ENVIRONMENTAL SCIENCE

Academic Year

2011-2012

School

School of Science, Engineering and TechnologySchool Web site

School Dean

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Department

Physics and Earth Sciences

Department Chair

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Description of Program/Major

The Environmental Science is a multidisciplinary field based on the nature of the complex environmental problems that need to be resolved. The St. Mary's Environmental Science degrees were designed to meet the demands of an ever increasing global population which brings about urbanization issues and the depletion of natural resources. This program aims to give students a foundation of scientific knowledge and professional skills that will enable them to assess a variety of environmental issues, and pose potential solutions. The degree plans allow the student to gain experience in one specialization, such as geosciences, chemistry, or ecology.

Degree Requirements

Core Curriculum (SMC)

St. Mary's University Core (30 Hours)
All St. Mary's Core SMC13## "Reflection" courses must be completed before registering for SMC23## "Practice" courses. "Reflection" courses can be taken in any order followed by "Practice" courses in any order.

SMC 1301	Foundations of Civilization	3
SMC 1311	Foundations of Reflection: Self (Formerly PL 1310)	3
SMC 1312	Foundations of Reflection: Nature	3
SMC 1313	Foundations of Reflection: Others	3
SMC 1314	Foundations of Reflection: God (Formerly TH 2301)	3
SMC 2301	Foundations of Practice: Ethics (Formerly PL 2332)	3
SMC 2302	Foundations of Practice: Civic Engagement and Social Action	3
SMC 2303	Foundations of Practice: Fine Arts and Creative Process	3

	(Formerly FA 1101, FA 1102, FA 1103)	
SMC 2304	Foundations of Practice: Literature	3
SMC 4301	Capstone Seminar: Prospects for Community and Civilization	3

School Specific Core (SSC)

School of Science, Engineering, and Technology Specific Core (21 Hours)

Speech	SE 1321 (for international students), SE 1341, SE 2333, SE 3391	3
Composition and Rhetoric (grade of "C" or better)	EN 1311, EN 1313 (for international students)	3
Foreign Languages	Six hours at the sophomore level (2311, 2312) in a Foreign Language previously studied for a minimum of one year; Or, 6 hours of introductory level (1311, 1312) in a Foreign Language not previously studied; Or, 12 hours of CLEP credit for a language previously studied.	6
Social Science	BA 1310, BA 3325, CJ 2300, CJ 3300, EC 2301, EC 2303, PO 1311, PO 1312, PO 1314, PS 1301, PS 3386, SC/CR 1311, SC 3321, HU 3300, HU 3303	3
Theology	Advanced Theology 33XX	3
Fine Arts	AR, DM, MU or Literature: EN 2321, 2322, 2353, 2354, 2355, 2356	3

Four Year Degree Plan

Sample 4-year degree plan, Environmental Science (BA)
Sample 4-year degree plan, Environmental Science (BS)

Department Courses and Descriptions

General Geology Laboratory ()
ES 1100
Laboratory study of earth materials (minerals and rocks), introduction to maps, historical geology (fossils), and plate tectonics exercise. (2 hours per week)

Environmental Science Lab (1)
ES 1173

General Geology (3)
ES 1300
A survey course covering the physical aspects of geology (minerals, rocks, geologic agents, plate tectonics) and the geological history of the earth and development of life (fossils). (field trip)

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Physical Geology (3)
ES 1301
Minerals and rocks and work of agents of geology; water (rivers, ground water, oceans), wind, ice and vulcanism; dynamics of the earth's crust as seen by use of maps and observation. (Lecture 2 hours, lab 2 hours, field trip.)

Geology of Earth Resources (3)
ES 1303
Explores the nature, origin, distribution, use, conservation and future availability of valuable earth materials such as minerals, rocks, soils and water. Earth materials and activities will be used in class where appropriate. (field trip)

Geology of Energy Resources (3)
ES 1304
Explores the nature, origin, distribution, use, conservation and future availability of petroleum and natural gas, coal and nuclear fuels. The probable impact of alternative energy sources will also be considered. Energy materials and activities will be used in class where appropriate. (field trip)

Physical Geography (3)
ES 1305
A survey course which considers the entire world in terms of location, mapping, time zones, weather and climate, soils and vegetation, land forms, surface processes, and oceanography. (Candidates for Teacher Certification only)

Oceanography (3)
ES 1342
A broad-based introductory course on every facet of ocean study: biologic, geologic, hydrologic, physical and chemical. (Saturday field trip) Prerequisite: ES 1300, 1301 or other natural science.

Intro. Environmental Science (3)
ES 1373
Investigation of man's relationship to the earth; earth resources and conservation, pollution problems, geological hazards (earthquakes, volcanoes, land-slides). Designed to benefit students majoring in any field. (field trip)

Global Change (3)
ES 2300
The main objective of this course will be to provide students with a perspective of the geological history of the earth, and the natural changes the planet has endured. Learning about the history of environmental changes and events such as species extinctions and causes will give students a background to understand how recent environmental changes compare the past changes on the planet. Prerequisites: ES 1300 and ES 1373.

General Ecology (3)
ES 2320
The main objective of this course will be to will learn about the fundamentals of ecology by studying the

hierarchy of life, adaptations, population ecology and community ecology. Prerequisites: ES 1373 and ES 1173. Concurrent enrollment in MT 2303 recommended.

