

## **Focused Undergraduate -**

### **1. AMS 397. American Environmental History**

Chronological and regional approach to covering American environmental history from 1600 to present; includes political economy and the American conservationist/environmentalist movement.

### **2. ATH 471. Ecological Anthropology**

Reviews scientific methodology of anthropologists in analyzing cultural-environmental relations and conservation planning.

### **3. ARC 212. Principles of Environmental Systems.**

Understanding basic design and structure principles in integrating environmental and structural into building design.

### **4. ARC 413 Environmental Systems I**

Basic principles of designing environmental systems. Emphasis on building envelope and energy-efficient systems, heat gain and loss, alternative energy systems, the design and integration of climate control systems (heating, ventilating, air-conditioning), and plumbing and fire prevention systems.

### **5. ARC 414 Environmental Systems II**

“ “ emphasis on lighting and power/data systems.

### **6. BSC 475. Capstone in Environmental Biology**

Explores the causes of environmental problems resulting from anthropogenic activities which affect our health and standard of living.

### **7. BIO 121. Environmental Biology**

Local, regional, and global environmental issues examined in the context of current ecological theory and principles of resource use and management.

### **8. BIO 438 Soil Ecology and Sustainable Use**

Analyzes soil functions including within the context of water quality, biodiversity, and evaluates sustainability of the soil resource in the context of environmental change and ecosystem management.

### **9. BIO 467 Conservation Biology**

Applying principles of biology and ecology in preserving uncommon plant and animal species as a result of anthropogenic activities and relevant legislation.

### **10. BUS 494 Sustainability Perspectives in Resources and Business**

Provides students with interdisciplinary perspectives of sustainability in business and resource management through consideration of the economic, social, and environmental value of organizations. Includes topics such as energy efficiency, alternative energy sources, ecosystem services, etcetera.

### **11. CPB 244. Introduction to Environmental Engineering**

Introductory design concepts for the control of water pollution, air pollution, and solid waste will be covered.

Introductory course on design concepts to control pollution and solid waste. Includes discussion of environmental legislation. Solutions to environmental issues on economical, societal, and technical bases covered.

**12. CPB 405 Industrial Environmental Control.**

Discusses the environmental- and sustainability-related issues facing the chemical, paper, and biomedical engineering fields. Introduces computer modeling solutions to be applied to these problems. In-plant solid waste abatement discussed.

**13. CPB 441 Pollution Prevention in Environmental Management**

Discusses how corporations respond to government regulations in managing pollution. Engineering concepts such as material balances, energy balances, risk assessment, and life cycle assessment have impacted new process designs.

**14. ECO 406 Environmental Economics**

Economic analysis of environmental quality. Strategies for collective environmental action. Benefit-cost analysis. Economic growth and environmental quality.

**15. ECE 291. Energy Systems Engineering.**

Studies power sources using fossil fuels and renewable energy. Emphasizes economic decisions and societal and environmental consequences of using various energy sources.

**16. ECE 301. Advanced Circuits and Fundamentals of Renewable Energy**

Discusses advanced circuitry topics in the context of renewable energy.

**17. ENG 264. Literature & Environment**

Focuses on what literature and writing can do to help the environmental cause and understand changing ecology. Works at the intersection of identities and different societal groups to understand the relationship between humankind and nature.

**18. ENG 429 Environmental Communications**

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.

**19. IES 127. Environmental/Justice Films**

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.

**20. IES 211. Energy and Policy**

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.

**21. IES 274. Introduction to Environment and Sustainability**

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.

**22. IES 275. Principles of Environmental Science**

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.

**23. IES 278. Introduction to Food Systems**

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.

**24. IES 278L Understanding Food Systems Laboratory**

Laboratory course exploring the interrelationships between soil, water, plant resources, and other biotic components of agricultural ecosystems.

**25. IES 411 Environmental Protocols**

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.

**26. IES 419 Environment, Society & Justice**

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.

**27. IES 431 Principles and Applications of Environmental Science**

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.

**28. IES 441 Environmental Public Health**

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.

**29. IES 450 Environmental Law**

Introduction to the origins of environmental law; discussion of regulatory agencies; regulation of water pollution, hazardous substances, solid waste, land use, and air pollution.

**30. IES 474. Sustainability in Practice**

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.

**31. IES 494 Sustainability Perspectives in Resources and Business**

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.

**32. GEO 211. Global Sustainable Futures**

Integrates human and environmental geographic concepts and perspectives to understand global challenges and opportunities of sustainable development. This course also develops skills in research and writing for different audiences.

**33. PHL 376. Environmental Philosophy**

Critical study of metaphysical, epistemological, and moral problems associated with questions of ecology and humankind's relation to the natural environment. Considers such issues as conceptions of nature, character and impact of various forms of technology, relations of environment and economics, environmentalism and justice, and environmental ethics.

**34. PHY 121. Energy and Environment**

Application of physics principles and models to societal uses of energy. Includes mechanics, electricity and magnetism, thermodynamics, and atomic and nuclear physics. Energy topics include resources, environmental problems, global atmospheric challenges, nuclear power, solar energy, alternative energy systems, and energy conservation. Algebraic skills are required but no previous course in physics is needed.

**35. POL 459G. US Energy Policy**

Discusses US legislation and lawmaking in regard to sustainability and environmental security. Topics vary.

**36. GLG 121 Environmental Geology**

A survey of introductory geology with a sub theme of human interaction with the geologic environment. Topics include flooding, earthquakes, volcanoes, water quality and availability, energy, use and abuse of natural resources and land-use planning.

**37. MME 451 Sustainability Considerations in Design and Development**

This course presents sustainability issues to be considered in the planning process and provides tools to evaluate these for a balanced design. Topics include analysis of interactions between the technical, economic, and societal and policy aspects of sustainability, balance of the technical evaluation (life cycle costs, etc.) against the product's impact on the environment and societal preferences, and applying decision analysis methods to evaluate these preferences and tradeoffs.

**38. CPB 442 Air Pollution Control**

This course introduces students to the formation and control of air pollutants, engineering theories and principles pertaining to the design of air pollution control operations, and environmental legislation. Solutions to environmental problems are investigated, considering technical, economical and ethical aspects of engineering.

**39. IES 440 Contemporary Topics in Environmental Sciences**

An examination of historical and current world environmental conditions.

