ENVIRONMENTAL SCIENCE

The **Environmental Science** major is an interdisciplinary program that encourages students to investigate local and global environmental and sustainability issues and solutions using core courses in science, and integrative concentration courses in physical, natural and social sciences. The program emphasizes experiential learning via immersive activities such as internships, field studies, research with faculty, and community engagement. Environmental Science majors may pursue either a Bachelor of Science (B.S.) degree with a concentration in **Ecosystem Sciences** or **Geosciences**, or a Bachelor of Arts (B.A.) degree with a concentration in **Environmental and Sustainability Studies**.

Dearborn Discovery Core (General Education)

All students must satisfy the University's Dearborn Discovery Core requirements (http://catalog.umd.umich.edu/undergraduate/gen_ed_ddc/), in addition to the requirements for the major.
Students must also complete all CASL Degree Requirements. (http://catalog.umd.umich.edu/undergraduate/college-arts-sciences-letters/)

Major Requirements

Code	Title	Credit Hours
Environmental Science Core		
ESCI 101	Environmental Science	4
ESCI 201	Environmentalism	4
ESCI 118	Geology I	4
ESCI/BIOL 304	Ecology	4
ESCI 305	Intro to GIS	4
ESCI 385	Environmental Internship	3
or ESCI 492	Capstone Research Experience	
or ESCI 498	Indep Study in Environ Sci	
or ESCI 499	Lab Research in Environ Sci	
ESCI 377	Environmental Field Methods	1-4
or ESCI 410	Future Cities Live	
or ESCI 420	Advanced Field Ecology	
or ESCI 478	Field Geology	
Total Credit Hours		**24-27**

Concentration

Must select one of the following concentrations: Ecosystem Sciences. Geosciences, Environmental and Sustainability Studies

Notes:

1. At least 23 of the minimum 45 upper level hours in the major must be elected at UM-D.
2. A maximum of 6 hrs. of independent study/research in any Dept. of Natural Sciences discipline may count towards the 120 hours required to graduate.

Concentrations

Environmental Science majors may pursue either a **Bachelor of Science (B.S.) degree with a concentration in Ecosystem Sciences or Geosciences,** or a **Bachelor of Arts (B.A.) degree with a concentration in Environmental and Sustainability Studies**.

Students must declare one of the following:

Environmental and Sustainability Studies Concentration

The following courses are required:

Code	Title	Credit Hours
Required Prerequisite Courses:		
BIOL 130	Intro Org and Environ Biology	4
CHEM 134	General Chemistry IA	4
STAT 263	Introduction to Statistics	3
Required Concentration Core Courses:		
ESCI 370	Environmental Hazards	4
ESCI 372	Energy and the Environment	4
ESCI 401	Sustainable Cities	4
ENST 474	Environmental Education	2-3
ESCI 486	Environmental Interpretation	2-3
Concentration Elective Courses		
Select a minimum of 17 credits from the following:		17-20
ANTH 325	Anth of Health and Environment	
CRJ 483	Justice, Crime and Environment	
ECON 351	Environmental Economics	
ESCI 320	Field Biology	
ESCI 340	Remote Sensing	
ESCI 440	Advanced GIS	
ESCI 485	Spatial Analysis	
FNDS 3201	Weeds, Wastelands and the Salvation of the World	
GEOG 320	Global Climate Change	
PHIL 312	Environmental Ethics	
POL 325	Environmental Politics	
POL 445	Environmental Law	
POL 467	Food Politics and Policy	
POL 487	Comparative Enviro Policy	
URS 300	Urban and Regional Studies	

Ecosystem Sciences Concentration

The following courses are required:

Code	Title	Credit Hours
Required Prerequisite Courses:		
BIOL 130	Intro Org and Environ Biology	4
CHEM 134	General Chemistry IA	4
CHEM 136	General Chemistry IIA	4
Select one of the following STAT, MATH options:		
STAT 263	Introduction to Statistics	3
MATH 113 & STAT 301	Calc I for Biology & Life Sci and Biostatistics I	8
MATH 115 & STAT 301	Calculus I and Biostatistics I	8
Required Concentration Core Courses:		
ESCI 340	Remote Sensing	4

