

AS.270 (EARTH & PLANETARY SCIENCES)

AS.270.103. Introduction to Global Environmental Change. 3 Credits.

A broad survey of the Earth as a planet, with emphasis on the processes that control global changes. Topics include: the structure, formation, and evolution of the Earth, the atmosphere, oceans, continents, and biosphere. Special attention is given to present-day issues, such as global climate change, natural hazards, air pollution, resource depletion, human population growth, habitat destruction, and loss of biodiversity. Open to all undergraduates.

Area: Natural Sciences

AS.270.110. Freshman Seminar: Sustainable + Non-Sustainable Resources. 1 Credit.

An introduction to the important resources involved in the origin and production of oil, natural gas, coal, cement, metals and geothermal fluids.

Area: Natural Sciences

AS.270.111. Freshman Seminar: The Story of Earth. 1 Credit.

The four and a half billion year story of Earth's global changes focusing on the co-evolution of Earth and Life.

Area: Natural Sciences

AS.270.112. The Changing Arctic Environment: Problem or Opportunity?. 3 Credits.

The Arctic is warming three times faster than the global-mean rate. In this course we will be studying this phenomenon and its consequences by looking at the interconnected parts of the Arctic climate system (ocean, atmosphere, and ice), how they are changing, and which socio-economic opportunities and environmental challenges arise from these changes.

Area: Natural Sciences

AS.270.113. Freshman Seminar: Environmental Poisons. 1 Credit.

An exploration of the occurrence and potential effects of poisons in the environment, from naturally occurring ones such as arsenic to those that may be introduced by mankind such as nuclear waste.

Area: Natural Sciences

AS.270.114. Guided Tour: The Planets. 3 Credits.

An introduction to planetary science and planetary exploration primarily for non-science majors. A survey of concepts from astronomy, chemistry, geology, and physics applied to the study of the solar system.

Area: Natural Sciences

AS.270.125. People and the Earth: The Science Behind Our Interactions. 3 Credits.

This course is designed to introduce non-science students to the ways in which humans and the Earth interact. These interactions go in both directions, with Earth processes and materials affecting human society, and human activities altering the Earth. Topics include natural disasters, natural resources, and environmental issues rooted in geology; and they are examined from both a historical perspective and in the context of current events. Class time involves active learning and hands-on experiences. Course open to freshmen, sophomores, and juniors. Seniors by instructor permission only.

Area: Natural Sciences

AS.270.127. Our Moon From Imagination to Exploration. 3 Credits.

People imagined going to the Moon long before Neil Armstrong took those famous steps. Works such as Jules Verne's 1865 book *De la terre à la lune* (From the Earth to the Moon) and Georges Méliès's 1902 movie *Le Voyage dans la Lune* (A Trip to the Moon) served to inspire later exploration of the Moon in the second half of the 20th century. In 1959, Luna 2 became the first spacecraft to visit the Moon and since then a number of robotic and human missions have successfully explored the Moon. Analyzing data from those missions has led to a detailed scientific understanding of the Moon, yet certain fundamental questions remain unresolved. This calls for future exploration of the Moon. To be active participants of future exploration of the Moon, students in this course will understand the culture, history, engineering, and science of the Moon.

Area: Natural Sciences

AS.270.202. Introduction to Ecology. 3 Credits.

Ecology is the study of organisms and their environment. This course focuses on the patterns of distribution and abundance of organisms. Topics include population dynamics and regulation, competition, predation, host-parasite interactions, patterns of species diversity, community succession, the flow of energy and matter through ecosystems. We will also discuss the role of natural and human disturbances in shaping communities.

Prerequisite(s): AS.270.103 OR AS.020.151

AS.270.205. Introduction to Geographic Information Systems and Geospatial Analysis. 3 Credits.

The course provides a broad introduction to the principles and practice of Geographic Information Systems (GIS) and related tools of Geospatial Analysis. Topics will include history of GIS, GIS data structures, data acquisition and merging, database management, spatial analysis, and GIS applications. In addition, students will get hands-on experience working with GIS software.

Area: Engineering, Natural Sciences

AS.270.219. Natural Hazards. 3 Credits.

This course investigates earth processes that lead to natural hazards and their social and economic consequences. Topics include earthquakes, tsunamis, volcanoes, hurricanes, coastal flooding, drought, fire, and climate change. We will use case studies to explore the scientific principles behind the occurrence of natural disasters, assess their risks, and evaluate how societies have responded to these events.

Area: Natural Sciences

AS.270.220. The Dynamic Earth: An Introduction to Geology. 3 Credits.

Basic concepts in geology, including plate tectonics; Earth's internal structure; geologic time; minerals; formation of igneous, sedimentary, and metamorphic rocks; development of faults, folds and earthquakes; geomagnetism. Corequisite (for EPS Majors): AS.270.221; optional for others. The course is introductory and open to undergraduates at all levels; freshmen are encouraged to enroll.

Area: Natural Sciences

AS.270.221. The Dynamic Earth Laboratory. 2 Credits.

This course is a hands-on learning experience for introductory geological concepts and techniques using geological tools, such as mineral/rock samples, microscopes, and maps. Field trips are its essential part. The course is open to undergraduates at all levels; freshmen who wish to get their hands (and boots) dirty are encouraged to enroll.

Corequisite(s): AS.270.220

Area: Natural Sciences

AS.270.222. Mineralogy. 4 Credits.

An introduction to the properties, occurrence, and origin of the basic constituents of the Earth, including minerals and rocks. Introductory training in the recognition of minerals and rocks in the laboratory and the field.

Prerequisite(s): Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

Area: Natural Sciences

AS.270.224. Oceans & Atmospheres. 3 Credits.

A broad survey of the Earth's oceans and atmospheres, and their role in the environment and climate. Topics covered include waves, tides, ocean and atmosphere circulation, weather systems, tornadoes and hurricanes, El Niño, and climate change. For science and engineering majors

Area: Natural Sciences

AS.270.302. Aqueous Geochemistry. 3 Credits.

Modeling the chemistry of water-rock interactions from weathering and riverine development at Earth's surface to hot springs at depth, fluids in subduction zones in Earth's interior, and the ancient fluids preserved in fluid inclusions. Thermodynamic basis for the calculation of equilibria and irreversible chemical mass transfer involving minerals and aqueous species at low and high temperatures and pressures. The course culminates with practical examples of research interest to individual participants.

Prerequisite(s): (AS.030.101 AND AS.030.102) AND (AS.270.220 AND AS.270.221) or equivalents.

