Environmental Geoscience, B.A.

Degree Offered

- Bachelor of Arts

Nature of the Program

The B.A. in environmental geoscience is a joint program in the Department of Geology and Geography for students interested in geological and geographical approaches to environmental issues. Emphasis is placed on the physical, human, and spatial aspects of earth and its environment. The broad and interdisciplinary nature of the degree program is designed to produce geoscientists who can identify environmental problems, apply a variety of approaches to their remediation, and be conversant among the wide range of disciplines for which the environment is of special concern.

The course requirements for the degree reflect the diversity of environmental problems that we face today from the atmosphere (air pollution), to the hydrosphere (water pollution), to the lithosphere (ground pollution), and how these problems affect our quality of life. The courses required for the degree also reflect the increased demands placed upon modern environmental scientists that include being able to recognize and understand the sources and impacts of various pollutants within the physical environment, being able to compile and analyze environmental data, understanding the regulatory aspects of environmental protection, and being able to effectively communicate issues of importance with other environmental scientists and with the general public.

Graduates of this program will find employment in a wide array of fields including the assessment and remediation of environmental problems, land-use planning, geographic information systems, involvement in the legislative process by which laws are formulated to protect the environment, the application of such laws as part of a federal or state regulatory agency, or as a member of the journalistic community using the various methods of mass communication to increase the public awareness of situations that adversely affect the environment.

Students who earn a degree in the Eberly College of Arts and Sciences must complete the University requirements, the College requirements for their specific degree program, and their major requirements.

Minors

All students have the possibility of earning one or more minors; please check the list of all available minors and their requirements (http://catalog.wvu.edu/undergraduate/minors/). Please note that students may not earn a minor in their major field.

FACULTY

CHAIR

- Brent McCusker - Ph.D. (Michigan State University)

ASSOCIATE CHAIR

- Jaime Toro - Ph.D. (Stanford University)

PROFESSORS

- Kathleen Benison - Ph.D. (The University of Kansas)
  Regular Graduate Faculty, Sedimentary Geology - Planetary Geology
- Dengliang Gao - Ph.D. (Duke University)
  Regular Graduate Faculty, Exploration Geophysics, Petroleum and Structural Geology
- Amy Hessl - Ph.D. (University of Arizona)
  Regular Graduate Faculty, Biogeography, Forest Ecosystems, Climate Variability
- Brent McCusker - Ph.D. (Michigan State University)
  Regular Graduate Faculty, Land Use Change, Africa, Policy Making
- Shikha Sharma - Ph.D. (University of Lucknow)
  Regular Graduate Faculty, Isotope Geochemistry
- Jaime Toro - Ph.D. (Stanford University)
  Regular Graduate Faculty, Structure and Tectonics
- Dorothy Vesper - Ph.D. (Pennsylvania State University)
  Regular Graduate Faculty, Aqueous Geochemistry, Hydrogeology

ASSOCIATE PROFESSOR

- Jamison Conley - Ph.D. (Pennsylvania State University)
  Regular Graduate Faculty, Spatial Analysis, Geocomputation, Health Geography
- Karen Culcasi - Ph.D. (Syracuse University)

Regular Graduate Faculty, Geopolitics, Identity, Middle East

- Cynthia Gorman - Ph.D. (Rutgers University)
  Regular Graduate Faculty, Gender, Migration, Human Rights, Refugee Communities
- James Lamsdell - Ph.D. (The University of Kansas)
  Regular Graduate Faculty, Paleobiology, Arthropods, Macroevolution, Heterochrony, Paleoecology, Phylogenetics
- Joseph Lebold - Ph.D. (West Virginia University)
  Regular Graduate Faculty, Paleoecology, Paleontology, Regional Geology
- Brenden McNeil - Ph.D. (Syracuse University)
  Regular Graduate Faculty, GIS, Environmental modeling, Forest Ecosystem Services
- Maria Alejandra Perez - Ph.D. (University of Michigan)
  Regular Graduate Faculty, Cultural Geography, Science & Technology Studies, Speleology, Latin America and the Caribbean
- Amy Weislogel - Ph.D. (Stanford University)
  Regular Graduate Faculty, Sedimentology
- Bradley Wilson - Ph.D. (Rutgers University)
  Regular Graduate Faculty, Social Movements, Local/Global Food Systems, Food Justice