ESCI 348	Environmental Chemistry	4
ESCI 350	Geomorphology	4
ESCI 440	Advanced GIS	4
Concentration Elective Courses:		
Select a minimum of 17 credits from the following:		17-20
BIOL 333	Plant Biology	
BIOL 353	Ornithology	
BIOL 380	Epidemiology	
ESCI 320	Field Biology	
ESCI 337	Plant Ecology	
ESCI 352	Introduction to Toxicology	
ESCI 420	Advanced Field Ecology	
ESCI 422	Conservation Biology	
ESCI 485	Spatial Analysis	
GEOG 320	Global Climate Change	

Geosciences Concentration

Code	Title	Credit Hours
Required Prerequisite Courses:		
BIOL 130	Intro Org and Environ Biology	4
CHEM 134	General Chemistry IA	4
CHEM 136	General Chemistry IIA	4
Select one of the following STAT, MATH options:		
STAT 263	Introduction to Statistics	3
MATH 113 & STAT 301	Calc I for Biology & Life Sci and Biostatistics I	8
MATH 115 & STAT 301	Calculus I and Biostatistics I	8
Required Concentration Core Courses:		
ESCI 313	Earth Materials	4
ESCI 340	Remote Sensing	4
ESCI 348	Environmental Chemistry	4
ESCI 350	Geomorphology	4
ESCI 370	Environmental Hazards	4
ESCI 372	Energy and the Environment	4
ESCI 375	Groundwater Hydrology	4
ESCI 440	Advanced GIS	4
ESCI 485	Spatial Analysis	3

Minor or Integrative Studies Concentration Requirements

A minor consists of 16 credit hours of upper- level courses in Environmental Science (ESCI).

Code	Title	Credit Hours
Required Courses:		
GEOG 320	Global Climate Change	4
ESCI 401	Sustainable Cities	4
Elective Courses:		
Select any upper-level ESCI courses (300-400 level):		8
Total Credit Hours		**16**

- A minimum GPA of 2.0 is required for the minor/concentration. The GPA is based on all coursework required within the minor (excluding prerequisites).
- The use of transfer credit, field placements, internships, seminars, S/E graded courses, and independent study/research courses is limited to 3 credits in a 12 credit hour minor/concentration and 6 credits in a 15 credit hour and above minor/concentration.
- Courses within a minor/concentration cannot be taken as Pass/Fail (P/F).
- Minors requiring 12 credits may share one course with a major. Minors requiring 15 credits or more may share two courses with a major. This does not apply to concentrations for the Integrative Studies major.

Learning Goals

1. Have a strong background in areas of science which are relevant to environmental problems
2. Have sufficient scientific skills, knowledge, and intellectual abilities to approach future--as well as current--environmental issues
3. Have strong professional ethics
4. Be able to synthesize information obtained from different sources
5. Be able to read, understand, interpret, and critically evaluate scientific literature
6. Be able to extract useful information from oral presentations
7. Be able to write technical reports (using appropriate scientific language and concepts)
8. Be able to make oral presentations of technical information
9. Use the methodologies and models of science to select, define, solve, and evaluate problems independently and collaboratively
10. Be able to design and carry out data-collection or sampling protocols, using appropriate (and safe) laboratory and field techniques
11. Be able to design and conduct meaningful experiments
12. Be able to critically evaluate experimental data (including statistical analysis of experimental results)
13. Ask meaningful questions about real-world scientific issues
14. Make scientifically based decisions and solve problems drawing on concepts and experiences from relevant areas
15. Be able to describe phenomena with algebraic formulas, interpret graphs, and think quantitatively
16. Be able to use computers to simulate environmental processes
17. Be able to use existing information bases (library resources, computer databases, government documents, etc.)
18. Have a basic understanding of the biological and physical environment (including knowledge of physical geology, atmospheric science, and biogeography).
19. Be familiar with basic ecological concepts and ecological field methods
20. Be familiar with the techniques (and underlying theory) of analytical chemistry
21. Be familiar with geological concepts and field methods
22. Be familiar with a variety of current environmental problems and with remediation and restoration techniques that can be applied to those problems
23. Have in-depth knowledge in one of the fields of science developed in the Environmental Science Program (biology, chemistry, or earth science)