Area: Natural Sciences

AS.270.303. Earth History. 3 Credits.

This course will explore the evolution of life in the context of environmental, ecological, and geological changes to the Earth surface system. The goal of the class is to provide students with an understanding of how geological and paleontological records provide insight into the origin(s) of life, oxygenation of the atmosphere, the evolution of multicellularity, evolutionary radiations and extinctions, and modern global change.

Prerequisite(s): AS.270.103 OR AS.270.220 OR AS.270.224; or permission of the instructor.

Area: Natural Sciences

AS.270.304. Igneous Geology and Volcanology. 3 Credits.

This course provides an introduction to igneous and volcanic processes on Earth and other planetary bodies. Focus is placed on linking observations made on rocks in hand sample and outcrop to Earth/planetary processes. The course will review crystal chemistry of major rock-forming minerals and progress through how igneous rocks form. Volcanism, including eruption processes, landforms and tectonic settings, will be reviewed. Labs will include rock identification, study of thin sections under microscope and field trips. Teaching is geared toward the graduate and advanced undergraduate level. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

Area: Natural Sciences

AS.270.305. Energy Resources in the Modern World. 3 Credits.

This in-depth survey will inform students on the non-renewable and renewable energy resources of the world and the future prospects. Topics include petroleum, natural gas, coal, nuclear, hydroelectric, geothermal, solar, wind, biomass, and ocean energy. Global production, distribution, usage, and impacts of these resources will be discussed.

Area: Natural Sciences

AS.270.306. Urban Ecology. 3 Credits.

Urban ecology has been called the ecology in, of, and for cities. In this course, we will explore how ecological concepts are applied to urban ecosystems and the different approaches to urban ecological research. Topics will include: Biodiversity, water dynamics, energy and heat island effects, and nutrient cycling, urban metabolism, design of greenspace, and sustainability of cities. We will use Baltimore as a case study for studying cities.

Prerequisite(s): AS.270.308 OR EN.570.205 OR EN.570.403

Area: Natural Sciences

AS.270.307. Geoscience Modeling. 4 Credits.

An introduction to modern ways to interpret observations in the context of a conceptual model. Topics include model building, hypothesis testing, and inverse methods. Practical examples from geophysics, engineering, and medical physics will be featured.

Area: Natural Sciences

AS.270.308. Population/Community Ecology. 3 Credits.

This course explores the distribution and abundance of organisms and their interactions. Topics include dynamics and regulation of populations, population interactions (competition, predation, mutualism, parasitism, herbivory), biodiversity, organization of equilibrium and non-equilibrium communities, energy flow, and nutrient cycles in ecosystems. Field trip included. Students who have not taken one of the prerequisites may register with the permission of the instructor.

Prerequisite(s): AS.270.103 OR AS.020.151

Area: Natural Sciences

AS.270.310. Evolution and Development of the Vertebrates. 3 Credits.

Modern vertebrates (animals with backbones) are the products of a more than 500-million-year evolutionary history. This course surveys that history and uses it to explore such core evolutionary concepts as adaptive radiation, convergence, extinction, homology, phylogenetic taxonomy, and tree thinking. Emphasis will be placed on the origins of the modern vertebrate fauna and how fossils are being integrated with developmental biology to better understand major transitions in the vertebrate body plan.

Area: Natural Sciences

AS.270.312. Mammalian Evolution. 3 Credits.

An introduction to the evolutionary history and diversity of mammals, with emphasis on the first half of the Cenozoic - the beginning of the Age of Mammals. The course will focus primarily on the adaptive radiation of mammals (including our own order primates) that followed the extinction of the dinosaurs, exploring the origins and relationships of the major groups of mammals as well as the anatomical and ecological reasons for their success. Lectures will be supplemented with relevant fossils and recent specimens.

Area: Natural Sciences

AS.270.315. Natural Catastrophes. 3 Credits.

A survey of naturally occurring catastrophic phenomena, with emphasis on the underlying physical processes. Topics include hurricanes, tornadoes, lightning, earthquakes, tsunamis, landslides, and volcanic eruptions and climate change. Intended for students in science and engineering.

Area: Natural Sciences

AS.270.317. Conservation Biology. 3 Credits.

In this course, students examine the meaning and implications of biodiversity with a focus on disciplines associated with conservation biology, wildlife conservation and wildlife management, including taxonomy, genetics, small population biology, chemical and restoration ecology, and marine biology. This includes exploring how conservation biology differs from other natural sciences in theory and in application. Students learn the major threats to biodiversity and what natural and social science methods and alternatives are used to mitigate, stop, or reverse these threats. The course also includes the economic and cultural tradeoffs associated with each conservation measure at the global, national, regional, and local levels. One required field trip.

Area: Natural Sciences

AS.270.318. Remote Sensing of the Environment. 3 Credits.

This course is an introduction to the use of remote sensing technology to study Earth's physical and biochemical processes. Topics covered include remote sensing of the atmosphere, land and oceans, as well as remote sensing as a tool for policy makers. Also offered as 270.618

Area: Natural Sciences

AS.270.319. Geochronology and High-Temperature Isotope Geochemistry. 3 Credits.

Introduction to radioisotope geo/thermochronology and mantle stable and radioisotope geochemistry. Course covers: (1) methods for dating of rocks and geologic processes using long-half-life radioisotope systems, including the various isotope systems available and their applicability; (2) radioisotope techniques for investigation of the geochemical evolution of the crust and mantle; (3) isotope fractionation and utility of traditional and novel stable isotope geochemistry for interrogating high-temperature processes, and (4) thermochronology and methods for interrogating upper-crustal processes. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.320. Seminar in Planetary Science. 1 Credit.

Major problems of current interest in planetary science are critically discussed in depth.

Area: Natural Sciences

AS.270.323. Ocean Biogeochemical Cycles. 3 Credits.

This course will examine the cycling of trace chemicals in the ocean, consider what we can learn from the distributions of these chemicals about the ocean circulation, and ocean ecosystems. Topics covered will include oceanic biological productivity, open water cycling of nutrients and oxygen, ocean acidification and sediment cycling.

Area: Natural Sciences

AS.270.325. Introductory Oceanography. 3 Credits.

This class is an introduction to a wide range of physical, chemical, and biological phenomena in the world's oceans. Underlying basic principles are exposed wherever possible. Topics covered include: seawater, waves, tides, ocean circulation, chemical oceanography, biogeochemical ocean processes, and remote sensing of the oceans. Recommended Course Background: freshman Physics, Chemistry, Calculus through ordinary differential equations.

Area: Natural Sciences

AS.270.326. Cosmochemistry. 4 Credits.

Students in this course will gain an understanding of the origin of various forms of matter in our Solar System and beyond, along with its evolution through geologic processes. Beginning with the concepts of nucleosynthesis and stellar evolution, this course will then cover the condensation of matter, meteoritics, and petrogenetic evolution of differentiated, rocky bodies (i.e. asteroids, the Moon, Mars). Evolution of matter in extra-Solar planetary systems (i.e. exoplanets) will also be broached. In lab we will examine thin sections of meteorites, lunar material, and terrestrial analogs - a field trip to the Smithsonian Meteorite Collection is planned. Graduate and advanced undergraduate-level students are encouraged, as are interdisciplinary students with an interest in planetary science.

Prerequisite(s): Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

Area: Natural Sciences, Social and Behavioral Sciences

AS.270.328. Planetary Exploration: Techniques and Data Analysis. 3 Credits.

Have you ever wondered what it would be like if you could visit other planets and travel through the space? Students in this course will use state-of-the-art observational techniques in planetary exploration and actual spacecraft data from the Cassini mission to Saturn and the Mars Rover mission to solve problems in planetary science and design a space exploration mission. Important planetary properties, such as atmospheric composition and interior composition of a planet, will be studied using remote sensing and in situ data. Recent discoveries about exoplanets will be integrated into course activities. Recommended Course Background: One semester of Introductory Chemistry (AS.030.101).

Prerequisite(s): ((AS.110.105 AND AS.110.106) OR (AS.110.108 AND AS.110.109) OR (AS.110.202 AND AS.110.211)) AND ((AS.171.101 AND AS.171.102) OR (AS.171.103 AND AS.171.104) OR (AS.171.105 AND AS.171.106) OR (AS.171.107 AND AS.171.108))

Area: Natural Sciences, Social and Behavioral Sciences

AS.270.331. Isotope Geochemistry. 4 Credits.

Introduction to stable isotope and radioisotope geochemistry. Isotope measurements are used to probe fundamental questions in the Earth and environmental sciences because they can be used to extract information about the timing of and/or chemical, physical, and biological processes associated with the formation of geomaterials. The first half of the course focuses on light isotope systems (O, C, S, etc.) and low-temperature applications, including: (1) tracing sources and sinks of fluids, sediments, biological materials, and contaminants, (2) studying rates and mechanisms of biochemical reactions, and (3) paleoenvironmental reconstructions. The second half of the course focuses on heavier isotope systems and high-temperature applications, including: (1) methods for dating of rocks and geologic processes using long-half-life radioisotopes, including the various isotope systems available and their applicability, and (2) isotope fractionation at high temperatures and the utility of radioisotope and novel stable isotope geochemistry for interrogating processes influencing the crust and mantle. Biweekly lab classes (scheduled in first week) will allow students to become familiar with principles of isotope measurements and interpretations. Mid-term and final exams. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

Prerequisite(s): AS.270.220 AND AS.270.221

AS.270.332. Soil Ecology. 3 Credits.

The course introduces basic aspects of cycles and flows in the soil ecosystem, and provides students with an overview of the higher groups of soil organisms. Laboratory and field surveying methods are also covered.

Prerequisite(s): Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.
Area: Natural Sciences

AS.270.333. Mineral Physics Recitation. 2 Credits.

This course is designed for undergraduate students interested in pursuing geophysics research in the topics of solid state physics or inorganic chemistry. It will consist of a weekly seminar paired with a separate paper reading+discussion group, covering a range of topics on the frontiers of mineral physics. Themes rotate each semester, and Fall 2018 will be paired with the Mineralogy Lecture Series on Modeling and Experimental challenges in Cosmochemistry. Recommended Course Background: Relevant coursework such as Mineralogy or equivalent in other department, and instructor permission.

AS.270.334. Astrobiology: Chemical Evolution of Life on Earth and Beyond. 3 Credits.

Have you wondered how life began on Earth or if we are alone in the Universe? This course will explore the prebiotic chemistry and origin of life on Earth, then move on to Mars, icy bodies (Europa, Titan, Enceladus) and newly-found "habitable" exoplanets. Students in this course will learn state-of-the-art methods and techniques used to characterize habitable conditions and to detect life. This course will deepen understanding of the current developments and ongoing discoveries in field of astrobiology.

Prerequisite(s): AS.030.102 or equivalent.
Area: Natural Sciences

AS.270.336. Freshwater Systems. 3 Credits.

A study of streams, lakes, and groundwater with a focus on aspects of water quality, hydrology, geomorphology, and aquatic ecology that are relevant to human impacts on freshwater systems. US environmental policies and water resource management agencies will also be examined in the context of issues such as dams, cattle grazing, climate change, and water allocation.

Prerequisite(s): AS.270.103 OR AS.271.107 or permission of the instructor.
Area: Natural Sciences

AS.270.337. Freshwater Systems Lab. 1 Credit.

A hands-on investigation of the water quality, hydrology, geomorphology, and aquatic ecology of streams and other freshwater bodies. Includes field trips to water-related facilities such as drinking water and wastewater treatment plants.

Prerequisite(s): Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.
Area: Natural Sciences

AS.270.338. Field Methods in Ecology. 3 Credits.

This course will introduce student to methods used in field-based ecological research addressing population, community and ecosystem-level questions. Outdoor fieldwork is an essential part of the course. Field activities will center around the riparian ecosystem adjacent to the Homewood campus and on the urban ecology of the greater Baltimore region. Students will build skills in data collection, analysis, synthesis, and presentation. Basic statistical instruction in R will be taught to aid data analysis.

Prerequisite(s): Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.270.308 OR EN.570.205

AS.270.339. Topics in Mineralogy. 3 Credits.

This semester, join HEMI's Designer in residence, and MICA professor Jenna Frye, in a modified version of her popular experimental fabrication course, EPIC FAIL. Discover how thinking with your hands, embracing risk and failure and playful exploration with educational toys, can invigorate your research in mineralogy and deepen your understanding of crystallography visualization. This course is designed as a hands-on, deeply collaborative workshop, where we will investigate the role of creative fabrication technology and invention as it relates to communicating scientific research to outside audiences. Together we will make, tinker and fail our way to improved visualization and presentation strategies so that others may more fully access the complexities in our work. Topics in Mineralogy is a special topics course that rotates in subject and may be taken multiple times for credit. This course is designed for those interested in mineralogy, and we recommend concurrent enrollment in Planetary Interiors, Space Weathering, and/or Advanced Mineralogy seminar.