**40. GEO 271 Human Dimensions of Natural Resource Conservation**

Ecological, socioeconomic, and policy perspectives on the use and management of natural resources.

**41. GLG 307 Water and Society**

Provides a basic scientific understanding of what water is, where it resides and how it moves throughout the entire hydrologic cycle both on a global and watershed scale. Topics emphasize the importance and fragility of water resources and the world-wide threats to those resources. Major issues examined include flooding, water scarcity, irrigation, settlement of arid land, international water conflict and contamination of drinking water supplies. Topics are examined not only through a natural science perspective, but also through perspectives of history, policy, law and societal attitudes.

**42. GLG 428 Hydrogeological Modeling: Groundwater Flow and Contaminant Transport and Fate**

Explores techniques used in constructing and solving mathematical models of groundwater flow and contaminant transport. It reviews and covers the basic theory associated with these processes including the physical processes that govern the flow of groundwater in various geologic media and settings and the chemical, biological and physical processes involved in contaminant transport and fate in groundwater systems. The course explores how to incorporate our understanding of these various processes into numerical models that help us explore and come to a better understanding of natural systems and make predictions. The course also develops

familiarity some widely-used packaged models while learning about grid and boundary design, model parameter-value selection, calibration and exploration of uncertainty.

#### **43. GLG 437 Paleontology in Conservation**

This course explores the needs of conservation scientists, what paleontological data contribute, and new methods for synthesizing modern and paleontological data to develop effective strategies for conservation, remediation, restoration, and policy.

#### **44. BIO 131. Plants, Humanity, and Environment.**

Introduction to fundamental concepts in plant biology, ecology, and scientific perspective as they relate to issues of social concern.

#### **45. BIO 451 Conservation Education and Community Engagement**

Theory and practice of participatory education, collaborative research, and conservation action for positive ecological, educational, and social change. Includes community engagement projects and case studies in diverse local and global contexts.

#### **46. CPB 441 Pollution Prevention in Environmental Management**

Provides understanding of how corporations respond to governmental regulation by setting up environmental management systems which employ the principles of pollution prevention. Engineering concepts such as material balances, energy balances, risk assessment, and life cycle assessment have impacted new process designs. In this course a basis for evolution and maturation of pollution prevention as a fundamental methodology to ensure compliance and economic sustainability of industrial processes will be provided. The understanding of the concepts of pollution will be demonstrated by participation in a class project sponsored by industry at one of their facilities

#### **47. MKT 412. Sustainable Marketing Management**

The goal of this course is to provide an overview of the role of sustainability in marketing strategy. We use the triple bottom line perspective to cast sustainability as the simultaneous pursuit of financial, social/relational, and environmental performance. The course provides an assessment of current efforts to pursue sustainability with a primary focus on the interaction of the marketing organization with the environment. In the process, we investigate the interaction between consumption and the physical environment. We examine specific marketing tactics employed by firms seeking to maximize triple bottom line performance. We subsequently address consumption processes in the household, industrial, services, and transportation sectors of the economy.

#### **48. BIO 176. Ecology of North America**

Basic principles of ecology, major biomes of North America, and pertinent environmental issues. Biomes range from tundra to tropical rain forest. Environmental issues include biodiversity, deforestation, desertification, and other land management problems, each analyzed from a scientific perspective but involving social, economic, and humanistic factors as well.

#### **49. BIO 351. Environmental Education: Focus on Natural History.**

Introduction to the field of environmental education emphasizing the natural history and interpretation of natural habitats of southwestern Ohio.

### **50. GEO 436 Women, Gender, and the Environment**

Seminar discussing literature on the role of women in their relationships with natural resources as advocates, practitioners, and scholars. Ideas on ecofeminism will be introduced from more-developed "north" and developing "south" perspectives, and then directed toward the study of gender and development, and participatory tools in gender analysis

### **51. KNH 441 Environmental Public Health**

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.

### **52. GEO 425 Hydrogeography**

Investigation of the hydrologic cycle focusing on the surficial component parts of precipitation, infiltration, soil moisture, evaporation, transpiration, and surface runoff, and variation of these from place to place over the earth's surface.

### **53. GEO 121. Earth's Physical Environment**

Study of the earth's physical environment, using systems approach to understand energy and material cycles, global circulation, and temporal dynamics. Focus on influence of physical processes on spatial patterns and on interrelationships of the atmosphere, soils, vegetation, and landforms.

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## **Focused Graduate**

### **1. ARC 513. Environmental Systems I.**

Understanding of the basic principles that inform the design of environmental systems, with an emphasis on the building envelope and energy-efficient systems, heat gain and loss, alternative energy systems, the design and integration of climate control systems (heating, ventilating, air-conditioning), and plumbing and fire prevention systems.

### **2. ARC 514. Environmental Systems II**

Understanding of the basic principles that inform the design of environmental systems, with an emphasis on lighting and power/data systems. Course topics include acoustics, life-safety systems, and building service systems.

### **3. BIO 538. Soil Ecology and Sustainable Use.**

Introduces processes of soil formation and consequent physical, chemical, and biological properties. Analyzes soil functions related to plant growth, agricultural productivity, water quality, and biodiversity, and evaluates sustainability of the soil resource in the context of environmental change and ecosystem management.

### **4. BIO 567. Conservation Biology.**

Principles of ecology and organismal biology applicable to conservation of uncommon plant and animal populations or ecosystems as related to anthropogenic influences and relevant legislation.

### **5. BIO 622. Urban Ecology**

As urbanization increases globally, it is important to understand how natural resources can best be managed within and around cities. In this course, students explore the growing field of urban ecology and investigate how diverse stakeholders in cities can work together to increase urban sustainability and livability. The course includes a project whereby students collaborate to design a comprehensive urban land use management vision for the future of an urban system of their choice.

### **6. BIO 623. Human Dimensions of Conservation**

Conserving wildlife is a complex endeavor that requires the integration of sound science from both the social and natural sciences. This course explores how social sciences can inform conservation. Students consider how current conservation issues can be addressed through an understanding of human thought and action.

### **7. BIO 624. Pollinator Biology & Conservation**

Pollinators are critically important to global ecosystems. This course explores the diversity of pollinators, from relatively well-known honey bees to wild bee species and non-insect pollinators such as bats and hummingbirds. Participants implement a project that involves creating a pollinator garden or submitting a pollinator-focused research paper, lesson plan, or grant application.