ESCI 101 Environmental Science I 4 Credit Hours
The course is an introduction to environmental science. It aims to identify the underlying concepts of environmental issues and demonstrates the interdisciplinary nature of environmental problem solving. The focus is on the scientific aspects of environmental challenges from local to global scales. Concepts from biology, chemistry, geology, and physics help to analyze these challenges and present solutions. (F, YR).

ESCI 118 Geology I 4 Credit Hours
An introduction to the study of geologic processes at work in the earth's interior and on its surface. Rocks and minerals, the origin and evolution of the continents, and the gradual and catastrophic processes that shape surface and bedrock features. Three hours lecture, three hours laboratory. (F, YR).
Corequisite(s): ESCI 118L

ESCI 201 Environmentalism 4 Credit Hours
The course is an introduction to environmental science. It aims to identify the underlying concepts of environmental issues and demonstrates the interdisciplinary nature of environmental problem solving. The focus is on the societal aspects of environmental challenges from local to global scales, particularly on environmentalism. Concepts from environmental science, ethics, literature, history, politics, sociology, and economics help to analyze these challenges and present solutions. (W, YR).

ESCI 218 Geology II 4 Credit Hours
A generalized study of the history of the earth, with emphasis on the fossil record of life development, the stratigraphic sequence of deposits and paleogeography. Laboratory work will include the study of geologic and topographic maps and fossils of prominent invertebrate phyla. (W, YR).
Corequisite(s): ESCI 218L

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 Math Placement with a score of 116)

ESCI 305 Intro to GIS 4 Credit Hours
An introductory course that examines the digital representation, manipulation, and analysis of geographic data, with the 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.
Corequisite(s): ESCI 305L

ESCI 308 Principles of Ecology Laboratory 2 Credit Hours
A stand-alone laboratory experience designed to give student hands-on practice with ecological field methods and scientific communication using project-based learning as a theme. Students will use the campus natural area to gain experience with ecological research. Each lab applies different ecological research techniques. Students will complete a semester long project using ecological knowledge to develop solutions to real-world problems and to communicate those solutions and the science behind them to a wide-variety of audiences. (F, S).
Prerequisite(s): BIOL 304* or BIOL 315* or BIOL 320* or BIOL 456*

ESCI 312 Environmental Ethics 4 Credit Hours
The relationship of human beings to the non-human environment raises pressing moral and political issues. This course will use the theories and concepts of philosophical ethics to explore such questions as human obligations to non-human animals; the preservation of wilderness; balancing economic, aesthetic, and spiritual values; and the problems of pollution, urban sprawl, and ecological justice. Prerequisite or permission of instructor. (YR).
Prerequisite(s): PHIL 100 or PHIL 233 or PHIL 240 or PHIL 301 or PHIL 302 or PHIL 306 or PHIL 335 or PHIL 365 or PHIL 375 or PHIL 441 or PHIL 442 or ENST 301

ESCI 313 Earth Materials 4 Credit Hours
This course provides an overview of Earth materials. It includes topics of mineralogy, optical crystallography, igneous and metamorphic petrology and petrography as well as sedimentology and sedimentary petrology and petrography and how these rock types relate to tectonics. (W, AY).
Prerequisite(s): CHEM 134 and (GEOL 118 or ESCI 118)

ESCI 315 Aquatic Ecosystems 4 Credit Hours
An introduction to aquatic ecosystem ecology. Course topics include physical and chemical properties of water and how this contributes to a unique ecological environment, freshwater and marine biomes and their ecology, and threats that face these systems. Four hours lecture. Some weeks instruction will take place in the field. Some local travel may be required. (AY).
Prerequisite(s): BIOL 130 and (CHEM 134 or GEOL 118 or ESCI 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 or BIOL 130

ESCI 325 Anth of Health and Environment 4 Credit Hours
Many of the major threats to human health are linked to environmental changes around the world. Population growth, globalization, and economic interests are creating increases in pollution, deforestation, water scarcity, urban sprawl, oil spills, and numerous other kinds of destructive environmental changes. This course explores how these environmental changes shape new illnesses and disease patterns, add to inequalities, and effects the health and wellbeing of individuals in particular communities, locations, and cultures. (W,YR).

