

ENVIRONMENTAL SCIENCE SYSTEMS (ESS)

ESS 121. Global Resources. 3 Credit Hours.

Resources can be thought of as anything that an organism needs for survival. While this holds true for all life forms, in this class we will focus primarily on humans and human societies. The consumption of resources often results in a struggle for survival and this competition manifests itself at many levels, from the town and region (which tribes and ethnic groups have access to the best land and water supply); to the nation (control of the nation's oil, water, mines), and to the world at large. Does not carry biology major credit.

ESS 129. Global Ecosystems: North America. 3 Credit Hours.

This introductory level field course will offer students the opportunity to study the fundamentals of ecosystem and earth science, with specific reference to North America. This study will involve travel for two weekends in the Adirondacks and for an extended weekend to northern Arizona. Field-based learning activities will examine the geological and ecological processes that determine the structure and function of these two systems. Does not carry Biology major credit. Satisfies core science requirement. Additional fees will be required for this course. Does not carry biology major credit.

Cross-listed Courses: BSC 129

ESS 203. The Papal Climate Encyclical Critically explored. 3 Credit Hours.

This exploration of Laudato Si by Le Moyne College and SUNY College of Environmental Science and Forestry draws faculty and students to critically evaluate the case laid out in the encyclical that all humans have a responsibility to care for the Earth, "Our Common Home." It seeks to provide both a focus and a foundation to the question, how might we join together as environmental scientists, scholars and advocates for collaboration among secular and religious institutions as well as faith-based environmental activists? Counts as a major elective for ESS majors. Student carpooling will be arranged for transportation to the meeting location for this class. Prerequisite: EITHER one course in biology or environmental science [for ESS elective credit]; or one course in theology OR Junior standing or permission of the Instructor. (NOTE: THIS COURSE DOES NOT FULFILL THE CORE REQUIREMENT FOR A NATURAL SCIENCE COURSE.) Fulfills Core Requirement(s): Interdisciplinary Studies (IDS).

ESS 205. Physical Geology. 4 Credit Hours.

Physical Geology is an introduction to the study of the composition of the Earth and the processes that operate internally and at the surface. Students are introduced to basic geological concepts including plate tectonics, volcanoes, earthquakes, geologic time, types of rocks that form the crust and how they form, and surficial processes. Three hours lecture and three hours of laboratory per week. Does not carry biology major credit.

Prerequisites: BIO 191, BIO 192 and ESS 121.

ESS 228. Ecosystems of Costa Rica. 3 Credit Hours.

This classroom/field course offers students of biology and environmental science systems the unique opportunity to study the fundamental properties of ecosystems and how the physical environment (climate, geography, geology) controls them, with specific reference to tropical and temperate ecosystems. This study will involve travel for an extended period to Costa Rica, in addition to two weekend daytrips in central New York State. Field-based learning activities examine the ranges of biological diversity and differences in ecosystem structure, and the geological and ecological processes that determine ecosystem structure and function in these two locations. Note: Course satisfies BIO major requirement for ecology/population distribution and ESSS travel course requirement. Additional fees will be required for this course.

Prerequisite: BIO 191.

Cross-listed Courses: BIO 228

ESS 237. Ecology of the Galapagos. 3 Credit Hours.

This course allows students to study, in both classroom and field settings, the delicate balance between geological, biological, climatologic and anthropogenic processes in shaping ecological environments, with specific focus on the biogeography of tropical islands. The Galapagos Archipelago is a singular locale where the fragile nature of the environment, the processes that shape it, and the unique nature of its inhabitants are readily observed. Additionally, the historic significance of this locale in the development of one of the foundational theories of modern science will be explored fully. Additional expense for required travel component. Carries BIO and ESS major credit.

Prerequisite: BIO 191 and BIO 192.

Cross-listed Courses: BIO 237

ESS 238. History of Earth and Its Inhabitants. 4 Credit Hours.

This course utilizes readings, lectures, laboratory activities and field trips to examine the physical changes that have occurred on the surface of our planet and the history of life on earth. Key concepts include the tectonic evolution of North America and the fossil record of evolution, with emphasis on the geologic history of the New York region. Some travel may occur on weekends. Does not carry biology major credit.

Prerequisites: BSC 127, ESS 127, BSC 128, BSC 129 or ESS 205 or permission of instructor.

ESS 250. Water Resources. 4 Credit Hours.

This course shows the variety of ways that water impacts on the natural and man-made worlds. One of the original four 'elements', water is becoming more vital than ever, as a consequence of the continuing increases in human population, pollution, and changes in climate. The course explores the ancient concept of the water cycle in a modern context to give an appreciation of the importance of water and water quality to plants, animals and humans. Three hours lecture, three hours laboratory per week. Carries ESS major credit. Recommended: ESS 205. Does not carry biology major credit.

Prerequisites: CHM 151 and CHM 152.

ESS 260. Sustainability: Ecological Entrepreneurship. 3 Credit Hours.