AS.270.346. Structural Geology Seminar. 1 Credit.

Seminar class on fundamentals of structural geology, as applied in field-based studies. Involves weekly readings/practical exercises on: (1) field techniques for measuring structures; (2) interpretation of structural data on maps and cross-sections; (3) approaches for inferring large-scale structure from limited data; (4) techniques for visualizing structure; (5) deformation style and associated fabrics/textures/structure; (6) metamorphism and deformation, and (7) methods for visualizing and analyzing structure. Topics covered are geared towards developing skills required for a 10-day, field-based Independent Study in Structural Geology course in Scotland in the summer (May–June).

Prerequisite(s): AS.270.220

AS.270.347. Foundations of Ecology. 3 Credits.

In this seminar students will read seminal pieces in ecology. Assigned readings will span early 1900s to present. Students will pair a foundational paper with a more current paper on a similar topic to explore the evolution of ecological concepts and approaches over time. This course is aimed at upper level undergraduates and graduate students.

Prerequisite(s): AS.270.202

AS.270.348. Communicating Climate Science. 3 Credits.

This course is a study of techniques used to effectively communicate scientific knowledge with a focus on climate science. This will be done with three overarching topics: reading and comprehending scientific papers, critically interpreting science news from the media, and communicating complex climate science to a general audience. The course is intended for science and engineering majors and not open to freshman. Recommended pre-requisites: General Physics I and/or Oceans and Atmospheres.

AS.270.350. Sedimentary Geology. 4 Credits.

Sedimentary rocks are the historical records of the Earth, documenting climate change, mass extinctions, and the evolution of life. This course will provide an introduction to sedimentary processes and sedimentary rocks. Focus is placed on linking physical observations to the ancient environments in which sedimentary rocks once formed. Fundamental tools for interpreting the sedimentary rock record, such as depositional models, geochronology, and chemostratigraphy will be reviewed. Two 1-day weekend field trips will occur over the course of the semester. There will also be weekly 1-hour labs. Lab and field trip times will be determined in the first week of class. Graduate and advanced undergraduate level. Recommended Course Background: AS.270.220 or instructor permission. Area: Natural Sciences

AS.270.361. Geodynamics Seminar. 1 Credit.

Seminar class on the dynamics of subduction and accretionary orogenesis. Weekly readings discussed in class. Focus will be broad and process-based. Topics in subduction may include: (1) modes of global subduction through Earth history; (2) models of forced/triggered v. spontaneous subduction initiation; (3) arc development and implications for growth of continents; (4) subduction zone rollback and arc migration, and (5) subducted slab breakoff and tearing. Topics in accretionary orogenesis may include: (1) stress state of the overriding plate; (2) tectonic mode switches (shortening to extension and vice versa), and (3) length and time scales of the thermal manifestations of accretionary orogenesis.

Prerequisite(s): AS.270.220 AND AS.270.221 or instructor permission.

AS.270.366. Spacecraft Instrumentation Project. 3 Credits.

Co-Listed with EN.530.366 Investigation into the content relevant to an ongoing spacecraft instrumentation project. An interdisciplinary team will enhance the skills and knowledge of science and engineering students. Topics include mission background, planetary science, sensor design, spacecraft systems, and mission planning, and sensor fabrication, calibration, integration, and testing, data analysis and interpretation, scientific/technical writing and publication.

Area: Engineering, Natural Sciences

AS.270.369. Geochem Earth/Environmen. 3 Credits.

An introduction to all aspects of Geochemistry: theoretical, experimental, and observational, including the application of geochemistry to issues such as the migration of toxic metals and nuclear waste.

Prerequisite(s): AS.270.220

Area: Natural Sciences

AS.270.378. Present and Future Climate. 3 Credits.

Intended for majors who are interested in the science that underlies the current debate on global warming, the focus is on recent observations one can glean from model simulations. Meets with AS.270.641. Recommended Course Background: AS.110.108-AS.110.109 and AS.171.101-AS.171.102

Prerequisite(s): Student may not receive credit for both AS.270.378 and AS.270.641.

Area: Natural Sciences

AS.270.379. Atmospheric Science. 3 Credits.

A survey of core topics in atmospheric science, including dynamics, thermodynamics, radiative transfer, and chemistry. The course addresses both basic principles and applications to weather and climate. Recommended pre-requisites: General Calculus and Physics I and/or Oceans and Atmospheres.

Area: Natural Sciences

AS.270.380. Seminar in Regional Field Geology. 3 Credits.

Introduction to the regional geology and geological history of the Appalachian system (from Alabama to Newfoundland). Key papers on regional bedrock geology and Mesoproterozoic through Phanerozoic tectonics are reviewed in weekly seminar classes. Two three-day field trips are made on weekends negotiated at the beginning of the semester. Fieldwork will be designed with student input to test ideas and models from the literature. Techniques in sedimentary, metamorphic, igneous and structural field geology are introduced and developed in the field. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

Area: Natural Sciences, Social and Behavioral Sciences

AS.270.381. Seminar in Field Geology. 3 Credits.

Field experience is an integral part of a geology student's education. During this course, students will spend over a week outdoors, learning to make observations that can be used to interpret the geologic history and structure of natural environments. This course is a spring break field course that will focus on different topics each year. For Spring 2019, the focus of the trip will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), and Earth History (AS.270.303). Students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and first or second year E&PS graduate students. For logistical reasons, this class is capped at 10 students. Preference will be given to E&PS majors. Students will be camping during the field course and should be prepared to be hiking outside all day. In the case that obtaining personal field supplies (e.g., hiking boots, sleeping bags) is not possible through Homewood student affairs gear rentals and/or is a financial hardship, please contact the instructor. Any communication about this will be kept confidential. Mandatory class field trip: 9-day field trip to Esmeralda County, NV over spring break (3/16/18-3/24/18).

Prerequisite(s): (AS.270.220 AND AS.270.221) OR AS.270.350 OR AS.270.303

AS.270.385. Seminar in Virtual Field Experiences: Accessibility, Exploration, and Development. 2 Credits.

The Earth Sciences traditionally rely heavily on outdoor field education – the purposeful use of an outdoor environment to achieve educational objectives – in higher education. Observations made at the surface of the Earth are fundamental to understanding the processes that have shaped it, and outdoor field education is often considered an essential way to connect classroom theory with actual data and observations. However, despite the demonstrated benefits of outdoor field education, there are persistent, deep-rooted problems with it in higher education, two of which include accessibility issues and financial barriers. There is overwhelming and demonstrated need to make outdoor field education and research more accepting of all who want to participate. This course aims to explore some of these accessibility issues by: 1) reading and discussing peer-reviewed literature on this topic, 2) participating in and learning about already established virtual field trips and tools, and 3) developing our own virtual educational tools and experiences.

