ENVIRONMENTAL SCIENCE, B.S.

Program Description
The B.S. in Environmental Science (ENVSC) employs the principles, processes, and methodologies of the life and physical sciences to develop an integrated understanding of the environment and the effects associated with human use of the Earth's natural resources. Students will work in interdisciplinary teams in a capstone course and in environmental research/internship projects attuned to Great Lakes, water resources, and energy resources issues. Students choosing the Environmental Field Science option will obtain additional strengths in field biology, geographic information systems, and environmental geoscience and field methods. Those choosing the Environmental Lab Science option will obtain additional strengths in analytical chemistry and environmental geochemistry. The curriculum permits additional specialization in allied areas through completion of minors in chemistry, biology, or statistics.

What is Environmental Science?
Environmental science is an interdisciplinary field, meaning that it combines multiple academic studies. Environmental science draws from geology, geography, biology, chemistry, oceanography, limnology, atmospheric science, energy, and many other physical sciences. It also involves non-science areas such as engineering, law, political science, resource management, and environmental education. Study of environmental science prepares students to understand and solve problems at the human-earth interface. Environmental scientists understand environmental processes, analyze and solve environmental problems, and communicate the beneficial and adverse outcomes associated with human use of the Earth's physical and living resources.

You Might Like This Program If...
- You think bugs are beautiful, mud is marvelous, and rocks rock.
- You are interested in examining global environmental issues from multiple perspectives.
- You might like working with environmental data sets to understand how the physical world works.
- You are curious about how the environment affects humans—and about how humans affect their environment, for better and for worse.
- You enjoy theoretical study, hands-on laboratory learning using high-tech equipment, and in-the-dirt outdoor field work.

Entrance to Major
In order to be eligible for entrance to this major, a student must:
1. attain at least a C (2.00) cumulative grade-point average for all courses taken at the University; and
2. have third-semester classification (http://www.registrar.psu.edu/registration/semester_classification.cfm).

Degree Requirements
For the Bachelor of Science degree in Environmental Science, a minimum of 121 credits is required, with at least 15 credits at the 400 level:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Electives</td>
<td>0-1</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>102-103</td>
</tr>
</tbody>
</table>

General Education
Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)
- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Knowledge Domains
- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)
- Inter-Domain or Approved Linked Courses: 6 credits

27 of these 45 credits are included in the Requirements for the Major.

University Degree Requirements
First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements
• United States Cultures: 3 credits
• International Cultures: 3 credits

Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major
This includes 27 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 6 credits of GS courses; 3 credits of GH courses; 3 credits of GWS courses.

Each student must earn at least a grade of C in each 300- and 400-level courses; 3 credits of GWS courses.

To graduate, a student enrolled in the major must earn at least a 2.00 grade-point average for all courses completed within their degree program.

Requirements for the Option
Select an Option
Requirements for the Option
Select an Option
Requirements for the Option
Select an Option
Program Learning Objectives

The learning objectives of the Environmental Science program are to produce graduates who:

1. are proficient in the communication of results of field, lab, or literature based research in both oral and written formats, in both solo and team settings.

2. can demonstrate possession of the science skills and quantitative competency necessary to understand, interpret, and analyze data from across the interdisciplinary environmental science spectrum.

3. have proficiency in major concepts and methods in environmental science that are typically required of entry-level scientists in the workforce.

4. have demonstrated undergraduate-level research skills; project and experimental design skills.

5. can demonstrate skills in field/lab data collection, analysis, and synthesis; in utilizing the inter-disciplinary research literature to analyze and synthesize issues in environmental science; and in undergraduate-level grant-writing.

6. can demonstrate possession and application of higher-level learning skills in critical thinking and problem-solving as applied to environmental science.

Academic Advising

The objectives of the university’s academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee’s unit of enrollment will provide each advisee with a primary academic adviser, the information need to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy)

Erie

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Suggested Academic Plan

Environmental Field Science Option at Erie Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>GEOSC 451</td>
<td>Natural Resources: Origins, Economics and Environmental Impact or GEOSC 454</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following: 3

- CHEM 301 Environmental Chemistry and Analysis
- EGEE 101 Energy and the Environment
- EGEE 102 Energy Conservation for Environmental Protection
- STS 420 Energy and Modern Society

Select 3 credits of the following: 3

- Any Biology 400-level field/lab course (requires a grade of C or better)
- GEOSC 412 Water Resources Geochemistry
- GEOSC 418 Soil Environmental Chemistry

Supporting Courses and Related Areas 1

Select 12 credits from the Natural & Physical Sciences and/or the Social Sciences, Arts & Humanities program lists with not more than 6 credits from the latter list 2 12

1. A maximum of 9 credits of Thesis Research (GEOSC 494M), GEOSC 495, or GEOSC 496 may be applied toward credits for graduation in all options.