The concept and practice of Sustainable Growth and Development have generated increasing concern over the past four decades. Recently, due to a heightened focus on climate change, ecological damage, rising inequalities of resource distribution, etc., even more attention and effort have been directed toward the concept of Sustainability. This course explores the connections among science, technology, products, and markets in the service of society, (emphasizing that none of these forces works in a vacuum), in order to study the many aspects of sustainability. Students are encouraged to be entrepreneurs of sustainability, acting to find a balance among social, ecological, and economic needs. Course satisfies Core Natural Science requirement. Sophomore standing or permission of the instructor. Does not carry biology major credit.

ESS 265. Introduction to Geographic Information Systems. 4 Credit Hours.

This lab-based course introduces students to Geographic Information Systems (GIS), a system of integrated hardware, software and data-capture tools for the manipulation, modeling, analysis and display of geographic information. This course provides an introduction and practical experience with industry-standard software through three hours of lecture and a three-hour laboratory session each week. Carries BIO and ESS major credit.
Prerequisite: BIO 191.

Cross-listed Courses: BIO 265

ESS 275. Spring Field Botany. 3 Credit Hours.

The three-credit course will survey the spring flora of central New York, with daily excursions to various habitats to observe the diverse plants that support the regional ecosystem, with a special focus on spring ephemerals and native plants when flowering. Habitats may include local grasslands, sand dunes, peat bogs, old-growth forests, and wetlands. Plant identification and systematics will be the major focus, and students will learn human impacts and the importance of conservation of natural habitats and native species. Carries BIO and ESS major credit.
Prerequisites: Minimum of 6 BIO/ESS credits completed.

Cross-listed Courses: BIO 275

ESS 305. Environmental Economics. 3 Credit Hours.

Application of economic theory and models to critically analyze the state of the environments as well as to identify how we might bring improvements in environmental quality. Coverage of relationships and interactions of the public and private sectors in the creation and control of the different environmental issues. Junior standing required. Fulfills Core Requirement(s): Interdisciplinary Studies (IDS).

Cross-listed Courses: ECO 305

ESS 310. Field Ornithology. 4 Credit Hours.

This course will cover basic bird physiology, ecology, and conservation biology with a strong emphasis on field ecology. Students will be required to actively engage in bird identification, behavioral observation, and field data collection. This course will provide students with an extensive field experience aimed at broadening their view of the biological world around them. A major component to this course will be a Spring Break experience in southern Texas. Attaining experience in different ecoregions supplies students with a valuable perspective for thinking more broadly about biology. Additional expenses-travel expenses round-trip to McAllen, TX. Students must meet with the instructor before registration. Prerequisite(s): BIO 191 BIO 192.

Cross-listed Courses: BIO 310

ESS 320. Earth's Surface. 4 Credit Hours.

This course describes the interaction of sedimentary, hydrologic, and biologic processes at the surface of the Earth, with particular attention to the role of organisms and climate on the formation and erosion of soils. Topics will include sedimentary processes, landforms, surficial hydrology, pedogenesis, fluvial and glacial processes and landforms. Significant fieldwork and mapping applications will be a part of this course. Three hours of lecture and three hours of laboratory per week are required. Does not carry biology major credit.

Prerequisites: ESS 205 or permission.

ESS 329. Field Botany. 4 Credit Hours.

The four-credit course will survey the flora of central New York, with excursions to various habitats including grasslands, sand dunes, peat bogs, old-growth forests, and wetlands. Plant identification and systematics will be the major focus, and students will learn how to create and curate an herbarium, compare the species composition of the various habitats, and learn human impacts and the importance of conservation of natural habitats and native species. The six hour block allows for travel and time in the field.

Prerequisites: BIO 191 and BIO 192.

Cross-listed Courses: BIO 329

ESS 335. Biodiversity. 4 Credit Hours.

The course is designed to acquaint the student with the phenomenal diversity of life with which we share this planet. To do this, we will refresh the students' memories concerning evolution and the various mechanisms through which communities of life forms have become adapted to their environment. We will spend some time with taxonomy and biogeography before we can begin to examine the current state of biodiversity as well as future trends. The implications of these trends will signal a stopping point for the course but will hopefully serve as a beginning for the student as they move away from Le Moyne and take a place in society.

Prerequisites: Minimum of 10 BIO/ESS credits.

Cross-listed Courses: BIO 335

ESS 340. Environmental Chemistry. 3 Credit Hours.

The focus of this course is on understanding the underlying chemical principles and reactions of natural systems and anthropogenic compounds in the environment. Topics such as chemistry of the atmosphere, aqueous media, pollutants and energy sources will be covered. The emphasis of the course is on chemical aspects of environmental science, so a general background in chemistry is a prerequisite. Does not carry biology major credit.

Prerequisites: CHM 223.

Cross-listed Courses: CHM 340

ESS 340L. Environmental Chemistry Laboratory. 1 Credit Hour.