Energy Resources and the Environment (3)
ES 2325
This course will help students understand and appreciate the importance of geology in controlling the nature, origins, and distribution of energy resources. Students will also examine economic and political factors that influence both the present and future development of these resources, as well as the associated potential environmental impacts. Alternative energy resources such as solar, wind, geothermal, biofuels, and hydropower will also be discussed. Key concepts are reinforced by giving students hands on experience through classroom demonstrations and projects using case studies and materials from the extensive collections of the Department of Physics and Earth Sciences (Field Trip). Prerequisites: ES1300 or with permission of the instructor.

Experimental Design (3)
ES 2345
This class will be an applied statistics course that focuses on the design and analysis of experiments typical to research in environmental science. Students will learn the steps required to set up a sound experiment and then study the various methods used in single factor and multifactor analysis. Topics will include: ANOVAs, Confidence Intervals, the f-statistic, Pairwise Comparisons and Orthogonality. The course will require use of statistical software to analyze data sets. Prerequisite: MT 2303.

Environmental Geology (4)
ES 2450

Seminar in Environmental Science (1)
ES 3100
Presentation and discussion of current research in the environmental sciences will be covered in this course. Students will be expected to take 3 semesters of this course to meet the requirements of the major.

Special Topics (1)
ES 3103
Subject matter varies. Topic must be stated precisely on transcript, e.g., energy resources, petroleum geology, geophysics. May include lab and field work. Prerequisites: ES 1300, 1301 or permission of instructor.

Special Topics (2)
ES 3203
Subject matter varies. Topic must be stated precisely on transcript, e.g., energy resources, petroleum geology, geophysics. May include lab and field work. Prerequisites: ES 1300, 1301 or permission of instructor.

Earth Science for Teachers (3)
ES 3300
Activity-oriented review of basic concepts of geology, astronomy, oceanography and meteorology.

Emphasis on design of experimental units and development of resource files in each of these areas. Prerequisite: Science teaching experience or approval of the instructor. (Lecture-laboratory 3 hours, field trip)

Essential Elmnts of Life-Erth (3)
ES 3301
Includes essential elements in the following areas: classification, morphology and evolutions of life forms; characteristics, processes and evolution of the earth's lithosphere, oceans and atmosphere: and characteristics and evolution of the solar system and universe. Emphasis on learning through inquiry and discovery. No prerequisites. (Candidates for Teacher Certification only.)

Special Topics (3)
ES 3303
Subject matter varies. Topic must be stated precisely on transcript, e.g., energy resources, petroleum geology, geophysics. May include lab and field work. Prerequisites: ES 1300, 1301 or permission of instructor.

Environmental Policy and Regulation (3)
ES 3320
This course is designed to acquaint the student with numerous issues and perspectives confronting society and environmental scientists, and their influence on the development of environmental policy and regulation. This course is intended as a practical overview of environmental regulation, focusing on using case studies and examples to illustrate selected statutes and regulations that commonly shape the career of an environmental professional. Pre-requisites: ES 1373 or permission of the instructor.

Geophysics (3)
ES 3325
This course covers Physics of the Earth's Interior, where students learn about examining Earth structure, plate tectonics, and earthquakes. Students will also study methods of exploring the makeup of the Earth's surface using seismic surveys, electrical methods, magnetics, gravity and well logging. Field demonstrations will be a required part of the course, which may require some Saturday meetings.

Information Technology for Environmental Science Majors (3)
ES 3330
This course will teach the student the fundamentals of earth coordinate systems and collecting data with global positioning systems (GPS). Once the student is familiar with projection types and data collection systems they will begin using collected data to create maps with GIS technology, in order to better define and understand environmental problems. Map creation will also cover incorporating remotely sensed data, such as satellite imagery, showing how different layers of the mapping process can be used to display multiple maps in the GIS format, and examining ways the data can be interpreted using GIS software functions. Pre-requisites: ES1300 and ES1373 or permission of the instructor

Physical Hydrogeology (3)
ES 3340
This class will give students a firm understanding of the way that geology influences the water resources that exist in the world. Physical studies of geologic environments will examine the science required to

study the quantity and movement within surface and ground water systems. Hands on experience will be provided through classroom demonstrations and projects. Pre-requisites: ES1300 or with permission of the instructor.

Environmental Geochemistry (3)
ES 3400
The principal objective for this course is to provide students with an understanding of the importance of chemistry in determining the quality of our environment. Students will learn about natural geochemical processes that occur in Earth's water, air, and soil systems, and explore how human activity can affect geochemical cycles in the environment. Fundamental concepts will be reinforced using examples at both a local and a global scale. Course content is largely based on applied geochemistry, with supporting content in theoretical geochemistry. Pre-requisites: ES1300, ES 1373, and CH 1402, or with permission of the instructor. ES 3400L must be taken concurrently.

Environmental Geochemistry Lab (0)
ES 3400L
This laboratory will introduce students to the process of field sampling, data collection, data analysis, and data synthesis. The lab will use case studies of different geochemical systems based on real-world data either obtained by the students or gathered from databases maintained by federal and state government agencies. The lab may include some field studies involving sample collection and analysis. This lab will be required for all students working on a major in Environmental Science with a Chemistry Concentration. This lab must be taken concurrently with ES 3400.

Department Faculty

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