

BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE

DEPARTMENT OF GEOLOGY AND PLANETARY SCIENCE

WWW.GEOLOGY.PITT.EDU

63 credits minimum

Updated 11/08/2016

Visit the Department web page and click on “Undergrad Programs” for a complete range of advising information plus the latest Environmental Geology requirements.

CORE COURSES (check each as completed):

(27 credits)

Take each of the following:

- ___ GEOL 0840 Environmental Science (3) **OR** GEOL 0800 Geology (3) **OR** GEOL 0820 Natural Disasters (3)
- ___ GEOL 0055 Geology Laboratory (2) [Fall, Spring, Jones] **This is a prerequisite for many courses!**
- ___ GEOL 1015 Geology Colloquium (1 credit pass/fail) [Fall, Spring, Staff]
- ___ GEOL 1030 Oceans, Atmosphere, and Climate (3) [Fall, Werne]
- ___ GEOL 1051 Groundwater Geology (4) [Spring, Thomas]
- ___ GEOL 1060 Geomorphology (4) [Spring, Bain]
- ___ GEOL 1445 GIS, GPS, and Computer Methods for Earth Scientists (3) [Fall, Harbert]
- ___ GEOL 1515 Environmental Geochemistry (3) [Fall, Whittinghill]
- ___ GEOL 1641 Ecosystem Ecology (4) [Fall, Elliott]

CO-REQUIREMENTS (check each as completed):

(24 credits)

- ___ MATH 0220 Analytical Geometry and Calculus 1 (4) (may substitute equivalent Calculus I courses)
- ___ CHEM 0110 General Chemistry 1 (4)
- ___ PHYS 0174 Basic Physics for Science and Engineering 1 (4)

Plus at least THREE of the below:

- ___ MATH 0230 Analytical Geometry and Calculus 2 (4)
- ___ CHEM 0120 General Chemistry 2 (4)
- ___ PHYS 0175 Basic Physics for Science and Engineering 2 (4)
- ___ BIOSC 0175 Biology II (3) **AND** BIOSC 0060 Biology Lab (1)
- ___ BIOSC 0174 Biology I (3) **AND** BIOSC 0050 Biology Lab (1)
- ___ GEOL 1045 Statistics for Earth Science (3) **OR** STAT 1000 Applied Statistical Methods (4) **OR** Equivalent Statistics course with advisor approval (A statistics course is **STRONGLY RECOMMENDED**)

Note: PHYS 0174 and PHYS 0175 (calculus based physics) are recommended for those continuing in the sciences after graduation. However, you may substitute PHYS 0110 Introduction to Physics I (algebra based physics) and PHYS 0212 Introduction to Laboratory Physics for PHYS 0174 for the major.

ELECTIVES (check each as completed):

(9 credits)

Take at least 9 credits of upper division or graduate level GEOL courses or courses related to Environmental Science. The bold courses are most strongly recommended for the Environmental Science degree.

- ___ GEOL 0060 History of the Earth (4) [Spring, Jones]
- ___ GEOL 1003 Mineralogy (4) [Fall, Capo]
- ___ GEOL 1003 Igneous and Metamorphic Petrology (4) [Spring, Stewart]
- ___ GEOL 1020 Sedimentology and Stratigraphy (4) [Fall, Jones]
- ___ **GEOL 1052 Paleoclimatology (3) [Alternate years, Spring, Abbott]**
- ___ GEOL 1100 Structural Geology (4) [Spring, McQuarrie]
- ___ GEOL 1201 Marine Paleocology (invertebrate paleontology) (3) [Offered occasionally, Jones]
- ___ GEOL 1240 Evolution of the Vertebrates (3) [Offered occasionally, Jones]
- ___ **GEOL 1309 Physiochemical and Geological Limnology (3) [Offered occasionally, Werne]**
- ___ **GEOL 1510 Aquatic/Sedimentary Geochemistry (3) [Spring, Werne]**
- ___ **GEOL 1410 Exploration Geophysics (3) [Spring, Harbert]**
- ___ **GEOL 1446 Advanced Geographic Information Systems (3) [Spring, Harbert]**
- ___ **GEOL 1460 Remote Sensing of the Earth (3) [Fall, Ramsey]**
- ___ GEOL 1701 Geology of the Planets (3) [Alternate years, Fall, Ramsey]
- ___ GEOL 1xxx Other upper level classes (GEOL 1000 or higher) may be approved by your advisor.
- ___ BIOSC 1xxx Upper level biology classes (BIOSC 1000 or higher) may be approved by your advisor.

You may take a graduate class (GEOL 2xxx), but you must get *instructor permission for graduate classes*.

____ **GEOL 2054 Soils: Geobiochemical Landscapes (permission required)** [Fall, Bain]

____ **GEOL 2520 Isotope Geochemistry (permission required)** [Offered occasionally, Stewart]

____ **GEOL 2525 Stable Isotope Geochemistry (permission required)** [Offered occasionally, Elliott]

____ You may count **ONE** of the following classes as an elective for the Environmental Science major. Several of them are opportunities for a W credit.