### **8. BIO 631. Conservation Science & Community.**

This course explores the theory and practice of conservation science, including discussion of threats to biodiversity as well as methods to collaboratively address social-ecological problems. Vital to this course is a project in which students work directly with their local community to better understand and address real ecological problems.

### **9. BIO 638. Climate Change.**

Global warming is irrevocably altering our polar ice caps, our oceans, our forests, and the world's plant and animal life. In this course, participants study the science of climate change, the diverse causes of climate change, and the impact of climate change at local, regional, and global scales. Topics include global warming's effect on weather and climate, ice caps, deforestation, and species conservation. Because the public plays a central role in how the world responds to climate change, students also investigate the factors that guide public perception, ranging from media to social interaction. Students explore the effect of climate change specific to the biology of their local region and consider what actions they and their communities can take locally. Through project assignments and research, at the end of this course participants not only have a solid understanding of current issues surrounding climate change but will also have considered and developed strategies for taking action.

### **10. BIO 656. Environmental Stewardship in My Community.**

Students in this course investigate environmental stewardship, research science and conservation opportunities and solutions in their local communities, practice inquiry-based learning, develop a



conservation project to be used in their classroom or community, and reflect on ecological and carbon footprints. At the end of this course, students will have a solid understanding of community-based conservation, with a particular emphasis on current issues facing local habitats in the communities where they live. Students will also explore and begin to design stewardship strategies for empowering their own students or community members to generate solutions and take action.

### **11. BIO 657. Regional Ecology**

Through both zoo-based and field-based experiences, this course explores regional wildlife conservation issues, as well as field investigation techniques that scientists and citizens can use to study and conserve local ecoregions and wildlife. Students will be exposed to observational and experimental approaches and will practice field investigation techniques that can provide rigorous, engaging inquiry experiences for students. Student-conducted investigations will be used to contribute to local ecological knowledge by describing natural systems, noting differences in habitats, and identifying environmental trends and issues. This course focuses on different ecoregions in the area and highlights different conservation issues or themes based on that ecoregion

### **12. BUS 594. Sustainability Perspectives in Resources and Business**

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.

### **13. CPB 505 Industrial Environmental Control.**

Survey of environmental issues facing the industry and how the industry addresses these issues. In-plant pollution abatement alternatives discussed as well as external treatment. Computer-based modeling applications introduced and applied to problems. Design considerations involved in selecting among alternative pollution control strategies are presented and applied to examples.

### **14. CPB 541. Pollution Prevention in Environmental Management**

Provides understanding of how corporations respond to governmental regulation by setting up environmental management systems which employ the principles of pollution prevention. Engineering concepts such as material balances, energy balances, risk assessment, and life cycle assessment have impacted new process designs. In this course a basis for evolution and maturation of pollution prevention as a fundamental methodology to ensure compliance and economic sustainability of industrial processes will be provided. The understanding of the concepts of pollution will be demonstrated by participation in a class project sponsored by industry at one of their facilities.

### **15. ECO 506. Environmental Economics.**

Economic analysis of environmental quality. Strategies for collective environmental action. Benefit-cost analysis. Economic growth and environmental quality.

**16. ENG 529. Environmental Communications**

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.

**17. IES 511. Environmental Protocols**

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.

**18. IES 519 Environment, Society & Justice**

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.

**19. IES 531. Principles and Applications of Environmental Science**

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.

**20. IES 541. Environmental Public Health**

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.

**21. IES 550. Environmental Law**

Introduction to the origins of environmental law; discussion of regulatory agencies; regulation of water pollution, hazardous substances, solid waste, land use, and air pollution.

**22. IES 594. Sustainability Perspectives in Resources and Business**

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.

**23. IES 611. Environmental Problem Solving and Analysis**

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

**24. MME 551. Sustainability Considerations in Design and Development.**

This course presents sustainability issues to be considered in the planning process and provides tools to evaluate these for a balanced design. Topics include analysis of interactions between the technical, economic, and societal and policy aspects of sustainability, balance of the technical evaluation (life cycle costs, etc.) against the product's impact on the environment and societal preferences, and applying decision analysis methods to evaluate these preferences and tradeoffs.

**25. CPB 542 Air Pollution Control**

This course introduces students to the formation and control of air pollutants, engineering theories and principles pertaining to the design of air pollution control operations, and environmental legislation. Solutions to environmental problems are investigated, considering technical, economical and ethical aspects of engineering.

**26. GEO 536. Women, Gender, and the Environment**

Seminar discussing literature on the role of women in their relationships with natural resources as advocates, practitioners, and scholars. Ideas on ecofeminism will be introduced from more-developed “north” and developing “south” perspectives, and then directed toward the study of gender and development, and participatory tools in gender analysis.

**27. KNH 541. Environmental Public Health**

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.

**28. GEO 525. Hydrogeography**

Investigation of the hydrologic cycle focusing on the surficial component parts of precipitation, infiltration, soil moisture, evaporation, transpiration, and surface runoff, and variation of these from place to place over the earth's surface.

**29. MBI 671 Population and Community Ecology**

Principles and applications of population and community ecology: population dynamics, direct and indirect species interactions, food webs, and species diversity.

**30. MBI 672 Ecosystem and Global Ecology**

Structure, dynamics and management of ecosystems and the biosphere, including food web interactions, nutrient cycling, ecosystem functioning, and biogeochemical cycles at local, regional and global scales.

### **31. STA 671. Environmental Statistics**

Service course. Descriptive statistics, probability models, sampling distributions, estimation, hypothesis testing, regression and correlation analysis, elements of experimental design, and analysis of variance.

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#### **Related Undergraduate**

##### **1. ATH 405. Food, Taste, and Desire**

Explores food consumption as a meaningful practice embedded in local, national, and global relations and in social, economic, and political contexts. Topics include history of food consumption; food and power; nation, the state, and food; gender, sexuality and consumption; consumption, marketing, and subjectivity; globalization; hunger and memory; need, taste, and desire; and food aesthetics, moralities, and poetics.

##### **2. ARC 105. Introduction to Architecture.**

Introduction to spectrum of influences which determine environmental form. Emphasis placed upon development of understanding and appreciation of our man-made environment. Methods of communication and development of visual vocabulary capable of understanding and expressing three-dimensional form and space emphasized.

##### **3. ARC 107. Global Design.**

Introduces the role and influence of design on people and environments within a contemporary global context. Open to students in all majors.