This is an optional laboratory course that further explores topics covered in the lecture course. The lecture course (NSS 340) may be taken with or without this lab course (NSS 340L). Emphasis is on analytical methods, green chemistry techniques and investigation of materials. Three hours laboratory each week.

ESS 348. Environ Research in the Field: Iceland. 4 Credit Hours.

The environment of Iceland is shaped by the immensely dynamic geologic processes of active volcanoes and glaciers, but this environment is also deceptively fragile and subject to anthropogenic influence. The present landscape has resulted from this interaction of human and natural processes. A semester of classroom activity culminates in a field session where students conduct research on the processes of environmental change in Iceland.

Prerequisites: BIO 230 or ESS 205 or permission of instructor.

Cross-listed Courses: BIO 348

ESS 390. Independent Study in Biological & Natural Systems. 1-3 Credit Hours.

A student may pursue a semester or more of independent study in a specialized area of biology of mutual interest to the student and one or more members of the faculty in the department. This course is for the above average student whose interests and abilities go farther than normal course offerings. Proposals, indicating credit sought, must have approval prior to registration. Prerequisites or corequisites: 15 credit hours in biology in addition to BIO 380. Carries biology major credit for the tenth biology course.

Cross-listed Courses: BIO 390

ESS 428. Research in Tropical Biology Biology. 4 Credit Hours.

A variety of ecosystems exist throughout the tropics and are home to the majority of the terrestrial biodiversity found around the globe. Studies of organismal interactions and species diversity are still leading to the creation of new scientific knowledge and discovery of new species, and Costa Rica represents a county with diverse tropical forests that form the basis for many of these discoveries. This upper-level field-experience course will allow students to search, analyze and interpret the scientific literature during classroom activities at Le Moyne College, then apply the scientific process through observation, experimentation, and hypothesis testing during a 10 to 15 day session in Costa Rica. Additional fees will be required for the travel component of this course. Registration by instructor approval. Carries BIO and ESS major credit.

Prerequisites: BIO 191 and BIO 192.

Cross-listed Courses: BIO 428

ESS 458. Global Climate Systems. 3 Credit Hours.

In this class, students will come to recognize that Earth's biosphere, atmosphere, hydrosphere, and geosphere operate in complexly linked systems in which various components are exchanged over greatly varying time scales. Using laboratory and field studies, students will measure, discuss and define the impact of global change on natural systems.

Prerequisites: CHM 151 and CHM 152 and a minimum of 15 credits of BIO, including at least one course in the Ecology/Population Biology Area.

Cross-listed Courses: BIO 458

ESS 470. Seminar: Environmental Topics. 3 Credit Hours.

This advanced seminar provides students with the opportunity to explore the complexity of environmental issues in detail. By choosing current topics and analyzing the scientific and socio-economic factors underlying environmental problems, students will develop greater awareness and understanding of society's ability to mitigate these problems. Carries BIO and ESS major credit. This course places a high emphasis on oral and written presentation skills.

Prerequisites: 20 credits in BIO, ESS, PSC, ECO from 200, 300 or 400 level courses.

Cross-listed Courses: BIO 470, PSC 470

ESS 481. Business Strategies for Environmental And Social Sustainability. 3 Credit Hours.

The course studies the complex problems posed by climate change as well as the measures adopted to address the crisis. Corporate strategies along with national/regional policies needed to help deal with the challenge of limiting global temperature rise, are analyzed. Vital issues related to eco- and social justice are explored.

Prerequisite: Junior standing required, or permission of instructor.

Cross-listed Courses: BUS 481

ESS 490. Internship in Environmental Science. 1-3 Credit Hours.

The goal of this class is participation in a field-learning experience closely related to the student's major field of study. The student intern will meet regularly with his or her supervisor in the agency and will report as required to the faculty member assigned to supervise the internship. Students are expected to apply what they have learned in the academic program to the internship. An evaluation of the experience will also be required. The internship and placement must be approved by the faculty coordinator. Three hours of field work per week are required to generate one credit hour. Therefore, a three-credit internship will require at least nine hours on site per week. The number of credit hours to be awarded must be determined and contracted prior to registration. A signed Memorandum of Understanding (MOU) with the placement site must be on file with the Office of Career Services prior to the start of the internship experience.

Prerequisite: 64 credit hours of coursework in the major program or permission of the department chair.

ESS 499. Research in Bio & Environmental Systems. 1-3 Credit Hours.

The student conducts a laboratory or field investigation under the guidance of the faculty in the department. Proposals, indicating credits sought, must have approval prior to registration. Written research report and oral public presentation of the research are required. prerequisites and corequisites: 15 credit hours in environmental science or biology in addition to BIO 380. For biology majors, three credits of BIO 499 carries credit for the 10th biology course. For ESS majors, three credits of ESS 499 is required for graduation.

Cross-listed Courses: BIO 499