GEOL 1055 Environmental Ethics, Science, and Public Policy (3) [Fall, Spring, E. Collins]

GEOL 1056 Environmental Ethics, Science, and Public Policy UHC Section (3) [Spring, TBD]

GEOL 1313 **W** - Scientific Communication for Environmental Professionals (3) [Fall, Spring, Collins, Andrews-Brown]

GEOL 1336 **W** – Environmental Issues: Air Quality [Offered Occasionally, Hopey]

GEOL 1338 **W** – Environmental Issues: Water Quality [Offered Occasionally, Hopey]

GEOL 1340 **W** – Environmental Issues: Mining and Gas Drilling Issues [Fall, Hopey]

GEOL 1342 **W** – Environmental Issues: Parks & Forests [Spring, Hopey]

GEOL 1331 Health and Safety (HAZWOPER) (3) [Fall, Kubeldis]

LEGLST 1320 Law and Environment (Useful for understanding the environmental legal framework)

OTHER REQUIREMENTS

You must take at least one W course within your major department. Note: The combination of GEOL 0060 and GEOL 1020 counts as a W course, but will not show up in PeopleSoft. See the list of electives above for other W options in the Geology department. You may get both W's completed within the department

In order to graduate with a B.S. in Environmental Science **you must have a 2.0 grade point average** in your Geology/Environmental Science classes counting towards your major, a 2.0 average for your co requisites and Geology/Environmental Science classes combined, and 2.0 average overall.

CAPSTONE EXPERIENCE

(3 to 6 credits)

Choose one of the following capstone experiences.

You may complete more than one and count others as electives for the major. However, you cannot double count something as both an elective and a capstone experience.

- a) **GEOL 1900 Internship** (3) An internship should focus on the kind of work you are interested in pursuing for a career. It should not involve mere busywork, but should be a substantial training experience that draws upon the skills you learned as an undergraduate and better prepares you for a career after you graduate. Once you find an internship opportunity, get it approved by your advisor.
- b) **GEOL 1903 Undergraduate Research** (3). This class entails at least a semester of work that results in substantial results, as determined by your faculty member overseeing your research, and the production of a final report. To pursue undergraduate research requires you to start working with a faculty member as early as possible in your career. Many start with a trial semester as a lab worker; if you prove diligent and competent in the lab, you should explore the possibility of independent undergraduate research with the relevant faculty member.
- c) **GEOL 1910 Undergraduate Thesis** (3). This class is the culmination of at least two semesters of undergraduate research. You will gather substantial data, become familiar with the relevant academic literature, and write a thesis in the style of a formal academic article that could be submitted for publication. If your GPA is above 3.25, a successful thesis would earn you departmental honors.
- d) **Research Experiences for Undergraduates** (REUs) are funded research projects advertised by researchers around the country. To do an REU, apply to the researchers around the country who are advertising their REU. Once you have completed an REU, hand in a summary of your research results and conclusions to your advisor.
- e) **GEOL 1960 Field Camp** (4-6) [Summer] Although traditional geology field camps require most of the core courses required in the Geology major, there are several hydrology field camps that you can find in this [list of field camps](#)). Sign up for one through the host university, and then [transfer in the credits](#). The Yellowstone Field Camp does not fulfill this requirement.

Words of wisdom: Take your co-requisites as early as possible. First, take calculus early and often because it makes physics easier. Second, take chemistry early as it is a pre-requisite for several core and elective classes. Third, you will need calculus, physics, and chemistry for groundwater. In addition, if chemistry is a prerequisite for a class, you will have an easier time in that class if you take it soon after you take chemistry. Finally, it worth noting that you need GEOL 1445 before you can take geomorphology.

Departmental Honors Requirements: Complete the requirements for *one* of the following three options:

Course Option: Complete the minimum degree requirements, earn an overall QPA of 3.25 or more, and:

1. Satisfactorily complete a total of at least nine additional credits from other formal GEOL courses (excluding the 0800 series) or from any of the following: BIOSC 0370; CHEM 0250, 0260, 0310, 0320, 1410, 1540; MATH 0250; PHYS 0160, 0577, 1150;
2. Include within the requirements listed above a minimum of three credits in either geochemistry (e.g., GEOL 1309, 2500, or 2520) or geophysics (e.g., GEOL 1410, 1446, or 1460).

Research Option: Complete the minimum degree requirements, earn an overall QPA of 3.25 or more, and complete an Undergraduate Thesis (GEOL 1906) under the supervision of a faculty member from the Department of Geology and Planetary Science. This research must culminate in a written thesis that documents original research conducted by the student. Acceptance of the thesis will be contingent upon approval of the faculty supervisor and two additional faculty members. The results of the student's research are to be presented orally in a departmental seminar.

Internship Option: Complete the minimum degree requirements, earn an overall QPA of 3.25 or more, and work as an intern for a professional consulting geologist or firm in the field of geology while under the supervision of a faculty member from the Department of Geology and Planetary Science. A minimum of three credits of Internship (GEOL 1900) will culminate in written and oral reports documenting the project conducted by the student. Acceptance will be contingent upon approval of the faculty supervisor and two additional faculty members.