##### **4. BIO 205. Dendrology.**

Identification and distribution of native and introduced trees, characteristics and use of their woods, and an introduction to forestry practice.

##### **5. BIO 221. Plant Propagation**

Provides students with knowledge of the scientific and applied aspects of plant propagation in a closed system including basic plant production, watering, fertilization, crop management, insect and disease control, and problem solving.

##### **6. BIO 431 Global Plant Diversity**

Research-focused seminar on floristic, ecological, and cultural influences on global patterns of plant diversity, especially in tropical regions. Comparative topics include the role of disturbances and global environmental change.

##### **7. BIO 432. Ecoregions of North America**

Ecological study of vegetation that applies an understanding of climate, soils, and physiography across the continent toward interpreting major vegetation types and local patterns of diversity. Discussions and field work focus on current research and conservation issues.

##### **8. CPB 471. Engineering Design I**

Involves application and synthesis of accumulated knowledge in a major, open-ended, industrial research/design project. Critical elements of the design process and real world constraints

(economic, **environmental**, social, political, ethical, health and safety, manufacturability, and **sustainability**) are considered. Emphasis is placed on oral and written communication skills. Students from different academic backgrounds are assigned to multidisciplinary project teams in order to utilize their varied experiences, knowledge, learning styles, and skills to achieve a successful conclusion to each project.

### **9. CMR 111. Introduction to Management I**

Introduction to principles and practices of managing organizations. Exposure to contemporary management issues, functions of management, and the interrelationship between business organizations and the environment. Emphasis on development of supervisory skills.

### **10. EDL 216. Myaamia Ecology & History**

In this course we will introduce, explore, and weave together various perspectives of Myaamia (Miami) ecology and history. The ecological observations of this first course will be heavily influenced by the seasonal transition from summer into winter that occurs during the fall semester. From these observations, the class will create a shared understanding of the web of relationships that links humans, animals, plants, landscapes, other-than-human beings, and the stories that one particular group of humans "the Myaamiaki" have told about these interactions over time. Through an exploration of some of the general aspects of Myaamia ecology and history, each individual participant of the class will begin develop their own personalized understanding of this complex web of relationships. Half of the class meetings will be dedicated to discussing historical topics, i.e. focused on the past, but one of our explicit goals is to discuss how historical understandings and ecological practices are a part of, or can be made a part of, our contemporary lives.

### **11. EDL 316. Myaamia Ecology & History 2**

In this course we will continue to weave together the various perspectives of Myaamia (Miami) ecology and history, which were introduced in the first semester. The ecological observations of the second course will be heavily influenced by the seasonal transition from winter into summer that occurs during the spring semester. From these observations, the class will create a shared understanding of the web of relationships that links humans, animals, plants, landscapes, other-than-human beings, and the stories that one particular group of humans "the Myaamiaki" have told about these interactions over time. Through an exploration of some of the general aspects of Myaamia ecology and history, each individual participant of the class will begin develop their own personalized understanding of this complex web of relationships. Half of the class meetings will be dedicated to discussing historical topics, i.e. focused on the past, but one of our explicit goals is to discuss how historical understandings and ecological practices are a part of, or can be made a part of, our contemporary lives. The second semester of this course will more explicitly focus on traditional stories and historical narratives. These oral and textual sources will be used to contextualize the ecological knowledge that students began developing in the first semester of the course.

### **12. GEO 111. World Regional Geography: Patterns and Issues.**

Introduction to world geography emphasizing regional approach and comparisons; combines analysis and synthesis of characteristics distinctive to each principal culture realm; focuses upon selected topical issues involving ethnic, political, economic, social, and environmental aspects

**13. GEO 122. Geographic Perspectives on the Environment**

An introduction to physical geography that enables class participants to understand and interpret the environmental conditions of any geographic locality on earth. Special emphasis is placed on understanding relationships between geographic patterns and processes in the atmosphere (weather and climate), biosphere (vegetation and soils), and lithosphere (landforms). With knowledge of global physical environments, it is possible to predict the suitability an area may have for human habitation, and also the influences certain human activities may have on the physical environment.

**14. GEO 201. Geography of Urban Diversity**

Introduction to the processes and patterns that shape life in the American City. Students interpret urban landscapes—historical and contemporary—in relation to their environmental, economic, and cultural contexts. Students develop a geographic perspective on the social and spatial development of diverse American communities, a necessary foundation for addressing current issues in urban development and planning.

**15. GEO 333. Global Perspectives on Natural Disasters**

Exploration of the underlying causes, potential impacts, and mitigation measures of natural hazards including wildfire, severe weather events, and geologic hazards. Particular attention is paid to impacts on humans.

**16. GEO 431 Global Plant Diversity**

Research-focused seminar on floristic, ecological, and cultural influences on global patterns of plant diversity, especially in tropical regions. Comparative topics include the role of disturbances and global environmental change.

**17. GEO 491. Geography and Sustainable Development Research Seminar**

Students in this advanced research seminar explore an in-depth topic related to geography and/or sustainable development building research, writing, and oral presentation skills. Each student must select and work with at least one faculty advisor, not necessarily from the geography department, with appropriate expertise. Required for geography and sustainable development majors.

**18. GLG 111. The Dynamic Earth**

Earth as a geophysical-geochemical unit and its internal and external processes. Formation of minerals and their relationships in rocks. Earth stresses and rock deformation, mountain building, and earthquakes. Geomorphic (landscape) evolution by mass wasting and wave, stream, wind, ground water, glacial, and volcanic activity.

**19. GLG 115L. Understanding the Earth**

Laboratory course exploring Earth from multiple perspectives. Earth in the solar system; Earth in time; the solid Earth; Earth's surface in flux; Earth's atmosphere and hydrosphere.

**20. GLG 211. Chemistry of Earth Systems**

Material presented serves as the basis for dynamic links with upper-division courses within the department. The chemical evolution of the Earth is presented spanning all pressure and temperature conditions. Major geological processes are discussed with respect to the chemical principles controlling the distribution of elements and mass, e.g., crustal genesis, metamorphism, metasomatism, formation of the atmosphere and oceans, diagenesis, hydrothermal processes, and low-temperature chemical weathering.

