

ENVIRONMENTAL SCIENCE (ESCI)

ESCI 275 Intro to Environmental Science 3 Credit Hours

A distribution course which surveys major environmental problems. Concepts discussed are ecology, environmental chemistry, methods of investigating the environment, and possible solutions to environmental problems. Three hours lecture. (YR).

ESCI 301 Environmental Science 4 Credit Hours

A survey of historical and current environmental problems, with emphasis on understanding causes, consequences, and control. Topics include human population growth, air pollution, water pollution, and waste disposal. Laboratory emphasizes an experimental approach to environmental problems, including data collection, analysis, and interpretation. Lecture and laboratory/recitation.

Prerequisite(s): (CHEM 124 or CHEM 134 or CHEM 144) and GEOL 118 and BIOL 130

ESCI 304 Ecology 4 Credit Hours

Relationships between organisms and their environments. Patterns in the physical environment, physiological and behavioral adaptations, population dynamics, energy flow, nutrient cycling; succession. Three hours lecture, four hours laboratory (with field trips). (F).

Prerequisite(s): BIOL 130 and (MATH 104 or MATH 105 or MATH 113 or MATH 115 or Mathematics Placement with a score of 116)

Corequisite(s): ESCI 304L

ESCI 305 Intro to GIS 4 Credit Hours

An introductory course that examines the digital representation, manipulation, and analysis of geographic data, with emphasis on the analytical capabilities that GIS brings solutions to geographic problems. Students will explore and learn GIS principles using ESRI's mapping software, as well as complete a major GIS project.

Prerequisite(s): GEOG 302

Corequisite(s): ESCI 305L

ESCI 305D Intro to GIS & Cartography Dis 0 Credit Hours

Required discussion session for ESCI 305.

Corequisite(s): ESCI 305

ESCI 315 Aquatic Ecosystems 4 Credit Hours

An introduction to the physical, chemical, and biological characteristics of lakes, rivers, and wetlands emphasizing a comparison of ecosystem structure and function. Laboratory emphasizes data collection and analysis to characterize a representative lake, river, and wetland. Lecture and laboratory. (AY,F).

Prerequisite(s): BIOL 130 and (CHEM 124 or GEOL 118)

ESCI 320 Field Biology 4 Credit Hours

Adaptations, taxonomy, systematics, ecology, and behavior of southeastern Michigan flora and fauna. Techniques of field observation and recording are emphasized. Skills in the use of identification keys and guides are developed. The campus Environmental Study Area is used intensively. Three hours lecture, four hours laboratory (with field trips). (S).

Prerequisite(s): NSCI 120 or NSCI 233

ESCI 330 Land Use Planning and Mgmt 4 Credit Hours

Environmental aspects of land use planning, park planning, and site planning. Consideration of soils, groundwater, topography, and sensitive natural features and their role in determining land-use suitability. Examination of the mechanics and effectiveness of the planning process. Lecture and recitation. (AY,W).

Prerequisite(s): (BIOL 130 and GEOL 118) or ESCI 275

ESCI 332 Hazardous Waste Management 3 Credit Hours

Environmental problems associated with solid and hazardous waste. Regulations governing the generation, transport, and disposal of hazardous waste. Waste management techniques, including reduction, reuse, recycling, treatment, incineration, and land disposal. Three hours lecture. (AY,W).

Prerequisite(s): GEOL 118 or ESCI 275

ESCI 337 Plant Ecology 3 Credit Hours

This course focuses on different aspects of the relationship between plants and their environment. Topics include: a) interactions of plants with the physical environment; b) ways in which the environment acts to shape plant populations through evolution; c) intra- and interspecific interactions among individuals; and d) large-scale patterns and processes at the landscape-level. Three hours lecture.

Prerequisite(s): BIOL 130

ESCI 348 Environmental Chemistry 3 Credit Hours

Description of the concepts, principles, practices, and current problems in the chemistry of natural waters, the soil, and the atmosphere. Three hours lecture. (AY,W).

Prerequisite(s): CHEM 344 and (CHEM 225 or CHEM 325)

ESCI 349 Environmental Chemistry Lab 1 Credit Hour

Collection and analysis of air, water, soil, and organisms for pollutants such as noxious gases, heavy metals, and trace organics. EPA-approved methods are emphasized. Four hours laboratory. (AY,W).

Prerequisite(s): ESCI 348* or CHEM 348*

ESCI 352 Introduction to Toxicology 3 Credit Hours

An introduction to the principles of toxicology with an emphasis on environmental toxicology. Major topics include toxic agents, toxicological mechanisms, and use of toxicological reference literature. Discussion of chemical carcinogenesis, genetic toxicology, immunotoxicology, teratology, and toxic responses of the skin, eyes and nervous system. Three hours lecture. (AY,W).

Prerequisite(s): CHEM 225

ESCI 370 Environmental Geology 3 Credit Hours

Interactions between people and the physical environment. Geological hazards and natural processes, such as earthquakes, volcanism, floods, landslides, and coastal processes. Relationships between geology and environmental health, including chronic disease, water use and pollution, waste disposal, mineral resources, and energy use. Three hours lecture. (AY).

Prerequisite(s): GEOL 118

ESCI 372 Energy Resources 3 Credit Hours

Origin and development of fossil fuels (petroleum, coal, natural gas) and of radioactive ores used in nuclear power. Renewable and alternative energy sources, including hydro, solar, wind, biomass, and geothermal power. Environmental impacts of energy use. Three hours lecture. (OC).

