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

CORE COURSES (check each as completed): (27 credits)

*Take each of the following:*

___ GEOL 0840 Environmental Science (3)
(Other introductory Geology classes may be approved by advisor with additional biology coursework)

___ 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, Spring, Werne, staff]

___ GEOL 1051 Groundwater Geology (4) [Spring, Thomas]

**OR GEOL 1050 Surface Water Hydrology [Fall, Thomas]**

(may substitute CEE 1412 Hydrology and Water Resources)

___ GEOL 1060 Geomorphology (4) [Spring, Bain] **OR GEOL 1062 Geomorphology [Alternate Years, Fall, Shelef]**

___ GEOL 1445 GIS, GPS, and Computer Methods for Earth Scientists (3) [Fall, Harbert]

(may substitute an equivalent GIS course such as URBNST 1104 or 1102)

___ GEOL 1515 Environmental Geochemistry (3) [Spring, Whittinghill]

___ GEOL 1641 Ecosystem Ecology (4) [Fall, Elliott] (may substitute BIOSC 0370 Ecology AND BIOSC 0390 Lab)

CO-REQUIREMENTS (check each as completed): (24 credits)

___ MATH 0220 Analytical Geometry and Calculus 1 (4)

___ CHEM 0110 General Chemistry 1 (4) (may substitute CHEM 0960)

___ 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) (may substitute CHEM 0970)

___ PHYS 0175 Basic Physics for Science and Engineering 2 (4) **OR PHYS 0111: Introduction to Physics 2 (3)**

___ BIOSC 0150 Biology I (3) AND BIOSC 005X Biology Lab (1)

___ BIOSC 0160 Biology II (3) AND BIOSC 006X Biology Lab (1)

___ STAT 0100 Applied Statistical Methods (4) **OR Equivalent Statistics course with advisor approval (A statistics course is STRONGLY RECOMMENDED)**

ELECTIVES (check each as completed): (9 credits)

*Take at least 9 credits of upper division or graduate level courses related to Environmental Science.*

___ GEOL 0060 History of the Earth (4) [Spring, Jones]

___ GEOL 1001 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 1410 Exploration Geophysics (3) [Alternate years, Spring, Harbert]

___ GEOL 1446 Advanced Geographic Information Systems (3) [Spring, Harbert]

___ GEOL 1460 Introduction to Remote Sensing (3) [Fall, Ramsey]

___ GEOL 1510 Aquatic/Sedimentary Geochemistry (3) [Alternate years, Spring, Werne]

___ GEOL 1701 Geology of the Planets (3) [Offered Occasionally]

___ CEE 1503 Introduction to Environmental Engineering (3)

___ CHEM 0250 Introductory Analytical Chemistry (3) **AND CHEM 0260 Introductory Analytical Lab (1)**

___ 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. Most courses taught at the Pymatuning Ecology Lab count as electives for the major.
You may count no more than **TWO** of the following classes as an elective for the Environmental Science major. Several of them are opportunities for a **W** credit in the major.

**GEOL 1045** Statistics for Earth Science (3) [Alternate Years, Spring, Whittinghill]
**GEOL 1055** Environmental Ethics, Science, and Public Policy (3) [Fall, Spring, E. Collins]
**GEOL 1310** W Communication in the Geosciences (3) [Offered occasionally, Jones, Whittinghill]
**GEOL 1312** Environmental Law and Policy [Spring, Nixon]
**GEOL 1313** W Scientific Communication for Environmental Professionals (3) [Fall, Spring, Andrews-Brown]
**GEOL 1331** Health and Safety (HAZWOPER) (3) [Fall, Kubeldis]
**GEOL 1333** Sustainability (3) [Fall, Spring, Allebach]
**GEOL 1336** W Environmental Issues: Air Quality [Alternate years, Hopey]
**GEOL 1338** W Environmental Issues: Water Quality [Alternate years, Hopey]
**GEOL 1340** W Environmental Issues: Mining and Gas Drilling Issues [Alternate years, Fall, Hopey]
**GEOL 1342** W Environmental Issues: Parks & Forests [Alternate years, Spring, Hopey]
**PS 1542** Global Environmental Politics
**LEGLST 1320** Law and Environment (Useful for understanding the environmental legal framework)

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

**GEOL 2054** Soils: Geobiochemical Landscapes [Offered occasionally, Bain]
**GEOL 2460** Applied Remote Sensing and GPS Techniques [Offered occasionally, Ramsey]
**GEOL 2520** Isotope Geochemistry [Offered occasionally, Stewart]
**GEOL 2525** Stable Isotopes [Offered occasionally, Elliott]
**GEOL 2640** Advanced Geohazards and Risk Management [Offered occasionally, Ramsey]
**GEOL 2853** Watershed Hydrology and Biogeochemistry [Offered occasionally, Elliott]

### 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.

**Please see your advisor for help about choosing the best capstone experience to prepare you for your career goals.**

**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. Before starting an internship, you should meet with the department’s internship coordinator (Dr. Danielle Andrews-Brown). Equivalent internship courses in other departments may be taken with advisor approval.

**b) GEOL 1903 Undergraduate Research** (3). This class entails at least a semester of work that results in substantial results, as determined by the 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. To find work in a lab, contact the professor in who’s research you are interested. Equivalent research courses in other departments may be taken with advisor approval.

**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. Equivalent thesis courses in other departments may be taken with advisor approval.