AS.270.396. Special Topics in Planetary Exploration. 3 Credits.

Geology in the Outer Solar System: This course will focus on the solid bodies of the outer solar system, addressing their formation, surfaces, interiors, evolution, and how we study them via remote sensing and spacecraft investigation. We will use data from the various missions that have investigated the outer system and cover aspects of instrumentation and remote sensing of outer system bodies from the Voyager missions, Galileo, Cassini, and New Horizons. The course includes lecture, discussion, and hands-on lab work. Recommended pre-requisites: Dynamic Earth and/or Introductory planetary science and/or remote sensing, or instructor approval.

Area: Natural Sciences

AS.270.400. The Carbon Cycle: Past, Present and Future. 3 Credits.

This course will explore how the carbon cycle shapes environmental conditions and influences other biogeochemical cycles through an investigation of the modern carbon cycle, major carbon cycle perturbations in the geological record, and projections of future global change. The majority of the class will be structured as a reading seminar, but students will also develop an understanding of how to use quantitative models to evaluate patterns of change associated with both modern and ancient carbon cycle perturbations with implications for predicting future environmental changes. Recommended Prerequisites: AS.270.103 or AS.270.220 or AS.270.224

Area: Natural Sciences, Quantitative and Mathematical Sciences

AS.270.401. Metamorphic Geology. 3 Credits.

Introduction to metamorphic geology and the concepts on which it is built. Ideas and techniques that underpin metamorphic petrology are introduced in the context of the development and evolution of metamorphic geology as a discipline. Focus is on utility of metamorphic geology in understanding crustal processes and the nature of plate tectonics. One-day, weekend field trips to explore the Baltimore Gneiss Domes. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

Prerequisite(s): AS.270.220 AND AS.270.221

Area: Natural Sciences

AS.270.404. Planetary Interiors. 3 Credits.

This course investigates the physical processes occurring in planetary interiors. Topics include formation and differentiation of planetary bodies, planetary structure, thermal evolution, convection, and dynamo generation of magnetic fields. Standard remote sensing methods used to investigate planetary interiors and results from recent planetary satellite missions will also be discussed. Recommended: Knowledge of vector calculus, PDEs and introductory physics.

Area: Natural Sciences

AS.270.406. Space Weathering. 1 Credit.

This course will introduce and explore multiple topics of Space Weathering - the interaction of solar system bodies with the space environment. Through a combination of lecture, reading, research, and discussion the course will explore physical and chemical processes of solar and cosmic radiation and particles, micrometeorites, etc., on the surfaces of planets. We will also explore interaction of the space environment with planetary magnetic fields and atmospheres, and with non-planetary materials (such as spacecraft, and astronauts).

Prerequisite(s): AS.270.222

AS.270.408. Petrology Seminar. 1 Credit.

Seminar class on recent developments in igneous and metamorphic petrology. Involves weekly readings on modern methods/understanding in petrogenesis and processes leading to mineral (re)crystallization; rock deformation; fluid transport in rocks; pressure and temperature estimates of rock formation, and rates/durations of thermotectonic processes in the lithosphere. Topics covered will cater to interests and learning goals of those who register in the class.

Prerequisite(s): AS.270.220

AS.270.410. Planetary Surface Processes. 3 Credits.

This course explores processes that influence the evolution of planetary surfaces, including impact cratering, tectonics, volcanism, weathering, and sediment transport. These processes manifest themselves as structural deformation of planetary crusts due to loading by volcanoes, formation of craters by asteroid impacts, modification of surfaces by flowing landslides, rivers and glaciers, and the accumulation and transport of sand in dune fields on various planets. Emphasis is on the relationship to similar Earth processes, and the integrated geologic histories of the terrestrial planets, satellites, and asteroids. The focus will be on developing a physical understanding of these processes to interpret the surface characteristics and evolution of planets, satellites, asteroids, and comets from both qualitative assessments and quantitative measurements obtained from spacecraft data. A key component of the class will be the interpretation of these observations from recent and current planetary missions to the Moon, Mars, and other terrestrial bodies. Recommended Course Background: A sound knowledge of Calculus and Introductory Physics, and some prior knowledge of Earth and/or Planetary Science.

Area: Natural Sciences

AS.270.412. Spring seminar: Geological Field Studies in California. 2 Credits.

Field experience is an integral part of a geology student's education. During this course, students will learn to digitize, synthesize, and interpret the observations they made during the January field-based class to interpret the geologic history and structure of southern California. Study USA: Geological Field Studies in California is a co-requisite for this course. For Spring 2020, the focus of the field work and course will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), Earth History (AS.270.303), Planets, Life and the Universe (AS.020.334), and Isotope Geochemistry (AS.270.331). Sedimentary rocks are spectacularly exposed in this region and record over a billion years of key events in Earth history. Students will learn how these rocks have shaped our understanding of major evolutionary and environmental shifts in Earth's past, while also learning how to map these units' regional geographic distribution. Finally, students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and E&PS graduate students.

AS.270.413. Readings in Mineral Physics. 1 Credit.

Mineral Physics is the study of mineralogical problems through the application of condensed matter physics and solid-state chemistry. In this course, students will participate in the journal discussion about the foundational and developing research capabilities in Mineral Physics, with an emphasis this semester on Spectroscopy. Topics will include electron spectroscopy and X-ray scattering (both elastic and inelastic) techniques. Readings in Mineral Physics is a special topics course that rotates in subject and may be taken multiple times for credit.

Prerequisites: Structure of Materials (EN.510.311/601), Mineralogy (AS.270.222) or permission of the instructor.

Prerequisite(s): (EN.510.311 OR EN.510.601) AND AS.270.222 OR Permission of the Instructor.

AS.270.423. Planetary Atmospheres. 3 Credits.

Fundamental concepts and basic principles of chemistry and physics applied to the study of planetary atmospheres. Vertical structure of planetary atmospheres. Atmospheric radiation, thermodynamics, and transport. Principles of photochemistry. Planetary spectroscopy and remote sensing. Upper atmospheres and ionospheres. Evolution and stability of planetary atmospheres. Recommended Course Background: basic physics, chemistry and calculus

Area: Natural Sciences

AS.270.425. Earth and Planetary Fluids. 3 Credits.

An introductory course on the properties, flow, and transport characteristics of fluids throughout the Earth and planets. Topics covered include: constitutive relationships, fluid rheology, hydrostatics, dimensional analysis, low Reynolds number flow, porous media, waves, stratified and rotating fluids, plus heat, mass, and tracer transport. Illustrative examples and problems are drawn from the atmosphere, ocean, crust, mantle, and core of the Earth and other Planets. Open to graduate and advanced undergraduate students. Recommended Course Background: Basic Physics, Calculus, and familiarity with ordinary differential equations.

Area: Natural Sciences

AS.270.431. Tectonics Seminar. 3 Credits.

Introduction to plate tectonics and its 'framework' role in understanding the Earth. Key papers will be discussed in a weekly seminar class. Focus will be on early works that helped establish the theory, in addition to recent breakthrough contributions that have led to modifications and improvements to the theory of plate tectonics.

AS.270.501. Independent Study. 1 - 3 Credits.

Exploration of topic(s) in earth, planetary, and/or environmental science under the direction of an instructor.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.504. Independent Research. 0 - 3 Credits.

Research in earth, planetary, and/or environmental science conducted under the direction of a faculty advisor.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.510. Senior Thesis. 1 - 3 Credits.

Senior thesis research project in earth, planetary, and/or environmental science conducted under the direction of a faculty advisor.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.
Writing Intensive

AS.270.595. Internship. 1 Credit.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.603. Geochemistry Seminar.

A variety of topics of current interest involving mineral-fluid interactions will be reviewed.

AS.270.605. EPS Colloquium.

A weekly seminar series in which graduate students present their latest research results and attend Departmental seminars. This course is required for all graduate students in the Department of Earth and Planetary Sciences.

AS.270.606. EPS Colloquium.

A weekly seminar series in which graduate students present their latest research results and attend Departmental seminars. This course is required for all graduate students in the Department of Earth and Planetary Sciences.

AS.270.611. Global Atmospheric Dynamics.

This course will examine the fluid dynamics that determine large-scale atmospheric circulation and variability using Ian James' "Introduction to Circulating Atmospheres." Topics covered will include the dynamics of Hadley cells, mid-latitude jets, baroclinic instability, monsoon circulations, and low-frequency variability of the circulation.

AS.270.615. Inversion Modeling & Data Assimilation.

This graduate class will introduce modern inverse modeling and data assimilation techniques. These powerful methods are used in atmospheric science, oceanography, and geophysics and are growing more widespread. Topics will include: singular value decomposition, Green's function inversions, Kalman filtering, and variational data assimilation. The class will include lectures on concepts and theory, and practical experience in the computer laboratory. Permission of Instructor Required

AS.270.618. Remote Sensing of the Environment.

Also offered as 270.318

Area: Natural Sciences

AS.270.624. Advanced Seminar on Remote Sensing.

Discussion of the physical principles that underlie earth remote sensing. Topics to include radiative transfer in Earth's atmosphere, operating principles of active and passive remote sensing systems, and advanced methods for image analysis.

AS.270.626. Ocean General Circulation.

The aim of this course is to achieve conceptual understanding of the large scale low frequency ocean general circulation. The role of the ocean circulation in earth's climate is emphasized throughout.

AS.270.628. Seminar in regional field geology.

Weekend field trip to explore regional geology. Students are required to prepare short presentations on field trip topics in advance of weekend trip. Attendance at two organizational meetings (to be scheduled) is required. Open to E&PS graduate students and upper level E&PS undergraduate majors and minors. Trip date is 11/9/2019. Consult instructors for details.

AS.270.629. Tracer Transport in Geophysical Flows.

This course examines the transport of substances in geophysical flows. Topics covered include fundamental transport processes, transport in simple flows, and use of chemical tracers to infer transport properties. These concepts will be illustrated by case studies in a variety of geophysical flows, including the flow in atmospheres, oceans, lakes, and groundwater.

AS.270.630. Physics and Chemistry of Aerosols.

This course will cover fundamentals of aerosol physics and chemistry. Topics covered will include aerodynamics and diffusion of aerosol particles, condensation and evaporation, particle size distributions, optics of small particles, characterization of particle composition, and the diversity of aerosols found in planetary atmospheres. Recommended Course Background: Basic Physics and Chemistry. Calculus.

AS.270.631. Tectonics Seminar.

Introduction to plate tectonics and its 'framework' role in understanding the Earth. Key papers will be discussed in a weekly seminar class. Focus will be on early works that helped establish the theory, in addition to recent breakthrough contributions that have led to modifications and improvements to the theory of plate tectonics.

Area: Natural Sciences

AS.270.641. Present and Future Climate.

Meets with AS.270.378.

Prerequisite(s): Student may not receive credit for both AS.270.378 and AS.270.641.

Area: Natural Sciences

AS.270.653. Earth and Planetary Fluids II.

A sequel to AS.270.425 concentrating on planetary-scale atmospheric and oceanic circulation. Physical understanding of the underlying fluid dynamics will be emphasized.

AS.270.654. Environmental Data Analysis.

Environmental data is often messy-contaminated with noise, fundamental nonlinear, potentially stationary. This course will build on Menke and Menke's Environmental Data Analysis with Matlab to examine methods of analyzing environmental data that don't lead us to confuse noise with signal. Topics covered will include significance testing, spectral estimation, nonparametric methods, multivariate data analysis. Applications will be tailored to the student interest.

AS.270.656. Geochemical modeling of water-rock interactions in the deep Earth.

Thermodynamic basis for the modeling of irreversible chemical mass transfer involving minerals and aqueous species at elevated temperatures and pressures. Reading will start with classic papers by Helgeson and co-workers and proceed to applications in the literature involving hydrothermal ore deposits, subduction zones, and diamond formation in the upper mantle. The course focusses on developing specific projects of research interest to individual participants. Recommended Course Background: AS.030.101 and AS.030.102 or equivalent, AND AS.270.220 AND AS.270.221 or equivalent, AND AS.270.302 or equivalent.

AS.270.662. Seminar in Planetary Science.**AS.270.667. Seminar in Soil Ecology.**

Area: Natural Sciences

AS.270.668. Geobiology Seminar.

Geobiology is the study of interactions between life and rocks. In this class we will explore how organisms impact sedimentary records both directly, by leaving behind biosignatures, or indirectly, by affecting their surroundings in a way that promotes formation of certain types of minerals. This will serve as a guide for interpreting geological records during the early evolution of life on Earth, the rise of animals, and major mass extinctions.

Area: Natural Sciences

AS.270.675. Communication for Scientists.

Communication for Scientists" and the description is "This course will cover the various ways in which scientists are expected to communicate throughout the life of a project. Topics will include writing proposals, preparing impactful figures, writing press releases, interacting with the press (press conferences, radio/TV, interviews, etc.), writing for and speaking to the public, social media, and interacting with policy makers."

AS.270.679. Atmospheric Science.

A survey of core topics in atmospheric science, including dynamics, thermodynamics, radiative transfer, and chemistry. The course addresses both basic principles and applications to weather and climate. Recommended pre-requisites: General Calculus and Physics I and/or Oceans and Atmospheres.

Area: Natural Sciences

AS.270.680. Seminar in Regional Field Geology.

Introduction to the regional geology and geological history of the Appalachian system (from Alabama to Newfoundland). Key papers on regional bedrock geology and Mesoproterozoic through Phanerozoic tectonics are reviewed in weekly seminar classes. Two three-day field trips are made on weekends negotiated at the beginning of the semester. Fieldwork will be designed with student input to test ideas and models from the literature. Techniques in sedimentary, metamorphic, igneous and structural field geology are introduced and developed in the field. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

Area: Natural Sciences

AS.270.681. Seminar in Field Geology.

Field experience is an integral part of a geology student's education. During this course, students will spend over a week outdoors, learning to make observations that can be used to interpret the geologic history and structure of natural environments. This course is a spring break field course that will focus on different topics each year. For Spring 2019, the focus of the trip will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), and Earth History (AS.270.303). Students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and first or second year E&PS graduate students. For logistical reasons, this class is capped at 10 students. Preference will be given to E&PS majors. Students will be camping during the field course and should be prepared to be hiking outside all day. In the case that obtaining personal field supplies (e.g., hiking boots, sleeping bags) is not possible through Homewood student affairs gear rentals and/or is a financial hardship, please contact the instructor. Any communication about this will be kept confidential. Mandatory class field trip: 9-day field trip to Esmeralda County, NV over spring break (3/16/18-3/24/18).

Area: Natural Sciences

AS.270.683. Topics in Mineral Physics.

Mineral Physics is the study of mineralogical problems through the application of condensed matter physics and solid-state chemistry. In this course, students will learn about the foundational and developing research capabilities in Mineral Physics, with an emphasis this year on shock compression and experiments at High Energy Density. Topics will include experimental investigation of equation of states, phase transitions, changes in optical and transport properties and other strain-rate dependent phenomena. Topics in Mineral Physics is a special topics course that rotates in subject and may be taken multiple times for credit. **Prerequisite(s):** (EN.510.311 OR EN.510.601) OR AS.270.222 or instructor permission.

AS.270.684. Mathematical Methods in Earth and Planetary Sciences.

A range of standard mathematical methods used in earth and planetary science applications will be studied. A core set of topics will include back-of-the-envelope estimates, differential equations, linear algebra, special functions, and transforms. In addition, students will tailor the course to their needs by choosing from a range of extended topics to explore further. Potential topics include perturbation theory, tensors, probability theory and complex analysis. Open to graduate students and senior undergraduate EPS majors with permission of instructor. Recommended preparation includes knowledge of single and multivariable calculus and linear algebra.

AS.270.685. Seminar in Virtual Field Experiences: Accessibility, Exploration, and Development.

The Earth Sciences traditionally rely heavily on outdoor field education – the purposeful use of an outdoor environment to achieve educational objectives – in higher education. Observations made at the surface of the Earth are fundamental to understanding the processes that have shaped it, and outdoor field education is often considered an essential way to connect classroom theory with actual data and observations. However, despite the demonstrated benefits of outdoor field education, there are persistent, deep-rooted problems with it in higher education, two of which include accessibility issues and financial barriers. There is overwhelming and demonstrated need to make outdoor field education and research more accepting of all who want to participate. This course aims to explore some of these accessibility issues by: 1) reading and discussing peer-reviewed literature on this topic, 2) participating in and learning about already established virtual field trips and tools, and 3) developing our own virtual educational tools and experiences.

AS.270.693. Special Topics in Dynamo Theory.

Current research literature in planetary magnetic fields and dynamo theory will be studied. Topics will vary year-to-year. Students will be responsible for leading discussions on relevant papers from the literature. Open to graduate students and senior undergraduate EPS majors with permission of instructor. Recommended preparation includes knowledge of fluid dynamics, electromagnetism and planetary science.

AS.270.696. Special Topics in Planetary Exploration.

A selection of planetary research topics investigated by Prof. Strobel spanning the past 45 years covering the progress that has been made and remaining problems that still need to be addressed. The majority of topics will involve the outer solar system and the science discoveries made by the Voyager, Cassini-Huygens, and New Horizons Missions as well as observations by Earth orbiting satellites – IUE, HUT, HST, FUSE. Area: Natural Sciences

AS.270.807. Research.**AS.270.808. Research.****AS.271.107. Introduction to Sustainability. 3 Credits.**

Humans are having such a massive impact on Earth systems that some call this the Anthropocene epoch. Should we consider this state of affairs progress or catastrophe? How to we find a sustainable path to the future? This course provides an interdisciplinary introduction to the principles and practice of sustainability, exploring such issues as population, pollution, energy and natural resources, biodiversity, food, justice, and climate change through the lens of systems thinking. Course open to freshmen, sophomores, and juniors. Seniors by instructor permission only.

Area: Social and Behavioral Sciences

AS.271.302. Exploring Nature. 3 Credits.

This course integrates the analysis and production of environmental media with weekly outdoor excursions. Students will survey a range of authors, adventurers, journalists, scientists, photographers, acoustic ecologists and filmmakers that have explored the natural world and chronicled the history of human-environmental relations and environmental problems. Field trips to regional parks and green spaces will encourage students to discover their own sense of place, foster a deeper level of ecological awareness and construct personal environmental narratives through careful exploration, observation, documentation and reflection.

Area: Humanities, Social and Behavioral Sciences
Writing Intensive

AS.271.304. Sustainable Food Systems. 3 Credits.

Where does your food come from? What impact does food production have on the environment and human societies? How can food systems become more sustainable as the human population increases?

This seminar-style course examines the past, present, and future of agriculture, including topics such as the foodways of indigenous people, modern 'factory farming' versus organic agriculture, genetically modified foods, and the interplay among science, economics, policy, and agriculture. Involves hands-on experiences.