ASSISTANT PROFESSOR

- Vikas Agrawal - Ph.D. (West Virginia University)
  Associate Graduate Faculty, Chemical Hygiene Officer, Isotopic and Biogeochemical Characterization of Geological Materials, Energy and Environment
- Michael Harman - Ph.D. (West Virginia University)
  3D visualization, modeling complex landforms and processes, GIS
- Aaron Maxwell - Ph.D. (West Virginia University)
  Regular Graduate Faculty, Geospatial Instruction, Remote Sensing, Image Analysis, Spatial Modeling
- Charles Shobe - Ph.D. (University of Colorado - Boulder)
  Regular Graduate Faculty, Geomorphology, Earth Surface Processes, Landscape Evolution, Rivers, Source-to-Sink, Numerical Modeling

PROFESSOR EMERITI

- Robert Behling - Ph.D. (The Ohio State University)
- Timothy Carr - Ph.D. (University of Wisconsin - Madison)
- Joe Donovan - Ph.D. (Pennsylvania State University)
- Greg Elmes - Ph.D. (Pennsylvania State University)
- Trevor Harris - Ph.D. (University of Hull)
- Thomas Kammer - Ph.D. (Indiana University)
- Steven Kite - Ph.D. (University of Wisconsin)
- Kenneth C. Martis - Ph.D. (Michigan University)
- Henry Rauch - Ph.D. (Pennsylvania State University)
- Robert C. Shumaker - Ph.D. (Cornell University)
- Richard Smosna - Ph.D. (University of Illinois)
- Timothy Warner - Ph.D. (Purdue University)
- Thomas Wilson - Ph.D. (West Virginia University)

Admissions

- First-Time Freshmen are admitted directly into the Environmental Geoscience major.
- Students admitted from other majors within WVU must be in good standing (2.0 overall GPA).
- Students transferring from another institution must be in good academic standing (2.0 overall GPA).

ADMISSION REQUIREMENTS 2024-2025

The Admission Requirements above will be the same for the 2024-2025 Academic Year.

Major Code: 1447

Click here to view the Suggested Plan of Study (p. 6)

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. **(**http://registrar.wvu.edu/gef/**)**

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101	Introduction to Composition and Rhetoric	
& ENGL 102	and Composition, Rhetoric, and Research	
or ENGL 103	Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Students must complete WVU General Education Foundations requirements, College B.A. requirements, major requirements, and electives to total a minimum of 120 hours. For complete details on these requirements, visit the B.A. Degrees tab on the Eberly College of Arts and Sciences (http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/#bachelorofartstext) page.

Departmental Requirements for the B.A. in Environmental Geoscience

All students wishing to obtain a degree in Environmental Geoscience must comply with the following:

- **Capstone Requirement:** The General Education Foundations requires the successful completion of a Capstone course. For Environmental Geosciences majors capstone is completed by GEOL 400 and its co-requisite Research-intensive Geology and Geography course.
- **Writing and Communication Requirement:** Environmental Geoscience Bachelor of Arts students fulfill the Writing and Communication Skills requirement by completing ENGL 101 and ENGL 102 (or ENGL 103), and two additional **SpeakWrite Certified Courses™** that are major requirements: GEOG 205 and GEOG 307.
- **Calculation of the GPA in the Major:** Students must have a 2.0 overall GPA in all courses applied to major requirements. If a course is repeated, all attempts will be included in the calculation of the GPA unless the course is eligible for a D/F repeat.
- **Credit Limit:** No more than 50 credits of Geology (GEOL) and Geography (GEOG) combined can be used for the B.A. if the student has earned 120 credits overall. If a student has more than 50 credits, then those extra credits must be matched by an equal amount of non-GEOL and non-GEOG courses, and more than 120 credits will be required for graduation. For example, if a student has 52 credits in GEOL and GEOG, the student will need 122 credits to graduate (52 G&G, 68 non-G&G). 191 and 491 courses are excluded from the 50-credit count.
- **Benchmarks Expectations**: For details, go to the Environmental Geoscience Degree Progress tab (http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/environmental_geoscience/#degreeprogresstext).