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 4 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. Four hours lecture. (W, AY).
Prerequisite(s): BIOL 130

ESCI 340 Remote Sensing 4 Credit Hours
This course introduces students to the basics of remote sensing, characteristics of remote sensors, and remote sensing applications in academic disciplines and professional industries. Students will explore the physical and mathematical principles underlying remote sensing techniques, and will practice the acquisition, processing, and visualization of remotely derived data. This course emphasizes hands-on learning through projects. (W, YR).
Restriction(s):
Can enroll if Class is Junior or Senior or Graduate

ESCI 348 Environmental Chemistry 4 Credit Hours
Description of the concepts, principles, practices, and current problems in the chemistry of natural waters, the soil, and the atmosphere. (W, AY).
Prerequisite(s): CHEM 134 and CHEM 136

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 350 Geomorphology 4 Credit Hours
This introductory course is designed to familiarize students with the fundamentals of river behavior and the general principles in fluvial morphology, sedimentation, and hydraulics and stream bank erosion. Applications of these principles are shown utilizing a stream classification system. Problem solving techniques for watershed management, stream restoration, non-point source pollution and integration of ecosystem concepts in watershed management are presented. A combination of both lecture and field applications are provided. (W, AY).
Prerequisite(s): GEOL 118 or ESCI 118
Restriction(s):
Can enroll if Class is Junior or Senior
Can enroll if Level is Undergraduate

ESCI 351 Environmental Economics 4 Credit Hours
This course looks at environmental and resource problems from an economic perspective. We will consider various ways in which markets fail and discuss what kind of policies could improve environmental outcomes. Focus will be on current policies and environmental developments. (AY).
Prerequisite(s): ECON 202

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 Hazards 4 Credit Hours
This course is designed in the context of geosystems sciences. It sheds light on hazardous interactions between people and the physical environment including all four spheres: lithosphere, atmosphere, hydrosphere and biosphere. It explains natural and environmental hazards such as earthquakes, volcanism, floods, mass movements, wildfires, climate change, and severe weather. Theoretical concepts are applied to case studies from around the world. (F, AY).
Prerequisite(s): ESCI 118 or GEOL 118 or ESCI 101 or ESCI 201

ESCI 372 Energy and the Environment 4 Credit Hours
This course examines renewable and non-renewable energy sources: crude oil, gas, coal, radioactive ores, hydro, solar, wind, biomass, geothermal, and others. The energy sources will be discussed in the context of their origin, energy generation and efficiency, environmental impacts, and socio-economic implications. (W, AY).
Prerequisite(s): ESCI 118 or ESCI 101 or ESCI 201 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. (AY).
Prerequisite(s): GEOL 118

ESCI 377 Environmental Field Methods 1 Credit Hour
An intensive, off-campus field course that provides students an opportunity to observe and critically study different natural and human environments. Students learn how to collect data in a systematic way and formulate scientific inferences about environmental processes, products, and problems. Students also learn preparation techniques for conducting long days in the field under varying weather conditions and in challenging terrains. The course may be repeated for credit when destination varies. There is a mandatory pre-departure meeting and trip length is typically one to two weeks in length. (YR). (YR).
Prerequisite(s): GEOL 118 or ESCI 118

ESCI 385 Environmental Internship 1 to 9 Credit Hours
A field assignment relating to the student's environmental interests. The student will work in an off-campus government or private business for a prescribed number of hours each week to be arranged by the advisor and employer. May be repeated up to three times. Written permission of instructor. (F, W, S, YR).
Restriction(s):
Can enroll if Class is Junior or Senior or Graduate