### **21. GLG 244. Oceanography**

Examination of the major features of the ocean and the processes active there. Oceanic currents, waves and tides, biologic productivity and zonation, nutrient cycles, chemical parameters, bathymetry, and sediments explored

### **22. GLG 342. Geoarchaeology**

An introduction to geoarchaeology as a multidisciplinary field incorporating human-environment interactions, earth resources, and sustainability. The course focuses on natural processes that shape the archaeological record, and stratigraphic, geochemical, isotopic, and geophysical approaches to reconstructing landscapes of the past as a context for archaeological deposits. Lectures and discussions address site, intra-site and landscape scales in light of how processes of erosion, deposition, weathering, and biological and human activity shape the archaeological record.

### **23. GLG 412. Tropical Ecosystems of Costa Rica**

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.

### **24. GLG 413. Tropical Marine Ecology**

Investigates aquatic systems (estuaries, mangroves, coral reefs, seagrass beds, lagoons, beaches, intertidal zones, taxonomy of vertebrates and invertebrates of coral reefs, lagoons and tidal flats) paleobiology and global climate change (paleo-reconstruction of past lagoon environments, fossil coral reefs, and land use). Student research questions concerning biological and physical analyses of a select marine habitat are required. The course is taught on-site in the Florida Keys and the Bahamas.

### **25. GLG 417. Forensic Isotope Geochemistry**

Application of stable and radiogenic isotope systems to contemporary forensic problems including environmental contamination, climate change and wildlife forensics, archaeological forensics, animal migration patterns, soil provenancing, human provenancing, food authenticity and traceability, and criminal investigations including drug use and trafficking, weapons tracing, and counterfeit detection. Analytical methods, data quality, and isotopic mapping and modeling will be discussed as a basis for quantitative and qualitative forensic diagnostics.

### **26. MBI 131. Community Health Perspectives**

Discussion of community health primarily from the perspective of leading causes of disease and death in the U.S. Exploration of the impact of environment, behavior, and disease, including

prevention and treatment strategies, on human health, public resources, and quality of life for society. Does not count as credit toward an A.B. or B.S. in microbiology.

### **27. SLM 150B. Beginning Backpacking**

This course will focus on the essential skills and information that backpackers need to travel safely and comfortably in the backcountry. The course will cover trip planning, equipment use and proper attire, cooking and meal planning, water treatment, leave no trace, land navigation, permits, land use regulations, weather and risk management.

### **28. SLM 150A. Beginning Canoeing**

This course will focus on the essential skills and information that tandem canoeists need to travel safely and comfortably on the water. Course content aligns with the American Canoe Association curriculum for paddling on flat and moving water. The course will cover history, equipment and usage, paddling technique, environmental impact for boaters, navigation, risk management and emergency procedures.

### **29. SLM 150M. Mountain Biking**

Students will learn about mountain biking: equipment, performance, safety, its role in health promotion, environmental issues, trail development and maintenance, and building community. Students will learn how to mountain bike safely and will have opportunities to bike on a variety of mountain bike trails of different difficulty levels. Students will also participate in mountain bike trail maintenance and sustainability.

### **30. SLM 150N. Beginning Kayaking**

This beginning kayaking course will focus on the essential skills and information that recreational kayakers need to travel safely and comfortably on the water by utilizing the American Canoe Association (ACA) Introduction to Kayaking, Level 1 curriculum. The course will cover equipment and usage, environmental impact for boaters, paddling technique, risk management and emergency procedures.

### **31. AMS 352. Geographies of Urban Change.**

Examines the cultural, social and political dimensions of urban planning and development practices in the United States. Drawing on an array of source materials and using multiple methods of representing past places, students apply analytical tools to document the nature, extent, and significance of urban change and to communicate their understanding of the complex forces shaping urban America.

### **32. AMS 303. Consumer Culture.**

This course examines the messages, meanings, practices, and products of consumer culture in the United States. It explores consumption from an interdisciplinary perspective integrating literature, politics, visual imagery, multimedia, and technology that frame the business of buying and selling of goods. Central topics include advertising and desire, the meaning of consumer goods and the construction of consumer lifestyles, as well as the developing practices of salesmanship, marketing, and public relations in historical context. Course themes will focus on the analysis and interpretation of the American practices of consumerism with an emphasis on issues of commodification, globalization, transnationalism and issues of identity. Students will



explore how consumerism affects ideals of belonging, citizenship, and membership in a heterogeneous transnational America.

### **33. ATH 448. Developing Solutions in Global Health.**

Global health is the study of illness and health as a consequence of bio-cultural processes that are both local and global. This is a transdisciplinary capstone encouraging teamwork to understand the complexities of and develop a grant proposal to address a student-identified global health problem.

### **34. GLG 335. Ice Age Earth**

Introduces the study of climate change as recorded in the geologic record. Discusses natural and anthropogenic causes for climate change

### **35. GLG 419 Geology of Streams**

This field course examines the nature of streams, how humans have impacted stream systems in the US, and efforts underway to restore streams to their natural conditions. Students will canoe down waterways and camp along the river at night. Students will learn to collect and evaluate primary field data for the purpose of stream classification, quality habitat assessments, and evaluating human impacts and modifications to streams. This data may entail aspects of fluvial geomorphology, surficial geology, and water chemistry analysis. Students will analyze data in the field, and complete a final research project after completion of the field component of the course

### **36. GLG 496 Isotopes in Environmental Processes**

Focuses on applications of isotopes to environmental processes. Topics include introduction to environmental isotopes and basics of isotope fractionation, isotopes used as tracers in the hydrological cycle to identify and quantify reaction pathways for both clean and contaminated landscapes, dating of modern and paleo-groundwaters. The emphasis is given to the role of isotopes to trace sources, reactions and pathways of various contaminants in the environment.

### **37. CPB 405 Industrial Environmental Control**

Survey of environmental issues facing the industry and how the industry addresses these issues. In-plant pollution abatement alternatives discussed as well as external treatment. Computer-based modeling applications introduced and applied to problems. Design considerations involved in selecting among alternative pollution control strategies are presented and applied to examples.

### **38. GEO 426 Watershed Management**

Impacts of urban and agricultural land use on water resources; common watershed-scale tools for water quality and quantity management.

### **39. WGS 406 Indigenous Peoples and Their Sacred Lands**

An in depth look at topics related to policy and land management practices that impact indigenous peoples nationally, as well as internationally. The major focus of the various case studies is on designated sacred lands of Native American tribes within the United States. The course provides students with interdisciplinary training about indigenous cultures and human rights.