2. Students may apply 6 credits of basic ROTC.
## Environmental Science, B.S.

### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
<th>Spring Courses</th>
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<tbody>
<tr>
<td>Fall</td>
<td></td>
<td>BIOL 110S*</td>
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<td></td>
<td>CHEM 110†</td>
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<td>CHEM 111</td>
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<td></td>
<td>ENGL 15 or 30†</td>
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<td></td>
<td>Course Selection (N and PS List) or Course Selection (SSA and H List)†</td>
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### Second Year

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<tr>
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<td>GEOG 10 (or GEOSC 1 or GEOSC 20 or EARTH 2)*</td>
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<td></td>
<td>BIOL 220W*</td>
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<td>MATH 141†</td>
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### Third Year

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<tr>
<td>Fall</td>
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<td>PHYS 211 or 250*</td>
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<td></td>
<td>GEOSC 303*</td>
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<td></td>
<td>CHEM 301 or STS 420 (or EGEE 101 (MATSE 101) or EGEE 102)*</td>
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<td>Course Selection (N and PS List) or Course Selection (SSA and H List)†</td>
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### Fourth Year

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<th>Spring Courses</th>
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<td>Fall</td>
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<td>BIOL/CHEM/GEOSC/ENVSC 494 or 495†</td>
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<td>BIOL 435†</td>
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<td>GEOSC 412 (GEOSC 418 (SOIL 419) or 400-level BIOL Course)†</td>
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<td>GEOSC 452†</td>
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<td>Course Selection (N and PS List) or Course Selection (SSA and H List)†</td>
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<td>Total</td>
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</table>

**Total Credits 121-122**

* Course requires a grade of C or better for the major
† Course requires a grade of C or better for General Education

### Program Notes

1.) Students who have not met the admission requirement of two units of a high school world language must complete a college level-one world language within their first 60 credits.

2.) Not all courses will be offered every year at Penn State Behrend, but a sufficient number of courses will be offered that will allow students to complete their chosen option.

3.) ENVSC 400W is the capstone course and is to be team-taught by 2-3 faculty members.

### University Requirements and General Education Notes:

- **US and IL** are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).
- **W, M, X, and Y** are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.
- **GWS, GQ, GHW, GN, GA, GH, and GS** are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

### Natural & Physical Sciences List (N and PS)

- BIOL 200-level or higher
- CHEM 200-level or higher
- CMPSC 100-level or higher
- EARTH 100, EARTH 103, EARTH 105, EARTH 111, EARTH 202, EARTH 204
- EGEE 100-level or higher
- ENVE 300-level or higher
- ENVSC 494, ENVSC 495
- ENVSE 400-level
- ENVST 200, ENVST 299
- GEOG 313, GEOG 362, GEOG 430, GEOG 431, GEOG 432, GEOG 463, GEOG 469
- GEOSC 1, GEOSC 40, GEOSC 71, GEOSC 200-level or higher
- GEOSC 497A
- MATH 200-level or higher
- MICR 200-level or higher
- SOILS 101 or higher
- STAT 300-level or higher
- STS 201, STS 420
- WFS 400-level or higher

### Social Sciences, Arts & Humanities List (SSA and H)

- COMM 160, COMM 315, COMM 409
- ECON 428
- ENGL 180, ENGL 424
- ENVST 100
- GEOL 30, GEOL 126
- LARCH 60
- PHIL 403
PLSC 2, PLSC 14, PLSC 22, PLSC 135, PLSC 299, PLSC 419, PLSC 482, PLSC 487, PLSC 489, PLSC 499
PSYCH 301W
STS 245
Any 1, 2, 3 World Language

Environmental Lab Science Option at Erie Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
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<tbody>
<tr>
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<td>BIOL 220 Substituted</td>
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<tr>
<td>CHEM 110 Substituted</td>
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<td>ENGL 15 or 30 Substituted</td>
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<td>MATH 140 Substituted</td>
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<td>3 General Education Course (GH Selection) Substituted</td>
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<td>PSU 7</td>
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Second Year