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 401 Sustainable Cities 4 Credit Hours
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 presents socio-ecological challenges of increasing scale. Sustainability and resilience efforts in cities around the world require a multi-disciplinary approach that integrates urban-focused concepts from history, sociology, ecology, geography, and architecture and planning. Topics include, for example, smart growth, renewable energy, public inter- and inner-city transportation, recycling and zero waste, water management, green architecture, environmental and social (in)justice, cultural diversity, and urban forestry and farming. (W, AY).
Prerequisite(s): ESCI 118 or GEOL 118 or ESCI 101 or ESCI 201 or ESCI 275 or ESCI 301

ESCI 410 Future Cities Live 1 to 4 Credit Hours
This field course explores sustainability and resilience in cities around the world. It follows a multi-disciplinary approach by integrating urban-related concepts from history, sociology, ecology, geography, architecture, and planning. It also explores how seriously cities take their "going green" initiatives. Target cities might vary from year to year to include U.S. and foreign cities. The course may be repeated for credit when destination varies. There will be one or multiple mandatory pre-departure meeting/s depending on the trip length that is typically one to two weeks. (OC).

ESCI 420 Advanced Field Ecology 1 to 4 Credit Hours
An intense study of organisms and ecosystems at an advanced level, utilizing ecological habitats in a local or remote setting. Students will learn data collection and hypothesis testing as applied to investigations of behavior, biotic interactions, and biodiversity patterns in a focal ecosystem. The course may require travel. See current schedule of classes for destination and travel dates. Hours are variable depending on the field location. Repeats allowed if different location. (OC).
Restriction(s):
Can enroll if Class is Senior

ESCI 422 Conservation Biology 4 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. (W, AY).
Prerequisite(s): BIOL 304 or ESCI 304
Restriction(s):
Can enroll if Class is Senior
Can enroll if Level is Undergraduate

ESCI 440 Advanced GIS 4 Credit Hours
This course offers an opportunity for students with a background in the fundamentals of geographic information systems (GIS) to apply the analytical capabilities of geospatial technology to model real-world situations in support of decision making. Particular emphasis is given to data development and management, spatial and statistical analyses, customization, and effective visualization. (W, YR).
Prerequisite(s): GEOL 305 or ESCI 305 or GEOG 305

ESCI 467 Food Politics and Policy 4 Credit Hours
How do politics affect our food at the global, national and urban/local scale? This course examines close historical relationships between politics and food; the politics of conventional agriculture and food policy; and alternative agriculture movements and food systems, with a particular emphasis on urban food policy and urban food systems.

ESCI 478 Field Geology 4 Credit Hours
Introduction to geological field methods; detailed rock descriptions, how 3-dimensional structures are visualized, described, and how maps and cross sections are constructed from field data. (F, AY).
Prerequisite(s): GEOL 118 or ESCI 118
Restriction(s):
Can enroll if Class is Sophomore or Junior or Senior

ESCI 483 Justice, Crime and Environment 4 Credit Hours
This service-learning course focuses on environmental justice and law. Environmental Justice is defined as the fair treatment of all people with respect to the development, implementation, and enforcement of environmental laws. In the classroom, students learn the theory, history, and enforcement of environmental laws and regulations in Detroit, Michigan, and nationwide. In a required civic engagement project, students apply their substantive knowledge to solve local environmental problems. Through classroom learning and projects with community organizations, students connect law and justice concerns to Detroit's environmental problems. Students cannot receive credit for both CRJ 483 and CRJ 583. (AY).
Restriction(s):
Cannot enroll if Class is

ESCI 485 Spatial Analysis and GIS 4 Credit Hours
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. (AY).
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 Engineering and Computer Science or Education, Health, and Human Services or Business or Arts, Sciences, and Letters

ESCI 486 Environmental Interpretation 2 to 3 Credit Hours
Course deals with the interpretation of the environment, its characteristics, and its presentation to school groups as well as to the general public. Intended to acquaint students with a variety of skills and techniques necessary for interpreting the environment to others. Extensive use is made of the UM-Dearborn Environmental Study Area. (AY).

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 curent 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 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