EARTH AND ENVIRONMENTAL SCIENCES (EESC)

EESC 000 - Summer Research (0 Credits)
Open to qualified students by permission of department. Supervised on-campus or off-campus summer research experience developed in consultation with department.

EESC 110 - Environmental and Ecological Systems (3 Credits)
Connecting humans and the environment with biological, chemical, and geologic principles, with a focus on ecological effects.

EESC 111 - Our Dynamic Earth (4 Credits)
The modern view of the Earth as a dynamic, constantly-changing planet and the impact of geological processes on our lives. Discussions will include the origin of the solar system and Earth, how earthquakes and volcanoes result from heat-driven plate tectonic processes and our ongoing attempts to predict such hazardous events, and how Earth's rocks and minerals are ingrained in our everyday lives. Streams and groundwater processes, and cycles of mountain uplift and erosion that continuously alter the Earth's surface, will also be examined. Laboratory.

EESC 112 - Evolution of Earth (4 Credits)
History of the Earth with emphasis on surficial processes, evolution of life, climate change, and energy resources. Laboratory.

EESC 120 - Principles of Environmental Sustainability (4 Credits)
Scientific examination of human impacts on the environment, including population growth, pollution, climate change, and energy use, along with possible solutions for a more sustainable world. Laboratory.

EESC 121 - Oceanography (4 Credits)
An introduction to the oceans. Physical and chemical processes affecting seawater; the geology of the seafloor; biological productivity in the oceans; and environmental challenges involving the oceans. Laboratory.

EESC 205 - GIS Applications in Environmental Science and Geology with Lab (4 Credits)
This course emphasizes the acquisition of spatial data and their display and analysis within ArcGIS geographic information system software. The class also includes an introduction to the use of global positioning system instruments for data collection. Laboratory.

EESC 230 - Global Environmental Problems (3 Credits)
Prerequisite: EESC 120. An in-depth analysis of specific global environmental problems facing society today. The course connects economic development, population growth, resource consumption, and environmental degradation with detailed case studies. The challenges of achieving a sustainable society today will be investigated through the lessons learned from these environmental crises across the world.

EESC 240 - Field Methods in Environmental Science and Geology (4 Credits)
Prerequisites: EESC 110 or EESC 111 or GEOG 110. The Earth & Environmental Sciences rely heavily on mapping and collection of physical, chemical, and biological field data. Students enrolled in the course will complete weekly laboratory and hands-on exercises to learn the essential field skills necessary to advance their careers in the earth sciences as technicians, academics, and/or educators. This introductory field course will provide a solid foundation to prepare students for advanced earth science study and/or a general introduction to the field methods within the discipline.

EESC 301 - Mineralogy (4 Credits)
Prerequisite: EESC 111. Prerequisite or co-requisite: CHEM 111. Study of Earth's major rock forming minerals, and those of economic value, in hand sample, microscopic thin section and through field studies. Course is conducted as a mix of lecture and laboratory activities. Laboratory.

EESC 302 - Petrology (4 Credits)
Prerequisite: EESC 301. Prerequisite or corequisite: CHEM 112. Study of metamorphic and igneous processes and important rock types in hand sample, microscopic thin-section and through field studies. Course is conducted as a mix of lecture and laboratory activities. Laboratory.

EESC 307 - Environmental Soil Science (3 Credits)
Prerequisites: EESC 110 or EESC 111 or GEOG 111. Prerequisite or corequisite: CHEM 112. An introduction to soil formation processes; soil classification (both basic classification and soil taxonomy); physical properties of soil; soil chemistry; and discussion of soil as an environmental interface.

EESC 311 - Sedimentation and Stratigraphy (4 Credits)
Prerequisite: EESC 111. Prerequisite or corequisite: CHEM 111. Recommended: EESC 301. This course provides an overview of the concepts associated with sedimentary rock formation, including theoretical sedimentology, process oriented facies analysis and applied stratigraphy in the context of cyclic sea level and climate change through time. Class work includes several field trips to collect samples for physical and chemical analysis. Laboratory.

EESC 315 - Hydrogeology (4 Credits)
Prerequisite: EESC 111. An introduction to surface water and groundwater flow; the hydrologic cycle; aquifer testing; flow to wells; contaminant transport; and field and laboratory instruments. Laboratory.

EESC 325 - Environmental Geochemistry (4 Credits)
Prerequisites: EESC 110, EESC 120, and CHEM 112. Study of chemical processes operating at or near the surface of the Earth, in bedrock, soils, streams, the oceans and the atmosphere. Particular attention is given to environmental applications. Laboratory.

EESC 326 - Pollution Prevention Planning (3 Credits)
Prerequisite EESC 110 and EESC 120. This course provides an examination of the legislative and scientific approaches to reduce pollution. Examples include an evaluation of industry processes, recycling, wastewater, air and solid waste treatment.

EESC 330 - Environmental Regulations (3 Credits)
Prerequisite: EESC 110 and EESC 120. This course focuses on the implementation of national environmental policy, laws, and regulations through the analysis of policy development, stakeholder impacts, and Congressional and federal agency actions. Students participate in multiple oral presentations, role-playing scenarios, and policy reviews.

EESC 335 - Plate Tectonics (4 Credits)
Prerequisite: EESC 111 This laboratory course offers a comprehensive study of lithospheric plate movements using information derived from seismology, paleomagnetics, petrology and tectonics. Selected topics also include a historical review of the development of the theory of plate tectonics, geologic and geophysical events at plate boundaries and an evaluation of evidence regarding plate-driving forces. Laboratory.

EESC 340 - Energy Resources and Technology (3 Credits)
Prerequisite: One from BIOL 126, or BIOL 132, or CHEM 112, or EESC 111, or EESC 120, or PHYS 106. Intended primarily for science majors, this course investigates the basic science and technology relating to alternative energy sources and fossil fuels. Students who complete this class will have a greater technical understanding of energy sources and the methods used to tap them.

EESC 355 - Earth's Climate: Past, Present, and Future (3 Credits)
Prerequisite: EESC 111 or EESC 112 or EESC 120 or EESC 121 or GEOG 110. This course investigates the history of Earth's climate system to better understand modern climate processes. Through critical analysis of primary scientific literature, students will explore major climate transitions and ocean-atmosphere interactions across geologic time. Emphasis is placed on how past climate reorganizations inform current climate dynamics and future change.

EESC 357 - Sustainable Aquaculture (3 Credits)
Prerequisite: EESC 112 or EESC 120 or BIOL 132 or BIOL 126. This course provides students with the basic principles of aquaculture and a factual understanding of whether aquaculture can be sustainable and, if so, what is being done to achieve this goal. Topics include the historical and current status of fisheries, water quality, nutrition, diseases and therapeutants, seafood safety, and anatomy.

EESC 360 - Environmental Exploration (2-4 Credits)
Specialized courses with a significant filed component not offered on a regular basis. Study of selected environments along with relevant geological issues with a focus on active exploration and research. Overnight trips and extra fees required. Permission of instructor required to register.

EESC 412 - Structural Geology (4 Credits)
Prerequisite: EESC 301 Analysis and interpretation of structural features of the Earth's crust such as folds and faults. Laboratory.

EESC 418 - Applied Ecotoxicology (4 Credits)
Prerequisite: BIOL 210 (C- or better). Students enrolled in this course will study the release of anthropogenic toxic contaminants into the environment, their transport through natural compartments, persistence in both terrestrial and aquatic environments, and their effects on wildlife and human health.

EESC 421 - Special Topics (2-4 Credits)
Prerequisite: permission of the instructor. Specialized topics not offered on a regular basis.

EESC 460 - Senior Seminar (2 Credits)
Multidisciplinary evaluation of environmental and geological problems. Senior-level seminar for EESC majors; others by permission of the instructor.

EESC 465 - Senior Portfolio and Career Preparation (1 Credits)
Co-requisite: Senior status and EESC major. This course will guide EESC students through the evaluation of the skills, knowledge, and experience they have accumulated at the University of Mary Washington and elsewhere in preparation for post-collegiate life. Student products include a scientific resume and online professional portfolio that will reflect their strengths and professional potential.

EESC 481 - Readings (1-2 Credits)
Readings in environmental and/or geologic literature selected by the student, who is guided by a faculty member. Open to majors by permission of the department. A maximum of two (2) credits count toward the major requirements.

EESC 491 - Individual Study (1-4 Credits)
Prerequisite: permission of the instructor and the department. Investigation of a topic which may include laboratory, field work, and literature research. Course of study determined by supervising instructor and student. A maximum of four (4) credits may count toward the major requirements.

EESC 493 - Honors Research (4 Credits)
Prerequisites: EESC 491 and permission of instructor and the department. Independent research project which may include field and/or laboratory work. Course of study determined by supervising research advisor and student. Successful completion of a written thesis and oral defense is required, and will result in the student earning Departmental Honors at graduation. A maximum of four (4) credits may count toward the major requirements.

EESC 499 - Internship (1-12 Credits)
Supervised off-campus experience, developed in consultation with the department.