**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. This usually comes in the form of the presentation or poster that you complete as part of the summer REU.

**e) GEOL 1960 Field Camp** (4-6 credits) [Summer] Although traditional geology field camps require most of the core courses required in the Geology major, there are several hydrology or environmental geology 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. To satisfy the field camp capstone, a field course must include opportunity for independent work with field data. Therefore, courses such as the Yellowstone Field Study do not fulfill this requirement, but the Spring Creek Wyoming Field Studies in Ecology and Paleontology does. Pymatuning Ecology Lab courses other than BIOSCI 0370 can be used toward the 4-6 credits of field study if they are not used as electives. Check with your advisor if you are not sure whether a course will count towards a capstone.
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.

Words of wisdom: Take your co-requisites as early as possible. First, take calculus and physics early because they are prerequisites for hydrology courses. Second, take chemistry early as it is a pre-requisite for several core and elective classes. 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 GEOL 1445 is best taken before geomorphology.

Take GEOL 0055 as early as possible. Since GEOL 0055: Geology Laboratory is a prerequisite for many upper level courses for the major, take it in your first semester as a major if possible. Other classes you can take before you take GEOL 0055, or concurrent with GEOL 0055 include GEOL 0840 (or other 800 level GEOL classes), GEOL 1445, GEOL 1030, and some of the upper level electives in the department.

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

<table>
<thead>
<tr>
<th>Fall, First Year</th>
<th>Spring, First Year</th>
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<tbody>
<tr>
<td>GEOL 0840 Introduction to Environmental Science</td>
<td>CHEM 0110: Chemistry 1</td>
</tr>
<tr>
<td>GEOL 0055: Geology Laboratory</td>
<td>GEOL 0055 if necessary</td>
</tr>
<tr>
<td>MATH 0220: Calculus I</td>
<td>PHYS 0174 Physics for Science and Engineering I</td>
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<table>
<thead>
<tr>
<th>Fall, Second Year</th>
<th>Spring, Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 1445: GIS, GPS, and Computer Systems</td>
<td>GEOL 1030: Oceans, Atmosphere, and Climate</td>
</tr>
<tr>
<td>GEOL 1515: Environmental Geochemistry</td>
<td>GEOL 1051: Groundwater Geology</td>
</tr>
<tr>
<td>Choice of Co-requisite class</td>
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</tbody>
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<tr>
<th>Fall, Third Year</th>
<th>Spring, Third Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 1641: Ecosystem Ecology</td>
<td>GEOL 1060: Geomorphology</td>
</tr>
<tr>
<td>Choice of Co-requisite class</td>
<td>Geology or other Environmental Science Elective</td>
</tr>
<tr>
<td>Geology or other Environmental Science Elective</td>
<td>GEOL 1015 Geology Colloquium</td>
</tr>
<tr>
<td>Find a summer field camp, internship, or REU!</td>
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<tr>
<th>Fall, Fourth Year</th>
<th>Spring, Fourth Year</th>
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<tbody>
<tr>
<td>Geology or other Environmental Science Elective</td>
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</table>

Example Compressed Schedule: You switched to the environmental science major late, but have already had at least one semester of Calculus, Chemistry, and Bio or Physics and have completed most of your general education requirements.

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td>GEOL 0840 Introduction to Environmental Science</td>
<td>GEOL 0055 if necessary</td>
</tr>
<tr>
<td>GEOL 0055: Geology Laboratory</td>
<td>GEOL 1030: Oceans, Atmosphere, and Climate</td>
</tr>
<tr>
<td>PHYS 0174 or another Co-requisite</td>
<td>GEOL 1515: Environmental Geochemistry</td>
</tr>
<tr>
<td>GEOL 1445: GIS, GPS, and Computer Systems</td>
<td>Choice of Co-requisite class</td>
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<td>GEOL 1051 or Environmental Science Elective</td>
</tr>
<tr>
<td>Environmental Science W class</td>
<td>GEOL 1015 Geology Colloquium</td>
</tr>
<tr>
<td>GEOL 1050 or Environmental Science Elective</td>
<td>Environmental Science Elective</td>
</tr>
<tr>
<td>Find a summer field camp, internship, or REU!</td>
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</tbody>
</table>
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 1910) under the supervision of a faculty member from the Department of Geology and Environmental 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 firm in the field of environmental science while under the supervision of a faculty member from the Department of Geology and Environmental 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. NOTE: This internship must be completed in addition to your capstone (i.e. be a second internship or in addition to completing undergraduate research).

Let your advisor know if you are seeking Departmental Honors!

**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.

**Sustainability Certificate**
The Mascaro Center for Sustainable Innovation offers a Sustainability Certificate 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.

**Civil and Environmental Engineering Minor:**
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 four core courses:
- CEE 1412 Hydrology and Water Resources
- CEE 1503 Introduction to Environmental Engineering (prerequisite: General Chemistry 1 & 2)
- CEE 1513 Environmental Engineering Processes (prerequisite CEE 1503)
- CEE 1514 Environmental Impact Assessment (prerequisite CEE 1503)
and one of the following electives:
- CEE 1505 Water Treatment and Distribution System Design
- CEE 1515 Wastewater Collection Pumping and Treatment (prerequisite CEE 1503)
- CEE 1609 Life Cycle Assessment Methods & Tools
- CEE 1610 Engineering and Sustainable Development
- CEE 1618 Design for the Environment