### **40. GEO 406 Indigenous Peoples and Their Sacred Lands**

An in depth look at topics related to policy and land management practices that impact indigenous peoples nationally, as well as internationally. The major focus of the various case studies is on designated sacred lands of Native American tribes within the United States. The course provides students with interdisciplinary training about indigenous cultures and human rights.

**41. ARC 435 Theory and History of Landscape Architecture**

Examination of the role of the landscape architect in the environmental design process through discussion of history, methodology, and practice of contemporary landscape design.

**42. BIO 115 Biological Concepts: Ecology, Evolution, Genetics, and Diversity**

Integrated study of microbes, plants, and animals emphasizing biological diversity and interdependence of life and environment.

**43. BIO 116 Biological Concepts: Structure, Function, Cellular, and Molecular Biology**

Biological principles common to microbes, plants, and animals, including interactions between organism and environment.

**44. MBI 475 Microbial Ecology: Exploration of the Diverse Roles of Microorganisms in Earth's Ecology.**

Integrative examination of the evolution of life, distribution, and abundance of microorganisms, and biogeochemical cycles leading to the discovery of principles used for societal applications such as water quality management and bioremediation.

**45. PHY 118. Introduction to Atmospheric Science**

Introductory survey of a broad range of atmospheric phenomena with emphasis on how they can affect our lives and mankind's impact on a changing atmospheric environment. Quantitative, illustrative, and mostly non-mathematical approach to processes that pertain to such topics as composition of the atmosphere, global climate, large-scale weather systems, and the nature of violent storms. Develops skills in the areas of problem solving (using charts instead of equations) and elementary weather forecasting

**46. BIO 425 Environmental Plant Physiology**

Examines the structure and function of plants from the cellular to the whole plant level focusing on plant-environment interactions.

**47. BIO 204 Evolution of Plant Biodiversity: Genes to Biosphere**

long with BIO 203, provides a foundation for botany majors. Covers genetic basis of evolution, heredity and genetic continuity, processes of evolution, and systematic and ecological end-products of evolution with an emphasis on plants, algae, and fungi.

**48. GLG 141 Geology of U.S. National Parks**

A survey of introductory geology with a sub theme of the structure and geologic evolution of North America as exemplified by the geologic features and development of U.S. national parks and other public lands.

**49. GLG 204. Survival on an Evolving Planet**

Paleontology is the scientific study of past life, and is therefore an interface between geology and biology. It includes such topics as the origin of life, mass extinctions, exceptional fossil

preservation, and response of past ecosystems to climate change, to name a few. This course provides an overview of the history of life and an introduction to the primary research areas in paleontology.

**50. GLG 436 Paleoclimatology**

Reviews stable isotopic techniques to reconstruct climate change over geologic time scales from various types of records, including ocean sediment cores, ice cores, lakes, soils, and speleothems.

**51. CHM 491 Chemistry in Societal Issues**

Chemistry is involved in many of the societal issues facing this nation. In order to protect the environment, create new energy sources, improve health, and increase consumer product safety, understanding chemistry is critical to the problem-solving process. It is important for students in technical fields to understand the interface between the known chemistry and government regulations, public perception, and legal interpretations. Students critically evaluate and form positions on current issues of national interest.

**52. GLG 435 Soils and Palesols**

Introduces methods of soil morphology, taxonomy, and genesis of modern and fossil soils. Describes how to use fossil soils to infer past environmental conditions.

**53. ARC 188 Ideas in Architecture**

Study of the relationship between architecture and the cultural, social, and environmental contexts in which it exists through selected historical and contemporary examples.

**54. ECO 131 Economic Perspectives on Inequality in America**

Introduction to economic perspectives on inequality in the United States, particularly the relationship between inequality and population diversity. The role of the market and of public policy in generating, transmitting, and ameliorating inequality. Dimensions of inequality include earning inequality, poverty, and unequal access to education and health care. Dimensions of diversity include race, ethnicity, gender, age, socioeconomic class, immigration status, and sexual orientation.

**55. ATH 175 Peoples of the World**

Provides an appreciation of human cultural, social, and linguistic variation around the world and through time. Develops anthropological and ethnographic approaches to understanding cultural differences and similarities in political, social and economic organization; marriage and family patterns; environment and beliefs systems; and other aspects of globalized human cultural life.

**56. GEO 454 Urban Geography**

Geographic principles related to the distribution, function, structure, and regional settings of urban centers.

**57. GEO 444 GIScience Techniques in Landscape Ecology**

Using geographic tools such as geographic information systems (GIS), remote sensing, global positioning system (GPS) receivers, and computer-based analysis, students will study a range of current topics in landscape ecology.

**58. GEO 459 Advanced Urban and Regional Planning**

Application of planning tools and techniques to significant urban and regional land use problems. Evaluation of major planning tools for redevelopment of central cities and declining regions in the U.S. Innovative techniques for solving American urban spatial problems at local to national levels.

**59. GEO 467 Land Use, Law and the State: Geographic Perspectives**

Explores the legal basis for urban and regional planning in the United States through analysis of relevant case law, statutes, and secondary texts. The course offers both practical knowledge of land use law and deeper understanding of its wider geographic context and significance.

**60. GEO 475 Global Periphery's Urbanization**

Countries of the Third World have experienced an unprecedented rate of urban growth and expansion since the middle of this century. As Third World countries continue to industrialize, urbanization and related problems will increasingly become important and will continue to be on the agendas of national governments, international agencies, planners, and academics well into the next century. Explores Third World (Africa, Asia, and Latin America) urbanization literature from an interdisciplinary perspective.

**61. GEO 205 Population and Migration**

Examines the spatial distribution and dynamics of human fertility, mortality, and migration, primarily in the contemporary period, as well as the interaction of these trends with environmental, economic, and political issues. Special attention is given to interpreting and evaluating quantitative measures of population geography

**62. GEO 221. Regional Physical Environments**

Brief, intensive review of patterns in the earth's physical environment followed by a comparative analysis of selected, distinctly different regions. Geographic techniques for data collection and analysis demonstrated and employed in the examination of these environments.

**63. BIO 241 Botanical Principles in Landscape Gardening**

Plant materials in relation to home, garden, and landscape uses.

