An off-campus field-oriented course that studies a specific ecosystem in detail. The study area varies from year-to-year with the focus shifting between marine coastal environments, freshwater lakes or rivers, forests, and alpine environments. Uses field research techniques appropriate for the study location. Additional costs for living accommodations and travel $500. May be repeated once with a different field site. Springs and Summers.

ESP 3200 Energy and Society (3)
Investigates the different forms of energy and the natural laws that govern their use, transformation, and conservation. Examines different sources of energy available to modern societies. Discusses the development of each as a resource, extraction methods, and associate environmental and societal consequence. Additional course fee required. Falls.
Prerequisite(s): Environmental Science and Policy majors or permission of the instructor.

ESP 3270 Sustainable Structures (4)
Introduces students to the built environment through the lens of sustainability. Sustainable building is the use of locally available, minimally processed materials for human use. Investigates many methods and materials associated with natural building. Students have opportunities to explore design processes through both an individual project and a collective group design/build project. Additional course fee required. Springs.
Prerequisite(s): Environmental Science and Policy or Environmental Planning major, or permission of instructor.

ESP 3300 Soils and Environmental Change (4)
Introduces soil science with a multidisciplinary focus on the relevance of soil studies across a broad spectrum of modern issues. Students learn the geologic, geographic, and climatologic aspects of soil formation, structural components that impact soil fertility, hydrology, and tendency to landslide or erode, and the biological aspects of soil nutrient, carbon cycling, and biodiversity. Field trips. Additional course fee. Falls Odd.

ESP 3310 Hydrology (4)
Combines physical hydrology concepts and theory with laboratory and field measurements, demonstrations, and observations. Provides integrated training in hydrologic sciences and hands-on experience with instruments and analytical methods such as stream gaging, indirect discharge measurements, and surveys of channel morphology. Students learn hydrologic aspects of fluvial lake, wetland and groundwater systems in interdisciplinary, biogeochemical contexts. Falls.
Prerequisite(s): ESP 2110, Or GE 2001, Or MT 2000.

ESP 3325 Climate, Risk, and Adaptation (3)
Introductory course on Earth's climate; examines evidence about climate change, both past and present, and predicted future effects on environmental and societal systems. Topics include global, regional, and local approaches to climate risks, mitigation, and adaptations. Springs. (GACO) (INCO) (INCP)
Prerequisite(s): BI 1120 or ESP 2110 or GE 2001 or MT 2110 or permission of the instructor.

ESP 3335 Environmental Geology (4)
Covers Earth's geosystems and the geologic aspects of environmental hazards concerns like heavy metals, asbestos and radioactive elements; sea level change; acid-mine drainages and hydrofracturing earthquakes. Provides hands-on opportunities to investigate, observe and document geological aspects of Earth's environmental systems including soils and sediments; minerals, rock and land formations; various types of fossils, oceanography, and geochemical cycles. Additional course fee required. Falls. (TECO)
Prerequisite(s): ESP 2110 or GE 2001.
ESP 3340 Introduction to Ecological Economics (3)
Science of sustainability. Implementing sustainable practices must consider what is ethical, practical, efficient, and logical, and economics is a key component. Topics include: ecosystem services, resource management, supply and demand, market failures, economic growth and human well-being, policy instruments, resource allocation efficiencies, pricing and valuation of non-market goods, and ecological economics case studies. Fall of even years.

ESP 3400 Life in the Universe (3)
Are we alone in the universe? Astrobiologists use their understanding of diverse concepts in biology, earth science, physics, chemistry, engineering, and technology to search for answers to this question. The science of astrobiology is an integrated study centered on the search for life in the universe. Builds on our understanding of earth and life systems to investigate the habitability of other worlds. Students participate in inquiry based activities and discussions to investigate the limitations of life, the habitability of other planets, and model robotic explorations in other worlds. Culminates with student designed space missions. Spring. (INCO) (INCP)
Prerequisite(s): Junior status.

ESP 3510 Advanced Field Techniques (1-4)
This intensive field methods course prepares individuals for entry-level field technician and research jobs with federal, state and private consulting agencies. The course is taught through industry partnerships and emphasizes hands-on training in survey and assessment techniques. Students develop proficiency in skills including site assessments, independent decision-making, surveying, field data collection and mapping. Repeatable up to 8 credits. Pass/No Pass. Falls and Summers.

ESP 3550 Environment and Health (3)
Highlights the connection between Healthy Places and Healthy People. Humans interact with the environment constantly. These interactions affect our quality of life and the surrounding environment. Students explore how human-altered environments can influence human health and disease. Discusses the natural environment, and the social and building environment. Falls and Springs. (WECO)
Prerequisite(s): Sophomore standing.

ESP 3600 Special Topics in Environmental Policy (3)
An in-depth study of a particular environmental science oriented topic or contemporary issue. Since topics vary, the course may be repeated with permission of the instructor. Additional course fee required.
Prerequisite(s): Environmental Science and Policy majors.

ESP 3610 Special Topics in Environmental Science (3)
An in-depth study of a particular environmental science oriented topic or contemporary issue. Since topics vary, the course may be repeated with permission of the instructor. Additional course fee required.
Prerequisite(s): Environmental Science and Policy majors.