Let your advisor know if you are seeking Departmental Honors!

Example Luxury Schedule: You picked the environmental science major early.

Fall, First Year	Spring, First Year
GEOL 0800, 0820, or 0860 (3 cr)	CHEM 0110: Chemistry 1
GEOL 0055: Geology Laboratory (2 cr)	GEOL 0055 if necessary
MATH 0220: Calculus I	PHYS 0174 Physics for Science and Engineering I
Fall, Second Year	Spring, Second Year
GEOL 1445: GIS, GPS, and Computer Systems	GEOL 1030: Oceans, Atmosphere, and Climate
GEOL 1515: Environmental Geochemistry	GEOL 1051: Groundwater Geology
Choice of Co-requisite class	Choice of Co-requisite class
Fall, Third Year	Spring, Third Year
GEOL 1904: Ecosystem Ecology	GEOL 1060: Geomorphology
Choice of Co-requisite class	Geology or other Environmental Science Elective
Find a summer field camp, internship, or REU!	GEOL 1015 Geology Colloquium
Geology or other Environmental Science Elective	
Fall, Fourth Year	Spring, Fourth Year
Geology or other Environmental Science Elective	

GIS Certificate

Environmental Science majors may be interested in completing the GIS certificate which requires several courses which are already core courses or electives for the Environmental Science major. The certificate requires 18 credits of coursework including GEOL 1445 and GEOL 1460, 6 credits of electives (many of the required courses for the Environmental Science major count), and 4 credits of GEOL 1901 Independent Study (a GIS or remote sensing project). More information on the Geographic Information Systems Certificate and possible electives can be found [here](#).

Recommended courses beyond the Department of Geology and Environmental Sciences:

The following are of particular interest to those wishing to become professional geologists or environmental consultants. They are not electives. Environmental science majors should have the appropriate background for these courses depending on which co-requisites you chose to take, but you should expect to work hard.

Civil and Environmental Engineering:

Engineers often run environmental companies, so being able to talk their language will help you do your job and achieve greater success. There are several courses in civil and environmental engineering which would be relevant to careers in Environmental Science. However, many CEE courses require that you are enrolled in a program in the Swanson School of Engineering (or have obtained permission of the instructor). Click [here](#) for the CEE course descriptions.

The Department of Civil and Environmental Engineering offers a Minor in Environmental Engineering to B.S. degree students in other engineering or science departments of the University of Pittsburgh. Information on the Minor in Environmental Engineering can be found [here](#). The Minor requires the completion of a minimum of 15 credits of course work in the environmental area. However, some of the required courses may also satisfy a requirement for the Major. The minor requires the following courses:

- CEE 1412 Hydrology and Water Resources (prerequisite: CEE 1402 Fluid Mechanics)
- CEE 1503 Introduction to Environmental Engineering (prerequisite: General Chemistry 1 & 2)
- CEE 1513 Environmental Engineering Processes (prerequisite CEE 1503)
- CEE 1505 Drinking Water Treatment and Distribution System Design **OR**
 - CEE 1515 Wastewater Collection Pumping and Treatment (prerequisite CEE 1503)
- CEE 1514 Environmental Impact Assessment (prerequisite CEE 1503)

Other CEE courses of interest include (**Pay attention to pre-req's**)

- CEE 1209 Life Cycle Assessment Methods & Tools (3)
- CEE 1610 Engineering and Sustainable Development. (3)
- CEE 1522 Fate and Transport in Environ. Engineering (3)
- CEE 1616 Design for the Environment (3)
- CEE 1811 Principles of Soil Mechanics

Sustainability Certificate

The Mascaro Center for Sustainable Innovation offers a Sustainability Certificate which applies concepts from engineering, natural sciences, social sciences and humanities to sustainable systems, engineering practices, and society. The Certificate requires two core courses across both the DSAS and SSOE tracks:

- ENGR 1905 Introduction to Sustainability (3)
- MCSI 1910 Sustainability Capstone Experience (3).

In addition, students must take either GEOL 1030 (DSAS track) **OR** CEE 1610 (SSOE track) and three electives (only one of which may be in the student's home department). Information on the Sustainability Certificate and possible electives can be found [here](#).

Carnegie-Mellon University:

Pitt students are allowed to take one class per semester from Carnegie-Mellon without paying extra tuition. Majors with strong interests in geochemistry or environmental engineering should check out the offerings at CMU's [Department of Civil and Environmental Engineering](#). While Pitt's chemistry department has a strong focus on research and industrial application, but CMU's chemistry department has a strong focus on environmental geochemistry and policy. **You will need to investigate whether you have the background for any particular class**, and you should probably consider signing up for these classes only if you have a B or B+ average in at least your chemistry classes.

Check out the [list of classes](#) available at the undergraduate and graduate level. If you've had CHEM 0110, CHEM 0120, CHEM 0250, and CHEM 0260, you should find *12-720 Water Resources Chemistry* to be rewarding. If you've had organic chemistry (CHEM 0310), you might find *12-725 Physicochemical Processes and Organic Compounds in Aquatic Systems* to be interesting.