**64. PHL 205 Science and Culture**

This course will examine philosophical questions that arise at the intersection of scientific understanding and everyday ways of living. Looking at the cultural, ethical, political, and social dimensions of various sciences, and reading across multiple genres, we will explore a variety of arenas where scientific knowledge and technological development have transformed human experience (including experience with the non-human world), and, conversely, arenas where reflection and insight are necessary to confront and navigate conundrums of meaning, value, and action presented by scientific endeavors. Potential topics might include: the roles of scientific, political, and ethical reasoning in considerations of public health; human/non-human animal relations; climate change and collective agency; the impact of new media and communication technologies on the boundary between public and private; the social transmission of (mis-)information; and the significance of social identity for scientific investigation.

**65. PHL 312 Contemporary Moral Problems**

Moral argument and bases of moral decision. Discussion of such issues as sexuality, career and professional ethics, environmental responsibility, individual conscience and authority, abortion, suicide, and war.

**66. GEO 352 Geographies or Urban Change**

Examines the cultural, social and political dimensions of urban planning and development practices in the United States. Drawing on an array of source materials and using multiple methods of representing past places, students apply analytical tools to document the nature, extent, and significance of urban change and to communicate their understanding of the complex forces shaping urban America.

**67. BIO 255 Introduction to Biotechnology**

Examination of modern biotechnology and issues emerging from this technology. Emphasis on plant biotechnology and practical application of plants or their components in industry, agriculture, medicine, and the environment. Basic principles of molecular biology and recombinant DNA technology introduced.

**68. BIO 395 Primate Biology and Behavior**

Taxonomic survey of the primate order including anatomy, distribution, adaptation, and morphological characteristics of various taxa. Selected primatological topics including primate conservation, reproduction and development, manipulation, and tool use

**69. FSW 242 Family Decision-Making and Resource Management**

Explores individual and family/household decision-making behaviors throughout the lifespan related to the acquisition and allocation of resources in socially responsible ways. Examines the relationships between human needs, values, attitudes, and family/household characteristics and dynamics in individual and family decision-making. Emphasis is placed on families/households, as producing and consuming units, and their efforts to achieve their goals in global and environmental contexts. Attention is given to the roles of family life educators and other helping professionals in guiding individuals and families/households toward optimal well-being and quality of life as it relates to families' management of resources.

**70. FSW 442 Family Resource Management: Education and Advocacy**

In this course students will engage in critical analysis while exploring individual- and family-level goal setting and decision-making with regard to the identification, development, acquisition, and allocation of resources (e.g., time, energy, friends, neighbors, natural environment, money, material assets, and space). The processes by which families manage their resources are complex and often influenced by many factors including relationships with current and past family members; the political, economic, and social environment; interactions with available resources in their community; and patterns of interaction within and between family members and others outside the family. This course will also discuss advocacy strategies for promoting environmental and economic justice.

**71. GEO 122 Geographic Perspectives on the Environment**

An introduction to physical geography that enables class participants to understand and interpret the environmental conditions of any geographic locality on earth. Special emphasis is placed on

understanding relationships between geographic patterns and processes in the atmosphere (weather and climate), biosphere (vegetation and soils), and lithosphere (landforms). With knowledge of global physical environments, it is possible to predict the suitability an area may have for human habitation, and also the influences certain human activities may have on the physical environment.

### **72. GEO 441 Geographic Information Systems**

Introduces students to the structure, concepts, capabilities, and functionality of Geographic Information Systems (GIS) and geospatial science inquiry. The course focuses on the management and processing of spatial data, emphasizing data models and structures, geographic data input, data manipulation and storage, spatial analysis and modeling techniques. Students will learn to frame and solve a sequence of problems with GIS across a wide range of topics including environmental planning, biogeography, conservation biology, sustainable development, natural resource conservation, environmental justice, political geography, and urban geography and planning.

### **73. SLM 276 Current Issues in Leisure and Sport**

This course engages students in a critical examination of leisure as negotiated practices and experiences. Issues of globalization, sustainability, social equality and social justice are explored and provide a context for students to reflect on their leisure and inform their future professional practice.

### **74. MBI 121 The Microbial World**

Introduces basic concepts in the study of microorganisms - bacteria, viruses, and fungi. Topics include microbial structure and function, metabolism, genetics and the immune system. Special emphasis is placed on the impact of microorganisms on medicine, agriculture, food production, biotechnology, and the environment.

### **75. POL 345 National Issues**

Examination of major contemporary domestic national issues, especially pollution, health care, inflation and recession, crime, income distribution, poverty, federal budget.

### **76. BIO 432 Ecoregions of North America**

Ecological study of vegetation that applies an understanding of climate, soils, and physiography across the continent toward interpreting major vegetation types and local patterns of diversity. Discussions and field work focus on current research and conservation issues.

### **77. GEO 432 Ecoregions of North America**

Ecological study of vegetation that applies an understanding of climate, soils, and physiography across the continent toward interpreting major vegetation types and local patterns of diversity. Discussions and field work focus on current research and conservation issues.

### **78. SOC 257 Population**

Examines population theory, characteristics, dynamics and policies, focusing on global processes and global inequality

### **79. GEO 451 Urban and Regional Planning**

Introduction to the purposes and possibilities of urban and regional planning. Topics include historical development and theoretical rationale of planning, analytical techniques, and policy and design strategies for addressing urban problems. Surveys contemporary urban issues and areas of planning specialization. Prepares students with fundamental concepts and skills for careers in urban planning and development.

**80. ECE 491 Power Systems Engineering**

Study of electric power generation, utility load flow, fault analysis, system stability, surge protection, and the interconnection of the electrical grid system.

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**Related Graduate**

**1. ART 624. Design for Access.**

Approaches goal formulation and problem definition for experience-focused design with usability and access as primary drivers. Projects grow learners' sensitivity to different needs, cultural and lifestyle diversity, socioeconomic status, literacy, globalization, sustainability, and other aspects of design when it impacts people of diverse needs. Particularly focuses on developing innovations for enabling access for marginalized people groups who have not been equitably served by design.

**2. ART 625. Systemic Design**

Explores and applies theory and methods for exploring complex "wicked problems" at a systemic level. Primary and secondary research are conducted in order to more clearly define real and perceived factors inherent in complex areas of need. A systemic approach is practiced via projects that consider a wide range of stakeholders from social good initiatives to industry innovation.

**3. BIO 532. Ecoregions of North America.**

Ecological study of vegetation that applies an understanding of climate, soils, and physiography across the continent toward interpreting major vegetation types and local patterns of diversity. Discussions and field work focus on current research and conservation issues.