ESP 4200 Natural Hazards: Science and Policy (4)
Upper-level lecture with lab course dealing with regional to global scale environmental geology, including hazards and risk assessment. Students learn inter-relationships between population growth, development, and environmental risk which occur from urbanization in coastal areas, in earthquake and landslide zones, along the flanks of active and dormant volcanoes, and flood and wildfire prone regions. Additional course fee required. Fall of odd years.
Prerequisite(s): upper-level Environmental Science and Policy majors.

ESP 4305 Land Conservation Techniques (4)
Conserving land is a common technique for protecting natural resources and critical habitats, providing recreational opportunities and maintaining forested and open land. This course explores diverse reasons for land conservation and various techniques and methods for land conservation and management of conserved areas. Field trips to conserved sites, meetings with land managers, and case studies provide first hand examples. Additional course fee is required. Fall of odd years.
Prerequisite(s): junior or senior status.

ESP 4310 Advanced Conservation Ecology (3)
Provides students an in-depth understanding of ecological principles at the foundation of environmental problems and conservation actions. Blends qualitative and quantitative assessment of environmental integrity of landscape, ecosystem, community species, and genetic levels. Students discuss peer-reviewed literature and use Excel formula, GIS, and online tools to achieve learning outcomes. Fall of even years.
Prerequisite(s): ESP 2100 and BI 3240.

ESP 4325 Decision Making in Environmental Management (4)
Managing our environmental resources for multiple objectives creates challenges for practitioners and researchers in today's complex world. This course presents decision making approaches used in addressing environmental issues, resource management, and land use. Students learn decision making steps and processes. Case studies will demonstrate real world application of course material. Spring Odd.
Prerequisite(s): ESP 2110.

ESP 4405 Environmental Outreach and Communication (4)
Communicating about environmental science is an important skill that helps link environmental science to policy. Introduces environmental science communication concepts, explores its historical and theoretical aspects, and develops communication and outreach skills through a variety of activities and projects. Fall of even years.
Prerequisite(s): junior or senior status.

ESP 4440 Climate Change (3)
This interdisciplinary course focuses on the science underlying climate knowledge, including the sun-earth energy balance, land-sea-air climate systems and feedbacks. It is highly interdisciplinary and broadens overall comprehension of past, present and future changes in earth's climate. May be taken as ESP 4440. Spring Odd. (INCO) (INCP)
Prerequisite(s): MT 2000, Or ESP 3320, Or ESP 3325, Or ESP 3330, Or ESP 3335. May be taken with Junior or Senior status.

ESP 4550 Environmental Science and Policy Seminar (4)
This seminar integrates prior learning in environmental science and environmental policy to engage students in experiential learning around challenges and perspectives of interdisciplinary teamwork. Students conduct group research on significant environmental issues, often in collaboration with a local partner. The course builds student confidence in, and practice with, skills acquired during their program of study. Spring. (WRCO)
Prerequisite(s): Junior or Senior status.
ESP 4630 Environmental Science and Policy Internship (1-6)
Under the supervision of a faculty sponsor, Department Chair and supervising agency representative, students engage in a work program to apply, in a practical manner, knowledge gained in major and minor coursework. The internship addresses a department goal of being involved in a community-based or service learning project through a state, federal or local environmental organization. Students must obtain a faculty sponsor and submit a detailed written proposal prior to undertaking the internship. Students must also submit a written report to their faculty sponsor when the internship is complete. Final approval of the internship comes from the Department Chair. Repeatable for a maximum of 6 credits.
Prerequisite(s): Environmental Science and Policy majors and permission of the Department Chair.

ESP 4710 Science Colloquium Series (1)
The Boyd Science Colloquium Series is the department seminar intended to focus on the analysis of contemporary issues in environmental science and policy. Specific topics vary from year to year and are tailored to the interests of the students enrolled and the faculty. Creates a foundation of knowledge and methods for studying environmental issues. Helps students identify research interests as well as be exposed to new ideas through interaction with others. May be repeated with a different topic for a maximum of 4 credits. Falls and Springs.
Prerequisite(s): Environmental Science and Policy majors or permission of the Department Chair.

ESP 4910 Independent Study (1-4)
Offers students the opportunity to gain an in-depth understanding of an environmental science or policy topic that is not covered extensively in other courses. Working with guidance from a faculty member with relevant expertise, students select a specialized topic in environmental science and/or policy for exploration and prepare an in-depth research paper or project pertaining to that topic. Scheduled conferences with the faculty members are required and a possible presentation to a class or seminar group is suggested. Permission of the student’s advisor, the supervising faculty member and the Department Chair is required.

ESP 4915 Undergraduate Research (1-4)
Provides opportunity for students to conduct authentic science/social science environmental research in collaboration with 1 or more PSU faculty member. Expected outcomes include publication and outreach of work. The number of credits corresponds to the level of effort and scope of work at 60 hours per credit. Repeatable for a maximum of 8 credits. Pass/No Pass. Falls and Springs.
Prerequisite(s): permission of the instructor and ESP Department Chair.