Area: Social and Behavioral Sciences

AS.271.305. Special Topics in Environmental Studies. 3 Credits.

Environmental Policy in the Age of Trump. This course will analyze the effects of the current administration's actions on environmental issues by assessing the policies in question and estimating the potential impacts on climate change, human health, and ecology. Policies that have been overturned or are under review represent a number of environmental issues, including climate change and greenhouse gas emissions, offshore drilling, national monuments, mining pollution, toxic discharge into public waterways, the development of oil pipelines, public land use planning, coal leases, a harmful insecticide, hunting in wildlife refuges, airborne mercury emissions, protection of tributaries and wetlands under the Clean Water Act, energy and fuel-efficiency standards, and resource extraction from federal lands. Students will examine the historical roles environmental organizations and government agencies have played in advocating for, creating and enforcing U.S. environmental policy and will discuss the future roles of these actors and other stakeholders in implementing effective environmental policy

Area: Social and Behavioral Sciences

AS.271.320. Environmental Photojournalism. 3 Credits.

Environmental cognition, consciousness and communication are produced, reproduced, interpreted and remembered with the support of visual representations and, in particular, photography. Images increasingly structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Students will review critical literature focusing on visual representation theory, the relationship between images and social change, the practice of journalism and the history and typology of environmental photography. An understanding of environmental issues is required. Students will engage with the local community, identify and investigate environmental issues facing Baltimore, participate in photographic critiques, and develop a documentary project. This studio/seminar course is designed with an emphasis on independent research and practice.

Area: Humanities, Social and Behavioral Sciences
Writing Intensive

AS.271.345. Society and Nature Conflicts: Interdisciplinary Approaches to Studying Environmental Problems Over Time. 3 Credits.

In this seminar students will read seminal pieces in the field of socio-environmental research. Socio-environmental research recognizes that society and nature inherently interact in such a way that they affect and change one-another - it is not only that society affects the nature or that nature only affects society. Solving environmental problems necessitates understanding this duality and thus an interdisciplinary background. Assigned readings will span early from thinkers on environmental problems (Before 1900) to current approaches to studying and solving environmental problems. It is aimed at upper level undergraduates and graduate students.

AS.271.360. Climate Change: Science & Policy. 3 Credits.

Prereq: 270.103 or permission of instructor. This course will investigate the policy and scientific debate over global warming. It will review the current state of scientific knowledge about climate change, examine the potential impacts and implications of climate change, explore our options for responding to climate change, and discuss the present political debate over global warming.

Area: Natural Sciences

AS.271.399. Research Design. 1 Credit.

This course supports students in the design of their senior capstone project, including crafting a suitable research question, identifying appropriate methodologies, and writing a formal project proposal.

AS.271.401. Environmental Ethics. 3 Credits.

Environmental Ethics is a philosophical discipline that examines the moral relationship between humans and the natural environment. For individuals and societies, it can help structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Beginning with a comprehensive analysis of their own values, students will explore complex ethical questions, philosophical paradigms and real-life case studies through readings, films and seminar discussions. Traditional ethical theories, including consequentialism, deontology, and virtue ethics will be examined and applied. Environmental moral worldviews, ranging from anthropocentric to ecocentric perspectives, will be critically evaluated. Organized debates will help students strengthen their ability to deconstruct and assess ethical arguments and to communicate viewpoints rooted in ethical principles. Students will apply ethical reasoning skills to an examination of contemporary environmental issues including, among others, biodiversity conservation, environmental justice, climate change, and overpopulation. Students will also develop, defend and apply their own personal environmental ethical framework. A basic understanding of modern environmental history and contemporary environmental issues is required. Prior experience with philosophy and ethics is not required.

Area: Humanities, Social and Behavioral Sciences
Writing Intensive

AS.271.402. Water, Energy, and Food. 3 Credits.

The water, energy and food (WEF) nexus is a topic of growing interest in the research and policy communities. This course will survey WEF concepts and principles, introduce tools of analysis, and engage students in case studies of critical WEF issues in the United States and internationally.

AS.271.403. Environmental Policymaking and Policy Analysis. 3 Credits.

This course provides students with a broad introduction to US environmental policymaking and policy analysis. Included are a historical perspective as well as an analysis of future policymaking strategies. Students examine the political and legal framework, become familiar with precedent-setting statutes such as NEPA, RCRA, and the Clean Air and Clean Water Acts, and study models for environmental policy analysis. Cost benefit studies, the limits of science in policymaking, and the impact of environmental policies on society are important aspects of this course. A comparison of national and international policymaking is designed to provide students with the proper perspective. This course is taught in conjunction with an identical graduate course. All students will be expected to perform at a graduate level.

Area: Social and Behavioral Sciences

AS.271.404. GIS Workshop. 1 Credit.

An accompaniment to the GECS Senior Capstone Seminar for students whose research project involves a GIS component. Designed to enable beginner to advanced GIS users to acquire the data and skills needed to accomplish their research goals.

Area: Natural Sciences

AS.271.405. Energy and Politics. 3 Credits.

In the 21st century, energy supply and consumption are critical subjects for international politics, social development, and the future of the environment. Policies that determine energy supply and consumption come to being in complex institutional, national, and international contexts. This course will equip students with the necessary background to analyze energy policy issues and contribute to them in a meaningful manner. It also involves examination of wide-ranging debates over the switch to renewables, the use of unconventional energy sources, and the environmental consequences of energy choices.

Area: Social and Behavioral Sciences

AS.271.496. Senior Capstone Experience. 3 Credits.

This seminar will provide the academic space, time, and mentoring for students to integrate, synthesize and apply the knowledge and skills obtained through the ENVS curriculum into a tangible environmental project.

AS.271.499. Senior Seminar. 1 Credit.

This seminar explores topics related to career development and current events to support senior environmental majors as they transition to post-graduate life and work.

AS.271.502. Independent Study. 1 - 3 Credits.

Exploration of topic(s) in environmental studies under the direction of an instructor.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.506. Independent Research. 1 - 3 Credits.

Research in environmental studies conducted under the direction of a faculty advisor.

AS.271.507. Internship. 1 Credit.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.509. Applied Experience. 1 Credit.

This course is designed to accompany a supervised, hands-on experience working on an environmental or sustainability-related research project or internship. While completing 80 hours of applied work, students will prepare a reflective journal, paper, and poster presentation about their experience. Graded S/U only.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.511. Senior Thesis. 1 - 3 Credits.

Senior thesis research project in environmental studies conducted under the direction of a faculty advisor.

Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.
Writing Intensive