worldwide. Przewalski's horse, also called takhi, are considered to be the only true wild horse left in the world. We will join research on an ambitious reintroduction project based in Mongolia that has returned this remarkable species to its former homeland after being driven to extinction in the wild. Prior to and following the field experience in Mongolia, students will complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 652. Thailand: Buddhism & Conservation. (5)**

Students travel to Thailand to investigate this country's astonishing Old World rain forests and diverse cultural environments. This course will address key topics in ecology while exploring emerging models of conservation and education. Possible research projects include Buddhism and the environment, indigenous ecological knowledge, spiritual connections to nature, and community forests. Discover the power of inquiry to generate knowledge and inspire conservation. All students conduct an investigation of the local ecosystem, asking their own questions, collecting data, and presenting conclusions. Prior to and following the field experience in Thailand, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.  
Cross-listed with BIO.

**IES 653. India: Species, Deities & Communities. (5)**

Students journey to India through the rich ecological, cultural, and spiritual landscapes of the Western Ghats, exploring sacred groves and forest temples where the fate of wildlife, people, and deities meet. The Western Ghats region is well known to conservationists as a biodiversity hotspot, home to diverse local ecosystems with an abundance of plant and animal species found nowhere else. The existence of sacred groves in the Western Ghats predates recorded history. For social scientists, sacred groves are valued as centers for community life. For the spiritually inclined, sacred groves transcend earthly bounds, allowing people to commune with gods and other powerful beings that offer protection, enlightenment, absolution, or guidance. In this course, we seek to better understand the multifaceted relationship between people and nature, and we address specific questions about a sustainable future. Prior to and following the field experience in India, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.  
Cross-listed with BIO.

**IES 665. IES Internship or Practicum Development. (1)**

Students explore career options and develop a plan for satisfying the professional experience requirements for the IES Master's of Environmental Science. Students will develop and write an internship or practicum proposal. Students pursuing an internship will also search for opportunities, develop application materials and apply for opportunities.  
Prerequisite: Admission to the IES MEn program.

**IES 670. Environmental Practicum. (1-12; maximum 12)**

Provides advanced graduate student with opportunity to apply acquired knowledge to the solution of an environmental problem.  
Prerequisite: satisfactory completion of comprehensive examination.

**IES 677. Independent Studies. (0-6)****IES 680. Environmental Internship. (1-12; maximum 12)**

Provides advanced graduate student with opportunity to apply acquired knowledge while working for approximately six months with an appropriate sponsoring organization actively involved in interdisciplinary environmental activities.  
Prerequisite: satisfactory completion of comprehensive examination.

**IES 681. Galápagos: Islands of Change. (5)**

Biologically, geologically, and culturally, the Galápagos are one of the best places on Earth to study the forces of change. Here, in 1835, Charles Darwin noted how giant tortoises, finches, and other taxa evolved different forms across the archipelago. Species on the islands have transformed in response to other species and the physical environment, through periods of isolation and connection, as new islands were created and old islands submerged over time. The most powerful changes now are of human origin. People are an increasing source of habitat destruction, overexploitation, and introduced species. But they are also a source of hope, with government agencies, researchers, NGOs, educators, and other informed citizens designing promising new approaches. Students will explore multifaceted forces of change in the Galápagos and contribute directly to sustainable solutions to current issues. Before and after the field experience, students complete coursework in Dragonfly's web learning community.  
Cross-listed with BIO.

**IES 682. Paraguay: Eco-Leadership. (5)**

The presence of conservation organizations in Paraguay is limited, and a critical need exists to better understand and build on the traditionally close relationship between local people and the land on which they depend. Cultivating the next generation of leaders is essential to a sustainable future for Paraguay's unique ecosystems and cultures, which are under increasing threat from population growth, agriculture, cattle ranching, hunting, and construction. Students in this course will co-develop an Eco-Leadership program for Paraguay, working in partnership with Para La Tierra (PLT), a nonprofit conservation organization devoted to scientific research, conservation, and community engagement. Students will learn with Paraguayan youth and others the diverse skills required for effective eco-leadership. Before and after the field experience, students complete coursework in Dragonfly's web learning community.  
Cross-listed with BIO.

**IES 683. Brazil: Saving Golden Lion Tamarins. (5)**

Golden lion tamarins live in only one small region of Brazil. By 1969, habitat destruction and forest fragmentation reduced the wild population to just 200 individuals. Since then, zoos worldwide have carefully managed the captive population, ecologists have studied habitat and population requirements, and educators have worked with local communities to increase knowledge of tamarins and their forest. Since 1969, the wild population has increased nearly tenfold, making this a landmark case of species recovery. This course focuses on multi-faceted wildlife conservation, including biological issues relevant to species reintroductions and translocations, management of wild and zoo-based populations, community-based habitat restoration, and participatory conservation education. We will explore the next generation of learning programs and public engagement campaigns through zoos and schools in Brazil, the U.S., and other countries. Before and after the field experience, students complete coursework in Dragonfly's web learning community.  
Cross-listed with BIO.

**IES 685. Internship/Practicum Final Report Writing. (1)**

This course guides IES master's students through the process of writing their final reports for their internship experiences or practica.En. program.  
Prerequisites: Part of the IES M.

**IES 690. Special Problems in Environmental Science. (1-4; maximum 6)**

Independent or team research on a current environmental problem.

**IES 691. Costa Rica: Neotropical Ecology. (5)**

Students join a summer field course in Costa Rica to explore Neotropical systems, including lowland rain forest and cloud forest; engage in inquiry and action projects on vital issues in education and conservation. Prior to and following the field experience in Costa Rica, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 692. Namibia: Great Cat Conservation. (5)**

Students join a summer field course in Namibia, Africa, to connect with the Cheetah Conservation Fund, the global center of cheetah conservation worldwide; engage in inquiry and action projects on vital issues in education and conservation. Prior to and following the field experience in Namibia, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions. Cross-listed with BIO.

**IES 700. Research for Master's Thesis. (1-12; maximum 12)**

Prerequisite: satisfactory completion of comprehensive examination.