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<td>CHEM 202 Substituted</td>
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<td>MATH 141 Substituted</td>
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<td>CAS 100 Substituted</td>
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<td>GEOG 160 Substituted</td>
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<td>3 General Education Course (GA Selection) Substituted</td>
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<td>GEOG 161 Substituted</td>
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Third Year

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<td>PHIL 103 or 119 (or PHIL 132 or STS 245)</td>
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<td>BIOL 402 Substituted</td>
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<td>CHEM 227 Substituted</td>
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<td>PHYS 212 or 251 Substituted</td>
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<tr>
<td>Course Selection (N and PS List) Substituted</td>
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<td>3 General Education Course (GHW) Substituted</td>
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Fourth Year

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<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>BIOL/CHEM/GEOSC/ENVSC 494 or 495 Substituted</td>
<td></td>
<td>ENVSC 400W Substituted</td>
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<tr>
<td>CHEM 301 Substituted</td>
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<td>GEOSC 451 or 452 (or STS 420) Substituted</td>
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| Course Selection (N and PS List) Substituted | | 3 General Education Course (GHW) Substituted |         |

|                       | 3 GEOSC 30N or 126 (or ECON 102 or ECON 104) Substituted | 3 | 15 |
|                       | 3 Course Selection (N and PS List) Substituted | 3 | 13.5 |
| 150-level Science Course Selection (N and PS List) Substituted | | 3 General Education Course (GHW) Substituted |         |

Total Credits 121-122

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

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EGEE 100-level or higher
ENVE 300-level or higher
ENVSC 494, ENVSC 495
ENVSE 400-level
ENVS 200, ENVST 299
GEOG 313, GEOG 362, GEOG 430, GEOG 431, GEOG 432, GEOG 463, GEOG 469
GEOSC 1, GEOSC 40, GEOSC 71, GEOSC 200-level or higher
GEOSC 497A
MATH 200-level or higher
MICRB 200-level or higher
SOILS 101 or higher
STAT 300-level or higher
Environmental Science, B.S.

STS 201,STS 420
WFS 400-level or higher

Social Sciences, Arts & Humanities List (SSA and H)
COMM 160, COMM 315, COMM 409
ECON 428
ENGL 180, ENGL 424
ENVST 100
GEOG 30, GEOG 126
LARCH 60
PHIL 403
PLSC 2, PLSC 14, PLSC 22, PLSC 135, PLSC 299, PLSC 419,
PLSC 482, PLSC 487, PLSC 489, PLSC 499
PSYCH 301W
STS 245
Any 1, 2, 3 World Language

Career Paths
The study of environmental science leads to a wide variety of careers. Penn State Behrend offers two options to help you tailor your degree to your interests. The Environmental Field Studies Option has a concentration in field biology, geographic information systems, and environmental geoscience, while the Environmental Lab Science Option emphasizes analytical chemistry and geochemistry. Penn State Behrend has a comprehensive support system to help you identify and achieve your goals for college and beyond. Meet with your academic adviser often and take advantage of the services offered by the Academic and Career Planning Center beginning in your first semester.

Careers
State and federal agencies, nonprofits, and corporations are looking for environmental scientists. The U.S. Bureau of Labor Statistics predicts that over the next twenty years the number of jobs for environmental scientists will grow faster than the average for all occupations. This increase will be driven by population growth and the concurrent need for water, energy, and mineral resources. A recent survey of undergraduate institutions showed that environmental science students typically are prepared for careers in many parts of the economy, including government agencies; nonprofit, advocacy, and nongovernmental organizations; consulting; education; industry; and resource management and conservation.

MORE INFORMATION (http://behrend.psu.edu/school-of-science/academic-programs/environmental-science)

Opportunities for Graduate Studies
A graduate degree allows you to take your environmental science education in a targeted direction. Advanced-degree disciplines commonly pursued by environmental science majors include environmental engineering, resource management, environmental science and policy, public health, atmospheric science, oceanography, and sustainability.

MORE INFORMATION (http://behrend.psu.edu/school-of-science/academic-programs/environmental-science)

Professional Resources
- Association for Environmental Studies and Sciences (https://aessonline.org)
- National Association of Environmental Professionals (http://www.naep.org)
- Geological Society of America (https://www.geosociety.org)
- American Geophysical Union (http://agu.org)
- Association of Environmental and Engineering Geologists (http://aegweb.org)
- Soil and Water Conservation Society (http://www.swcs.org)
- American Association of Geographers (http://www.aag.org)

Contact
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behrend-science@psu.edu
http://behrend.psu.edu/school-of-science