Prerequisite(s): GEOL 118 or ESCI 275 or ESCI 301

ESCI 375 Groundwater Hydrology 4 Credit Hours

Sources, occurrence, and movement of groundwater. Surface and subsurface investigations. Principles of hydrogeology. Groundwater pollution and management. Three hours lecture. (AY,F).

Prerequisite(s): GEOL 118

ESCI 390 Topics in Environmental Sci 1 to 3 Credit Hours

A course in special topics current to environmental science. Topics and format may vary. See current Schedule of Classes.

ESCI 395 Sem on Environmental Issues 1 Credit Hour

Readings, discussions, and presentations which examine current environmental issues. One hour seminar. Permission of instructor. (F,W).

ESCI 414 Limnology 4 Credit Hours

The study of the structural and functional relationships and productivity of organisms in lakes and streams as they are regulated by their physical, chemical and biotic environments. Laboratories will emphasize field study of area lakes and streams. Three hours lecture, four hours laboratory. BIOL/ESCI 304 or ESCI 275 recommended.

Prerequisite(s): BIOL 130 and (CHEM 136 or CHEM 146)

Corequisite(s): ESCI 414L

ESCI 416 Stream Ecology 4 Credit Hours

A study of the physical, chemical and biological characteristics of streams and rivers. Three hours lecture, four hours laboratory. (OC).

Prerequisite(s): BIOL 304

ESCI 420 Advanced Field Ecology 4 Credit Hours

An intense study of behavioral ecology and field-oriented research at an advanced level, utilizing ecological habitats on campus and in surrounding urban areas. Focus will be on plant/animal interactions and will include pollination ecology, reproduction and distribution ecology, optimal foraging theory, as well as hypothesis testing of animal migration and distribution of species in extreme urban environments. Three hours lecture, four hours laboratory. (OC).

Prerequisite(s): BIOL 304 or BIOL 320 or ESCI 320

Restriction(s):

Can enroll if Class is Senior

ESCI 422 Conservation Biology 3 Credit Hours

This course is a study of the historical and current preservation of global biodiversity. The value of biodiversity, extinction, threats to biodiversity, and both ex situ and in situ conservation strategies are considered. (F, AY)

Prerequisite(s): BIOL 304 or ESCI 304

Restriction(s):

Can enroll if Class is Senior

Can enroll if Level is Undergraduate

ESCI 485 Spatial Analysis 3 Credit Hours

Full Title: Spatial Analysis and the Environment The statistical methods behind analyzing spatial datasets is covered in detail, with a strong emphasis on environmental sciences and human populations. This course complements courses in remote sensing, geographic information systems, and geographic principles and is designed to quantitatively evaluate the relationships between objects and their surroundings. (S)

Prerequisite(s): GEOL 305 or ESCI 305 or GEOL 340 or ENST 340 or GEOG 302 or GEOG 202 or GEOG 305

Restriction(s):

Can enroll if College is Education, Health, and Human Services or Business or Engineering and Computer Science or Arts, Sciences, and Letters

ESCI 490 Topics in Environmental Sci 1 to 3 Credit Hours

A course in special topics of current interest in environmental science. Topics and course format may vary; see current Schedule of Classes for availability. (OC)

ESCI 490A Topics in Environmental Sci 3 Credit Hours

Topic: Conservation Biology. A scientific study of the concept of conservation biology, including its ecological, economic, ethical, and cultural components. Lectures, assigned readings, and class discussions will explore the major threats to biodiversity, the complexities of conservation issues, and the tools, strategies, and techniques conservation biologists use to implement policies for the protection and preservation of ecosystems from local to global and short-to long-term scales.

Prerequisite(s): BIOL 130

Restriction(s):

Can enroll if Class is Junior or Senior

ESCI 490B Sustainable Cities 3 Credit Hours

Topic Title: Sustainable Cities: In 2007, for the first time in human history, the world became an urban one with more than 50 percent of its population living in cities. The unseen influx of people into cities socio-ecological challenges of increasing scale. This course is a discussion of sustainability and resilience efforts (solution-focused) in cities around the world and follows a multi-disciplinary approach by integrating urban-focused concepts from history, sociology, ecology, geography, and architecture and planning., Topics include, for example, air pollution and climate change, sprawl and smart growth, alternative energy, public transportation, waste management, water management, green architecture, environmental and social (in)justice, cultural diversity, and forestry and farming. (OC).

ESCI 492 Capstone Research Experience 3 Credit Hours

An approved research experience with a full-time Environmental Science faculty member. Research results are reported in a seminar presentation and in a poster, thesis, or a manuscript submitted for publication. (F, W, S)

Restriction(s):

Cannot enroll if Class is Freshman or Sophomore or Junior

ESCI 497 Seminar in Environmental Sci. 1 Credit Hour

Readings, discussion, and presentation of research in selected areas of study. One hour seminar. Permission of instructor. (OC).

ESCI 498 Indep Study in Environ Sci 1 to 3 Credit Hours

Library research and independent study performed under the guidance of a faculty member. Four to twelve hours readings. Permission of instructor. (F,W,S).

ESCI 499 Lab Research in Environ Sci 1 to 3 Credit Hours

Directed laboratory or field research performed under the guidance of a faculty member. Four to twelve hours laboratory. Permission of instructor. (F,W,S).

* An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally