ENVIRONMENTAL SUSTAINABILITY AND POLICY

Degree: B.S., Environmental Science and Geology
Department of Earth and Environmental Sciences (https://cas.umw.edu/ees/)

The Environmental Science and Geology degree (Bachelor of Science) promotes the study of our environment and the impact that human activities have on natural systems. Environmental Science students choose either the Applied Environmental Science major or the Environmental Sustainability and Policy major, which includes social science connections, according to their interests. Both majors provide a strong background for graduate programs or employment in a variety of career areas after graduating from UMW.

The Environmental Sustainability and Policy major provides a diverse foundation in biology, chemistry, and geology with a focus on the economic, political, and sociological impacts of humans on the environment. This interdisciplinary nature permits students to select from a wide range of course offerings in multiple departments to customize their learning experience based on career goals. Sustainability knowledge gained from this program, coupled with analytical skills, will prepare majors for graduate study or careers in a variety of government agencies and non-governmental organizations.

The Department has recently-constructed laboratories in the Jepson Science Center equipped with sophisticated analytical instruments and the latest Geographic Information Systems (GIS) software to support both classroom instruction and research opportunities. Major laboratory equipment includes petrographic microscopes, a magnetic susceptibility instrument, inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), high-performance liquid chromatography (HPLC), fluorescent microplate readers, a variable pressure scanning electron microscope with chemical capabilities, a flow-through ecotoxicology exposure system, and dedicated wet and dry lab facilities for paleontology, sedimentology, and environmental geochemistry. For environmental and geological fieldwork, the department maintains a variety of high accuracy GPS devices, research vessels (including one equipped for trawling, coring, and dredging), and coring, surveying, and sampling equipment. An extensive collection of rocks, minerals, and fossils for classroom and comparative study is also available. To promote active learning, majors are encouraged to conduct independent studies, research, or internships which are often financially supported by undergraduate research grants provided by the University.

These experiences may also be used to fulfill the general education experiential learning requirement (Beyond the Classroom) through the completion of URES 197 Undergraduate Research, EESC 481 Readings, EESC 491 Individual Study, EESC 493 Honors Research, or EESC 499 Internship. Our faculty also offer short-course study abroad opportunities for students to explore environments in other countries. Students with a 3.00 overall grade-point average and a 3.25 grade-point average in the major may pursue Honors in Environmental Science, Geology, or Environmental Geology by completing an independent research project and writing and defending a thesis.

To complete the Beyond The Classroom requirement through a summer research experience, contact the department chair for more details.

Student Learning Outcomes

1. Students will demonstrate how different components of the Earth System interact.

2. Students will demonstrate the ability to examine a problem and develop a solution.

3. Students will demonstrate the ability to collect field and lab data.

4. Students will demonstrate the ability to process and interpret data sets.

5. Students will demonstrate the ability to effectively communicate in both oral and written formats.

Major Requirements

Code	Title	Credits
Foundation Courses		27
EESC 110	Environmental and Ecological Systems	
EESC 120	Principles of Environmental Sustainability	
EESC 111	Our Dynamic Earth	
BIOL 210	Introduction to Ecology and Evolution	
CHEM 112	General Chemistry II	
EESC 205	GIS Applications in Environmental Science and Geology with Lab	
or GISC 200	Introduction to GIS	
or GISC 250	Introduction to Geographic Information Systems and Cartography	
EESC 330	Environmental Regulations	
EESC 460	Senior Seminar	
Choose three (3) Environmental Sustainability courses:		9-10
EESC 230	Global Environmental Problems	
EESC 307	Environmental Soil Science	
EESC 326	Pollution Prevention Planning	
EESC 340	Energy Resources and Technology	
EESC 355	Icehouse-Greenhouse Earth	
EESC 357	Sustainable Aquaculture	
EESC 418	Applied Ecotoxicology	
GEOG 361	Sustainability in Guatemala	
Choose two (2) Environmental Policy courses:		6
ECON 312	Government and Business	
ECON 331A	Environmental and Resource Economics	
ECON 384	Economic Development	
GEOG 245	Environment and Society	
GEOG 337	The Nature of Cities	
GEOG 339A	Development Studies	
PSCI 350B	Politics of Developing Countries	
PSCI 475	Politics & the Environment Seminar	
SOCG 354	Environmental Sociology	
SOCG 456	Environmental Justice	

Choose two (2) courses with EESC designation at the 200-level or above	4
Total Credits	**46-47**

Up to three (3) credits in applicable Special Topics courses with departmental approval.

Prerequisites

Code	Title	Credits
Select one of the following:		8
BIOL 121 & BIOL 132	Biological Concepts and Organism Function and Diversity ( )	
BIOL 125 & BIOL 126	Phage Hunters I and Phage Hunters II	
CHEM 111	General Chemistry I	4

Plan of Study

This suggested plan of study should serve as a guide to assist students when planning their course selections. The schedule outlined below assumes a student enters UMW planning to major in Environmental Sustainability and Policy. All entering students considering a major in Environmental Sustainability and Policy should take the Chemistry Placement Test. Students who are recommended to take the preparatory CHEM 101 Foundations of Chemistry should do so during Fall of their freshman year. CHEM 111 General Chemistry I can then be taken during the spring of a student's freshman year and CHEM 112 General Chemistry II during fall of the sophomore year. Alternatively, a student may take the CHEM 111-112 sequence during their sophomore year.

This plan is not a substitute for a student's Degree Evaluation, or the Program Requirements listed for this major in the Academic Catalog. Academic planning is the student's responsibility, and course selections should be finalized only after speaking with an advisor in Earth and Environmental Sciences. Students should familiarize themselves with the catalog in effect at the time they matriculated at the University of Mary Washington. Students should also familiarize themselves with general education requirements (https://catalog.umw.edu/undergraduate/general-education/) which can be fulfilled through general electives as well as major/minor course requirements. Course requirements and sequencing may vary with AP, IB, CLEP, Cambridge or previous coursework, transfer courses, or other conditions. To be considered full-time, an undergraduate student must be enrolled in 12 or more credits for the semester.

Course	Title	Credits
Freshman		
Fall		
EESC 110	Environmental and Ecological Systems	3
BIOL 121	Biological Concepts	4
FSEM 100	First-Year Seminar	3
General Education Courses		5
	Credits	**15**
Spring		
EESC 120	Principles of Environmental Sustainability	4
BIOL 132	Organism Function and Diversity	4
General Education Courses		7
	Credits	**15**
Sophomore		
Fall		
CHEM 111	General Chemistry I	4
EESC 205 or GISC 200 or GISC 250	GIS Applications in Environmental Science and Geology with Lab or Introduction to GIS or Introduction to Geographic Information Systems and Cartography	4
General Education Courses		7
	Credits	**15**
Spring		
CHEM 112	General Chemistry II	4
BIOL 210	Introduction to Ecology and Evolution	3
Environmental Sustainability or Environmental Policy Courses [1]		6-7
EESC Elective		2
	Credits	**15-16**
Junior		
Fall		
EESC 111	Our Dynamic Earth	4
Environmental Sustainability or Environmental Policy Course [1]		3
General Electives		8
	Credits	**15**
Spring		
EESC 330	Environmental Regulations	3
Environmental Sustainability or Environmental Policy Course [1]		3
EESC Elective		2
General Electives		8
	Credits	**16**
Senior		
Fall		
EESC 465	Senior Portfolio and Career Preparation (After Mary Washington Option)	1
Environmental Sustainability or Environmental Policy Course [1]		3
General Electives		10
	Credits	**14**
Spring		
EESC 460	Senior Seminar	2
General Electives		13
	Credits	**15**
	Total Credits	**120-121**

[1] Students that wish to take upper-level ECON, GEOG, PSCI, or SOCG Environmental Policy courses should review the prerequisites to ensure they have been completed prior to registration.

Notes: BIOL 121-132 and CHEM 111 are prerequisites to courses in the major. The Environmental Sustainability and Policy major also requires a 4-credit GIS course; all three options satisfy the Digital Intensive general education requirement (EESC 205 or GISC 200 or GISC 250). EESC 205 is only offered in the fall; GISC 200 and GISC 250 are typically offered in both fall and spring. Students may take the honors BIOL 125-126 in place of BIOL 121-132.

Fall courses required in the ESP major:

Code	Title	Credits
BIOL 210	Introduction to Ecology and Evolution	3
EESC 110	Environmental and Ecological Systems	3
EESC 111	Our Dynamic Earth	4
EESC 120	Principles of Environmental Sustainability	4
EESC 205	GIS Applications in Environmental Science and Geology with Lab (GIS Option)	4
EESC 230	Global Environmental Problems (Environmental Sustainability Option)	3

EESC 340	Energy Resources and Technology (Environmental Sustainability Option)	3
EESC 418	Applied Ecotoxicology (Environmental Sustainability Option)	4

Spring courses required in the AES major:

Code	Title	Credits
BIOL 210	Introduction to Ecology and Evolution	3
EESC 111	Our Dynamic Earth	4
EESC 120	Principles of Environmental Sustainability	4
EESC 307	Environmental Soil Science (Environmental Sustainability Option)	3
EESC 326	Pollution Prevention Planning (Environmental Sustainability Option; every other spring)	3
EESC 330	Environmental Regulations (every other spring)	3
EESC 355	Icehouse-Greenhouse Earth (Environmental Sustainability Option)	3
EESC 357	Sustainable Aquaculture (Environmental Sustainability Option)	3
EESC 460	Senior Seminar	2

See Catalog for a complete listing of courses. Consult with other departments for frequency of their offerings, especially for Environmental Policy options.

Earth and Environmental Sciences Faculty

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Melanie D. Szulczewski, Career Advisor (Environmental Science)/ Program Director, (Environmental Sustainability Minor)

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