**4. BIO 641. Earth Expeditions: Advanced Field.**

The Earth Expeditions: Advanced Field course allows students to more fully and deeply explore community-based conservation, participatory education, and inquiry at an international conservation site they have previously visited during a past Earth Expeditions course. Possible field sites for the Advanced Field course include Baja, Belize, Borneo, Costa Rica, Guyana, Hawai'i, Kenya, Mongolia, Namibia, and Thailand (see [EarthExpeditions.org](http://EarthExpeditions.org) for detailed descriptions of each field site). Prior to and following the field experience, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.

**5. BIO 642. Amazon: Avian & Tropical Ecology.**

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.

#### **6. BIO 643. Australia: Great Barrier Reef.**

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.

#### **7. BIO 644. Baja: Field Methods.**

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 cour

#### **8. BIO 645. Belize: Approaches to Environmental Stewardship.**

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.

#### **9. BIO 646. Borneo: Primate Conservation.**

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.

#### **10. BIO 647. Guyana: Local Wisdom & Conservation.**

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

#### **11. BIO 648. Hawai'i: Saving Species.**

The extraordinary island ecosystems of Hawai'i evolved in isolation over millions of years, and the islands have long been home to species that occur nowhere else on the planet. However, since the arrival of humans, native species have been under tremendous threat, and by many measures Hawai'i is becoming one of the United States' most profound conservation failures. Habitat destruction, environmental degradation, introduced species, and other forces have made Hawai'i a global center for extinction. Students in this course will join with San Diego Zoo Global (SDZG), Project Dragonfly, and Hawaiian partners to explore what it takes to save

species in the wild. We will focus especially on the inspirational work of SDZG's Institute for Conservation Research, which uses science, education, and community programs to rescue species from the brink of extinction. We expect Earth Expedition's Hawai'i program to immerse graduate students and local partners in developing and testing site-specific methods of community engagement to sustain ecological and social health.

### **12. BIO 649. Kenya: Wildlife & People in Integrated Landscapes.**

The South Rift Valley of Kenya is one of the most spectacular wildlife areas on the planet. Project Dragonfly has partnered with the Cincinnati Zoo & Botanical Garden and the African Conservation Centre to advance community-based conservation in this dynamic landscape. This effort builds on the decades-long research of Dr. David Western, former head of the Kenya Wildlife Service, and the centuries-long research of the Maasai pastoralists, who have long co-existed with wildlife in an open grassland ecosystem populated by elephants, lions, giraffes, zebra, wildebeests, and a remarkable diversity of other species. With the rise of nontraditional lifestyles, private ranches, and fenced lands that prevent needed wildlife migrations, communities of the South Rift have recognized the need to understand the impact of these changes and to work together for a better future. Join Kenyan conservationists, educators, community leaders, and youth to study sustainable approaches to human-wildlife coexistence.

### **13. BIO 651. Mongolia: Steppe Ecology & Civic Media**

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.

### **14. BIO 652. Thailand: Buddhism & Conservation**

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.

### **15. BIO 653. India: Species, Deities & Communities**

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.

#### **16. BIO 662. Animal Behavior & Conservation.**

This course provides a foundation for understanding ethological research methods that can be applied to promote animal welfare and wildlife conservation. The course involves a community-based research project and direct observation of diverse animal species in a variety of settings such as zoos, botanical gardens, parks, and more.

#### **17. BIO 667. Conservation Research at Living Collection Institutions.**

This course provides students with an overview of conservation research conducted in zoological, reserve, aquaria and other ex situ settings. Students will explore key science concepts within the contexts of wildlife conservation, the imperative of in-situ conservation, the multi-disciplinary nature of science, and hands-on conservation research. Participants will learn about current research in the fields of genetics, reproductive physiology, disease diagnostics, ecology, and animal behavior. Course themes explore sustainable population maintenance, wildlife health, bioresource banking, restoration ecology, reintroduction biology, and the role of zoos, reserves and aquaria in conservation.

#### **18. BIO 672. Ecosystem and Global Ecology.**

Structure, dynamics and management of ecosystems and the biosphere, including food web interactions, nutrient cycling, ecosystem functioning, and biogeochemical cycles at local, regional and global scales.

#### **19. BIO 675. Inquiry & Action**

A follow-on course to summer Earth Expeditions global field courses, BIO 675 enables students to work with faculty, peers, and their local communities to address key ecological and education issues through hands-on investigation and action. Each student conducts a semester-long Inquiry Action Project (IAP) that requires scientific research in a community context as well as shared action or a plan of shared action addressing a focus issue.

#### **20. BIO 681. Galápagos: Islands of Change.**

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

**21. BIO 682. Paraguay: Eco-Leadership.**

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.

**22. BIO 694. Habitats, Adaptations, & Evolution**

This course explores the biology and conservation of species and habitats. Students implement a research project and investigate how local environmental conditions shape species' adaptations.

**23. BIO 695. Plants & People.**

This course explores the ecological roles of plants as well as the history of human-plant relationships (e.g., cultural context, ethnobotany, symbolism). Students implement a research project that engages their community in environmental action.

**24. GLG 536. Paleoclimatology**

Reviews stable isotopic techniques to reconstruct climate change over geologic time scales from various types of records, including ocean sediment cores, ice cores, lakes, soils, and speleothems

**25. ECE 591 Power Systems Engineering**

Study of electric power generation, utility load flow, fault analysis, system stability, surge protection, and the interconnection of the electrical grid system.

**26. BIO 531. Global Plant Diversity**

Research-focused seminar on floristic, ecological, and cultural influences on global patterns of plant diversity, especially in tropical regions. Comparative topics include the role of disturbances and global environmental change.

**27. GEO 531. Global Plant Diversity**

Research-focused seminar on floristic, ecological, and cultural influences on global patterns of plant diversity, especially in tropical regions. Comparative topics include the role of disturbances and global environmental change.

**28. GLG 517. Forensic Isotope Geochemistry**

Application of stable and radiogenic isotope systems to contemporary forensic problems including environmental contamination, climate change and wildlife forensics, archaeological forensics, animal migration patterns, soil provenancing, human provenancing, food authenticity and traceability, and criminal investigations including drug use and trafficking, weapons tracing, and counterfeit detection. Analytical methods, data quality, and isotopic mapping and modeling will be discussed as a basis for quantitative and qualitative forensic diagnostics