Curriculum Requirements

Code	Title	Hours
University Requirements		50
ECAS B.A. Requirements		12
Departmental Requirements		7

Biology Major Requirements	51
Total Hours	120

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 5, 6, and 7		15
GEOL 191	First-Year Seminar	1
General Electives		34
Total Hours		50

ECAS Bachelor of Arts Requirements

Code	Title	Hours
Fine Arts Requirement		
Foreign Language		12
Global Studies and Diversity Requirement		
Total Hours		12

Departmental Requirements

Code	Title	Hours
Math and Science Requirement:		**7**
Chemistry Requirement:		
CHEM 111 & 111L	Survey of Chemistry 1 and Survey of Chemistry 1 Laboratory	
or CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	
Math Requirement:		
MATH 124	Algebra with Applications	
or MATH 126	College Algebra	
or MATH 128	Plane Trigonometry	
or MATH 129	Pre-Calculus Mathematics	
or MATH 150	Applied Calculus	
or MATH 153	Calculus 1a with Precalculus	
or MATH 155	Calculus 1	
Total Hours		7

Environmental Geoscience Major Requirements

Code	Title	Hours
Core Courses:		**26**
Complete all of the following:		
GEOL 101 & 101L	Planet Earth and Planet Earth Laboratory	
GEOL 103 & 103L	Earth Through Time and Earth Through Time Laboratory	
GEOG 107 & 107L	Global Climate System and Global Climate System Laboratory	
GEOL 200	Geology for Environmental Scientists	
GEOG 205	Climate and Sustainability	
GEOG 307	Biogeography: Theory and Method	
GEOG 350	Geospatial Problem Solving	
Geology (GEOL) and Geography (GEOG) Electives		**9**
Any GEOL and GEOG courses at the 300 or 400 level.		

Electives Non-Geology/Geography		**12**
Select four (4) courses from the following list:		
ARE 382	Agricultural and Natural Resources Law	
ART 380	Art and Environment	
BIOL 302	Biometry	
BIOL 353L	Flora of West Virginia Laboratory	
BIOL 361	Plant Ecology	
BIOL 363	Plant Geography	
BIOL 463	Global Ecology	
ENVP 401	Environmental Microbiology	
ENVP 412	Pest Management	
ENVP 415	Hazardous Waste Training	
ENVP 420	Soil Microbiology	
ENVP 451	Principles of Weed Science	
ESWS 325	Principles of Water Resources	
ESWS 355	Environmental Sampling and Analysis	
ESWS 410	Soil Fertility	
ESWS 417 & 417L	Soil Genesis and Classification and Soil Genesis and Classification Laboratory	
ESWS 460 & 460L	Environmental Impact Assessment and Environmental Impact Assessment Laboratory	
FNRS 433	Forest Management	
FNRS 444	Watershed Management	
FNRS 454	Field Watershed Hydrology	
MATH 318	Perspectives on Mathematics and Science	
PHIL 310	Philosophy of Science	
POLS 338	Environmental Policy	
RESM 445	Spatial Hydrology and Watershed Analysis	
RESM 480	Environmental Regulation	
WMAN 313	Wildlife Ecosystem Ecology	
WMAN 314	Marine Ecology	
WMAN 446	Freshwater Ecology	
UTCH 420	Project-Based Instruction in Mathematics and Science	
Capstone		**4**
Students must complete GEOL 400 and its co-requisite Research-intensive Geology and Geography course		
GEOL 400	Environmental Practicum	
Research-Intensive Geology and Geography Courses:		
GEOG 443	African Environment and Development	
GEOG 454	Environmental Geographic Information Systems	
GEOG 455	Introduction to Remote Sensing	
GEOG 457	Open-Source Spatial Analytics	
GEOG 461	Web GIS	
GEOL 331	Paleontology	
GEOL 365	Environmental Geology	
GEOL 376L	Research Methods Laboratory	
GEOL 411	Deep Time Earth Systems	
GEOL 463	Physical Hydrogeology	
GEOL 472	Sustainable Energy	
GEOL 486	Environmental Isotopes	
Total Hours		51

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
ENGL 101 (GEF 1)	3	Foreign Language 102	3
Foreign Language 101	3	CHEM Requirement (GEF 8)	4
MATH Requirement (GEF 3)	3	GEOG 107 & 107L (GEF 8)	4
GEOL 101 & 101L (GEF 2)	4	GEOL 103 & 103L (GEF 8)	4
GEOL 191 or GEOG 191	1		
General Elective	1		
	15		15

Second Year

Fall	Hours	Spring	Hours
ENGL 102 (GEF 1)	3	ECAS Fine Arts Requirement (GEF 6)	3
Foreign Language 203	3	Foreign Language 204	3
GEOL 200	4	GEOG 350	4
GEOG 205 (GEF 4)	3	GEOL/GEOG Elective 1	3
General Elective	2	General Elective	2
	15		15

Third Year

Fall	Hours	Spring	Hours
GEF 5	3	Non-GEOL/GEOG Elective 1	3
ECAS Global Studies and Diversity Requirement (GEF 7)	3	Non-GEOL/GEOG Elective 2	3
GEOG 307	3	Non-GEOL/GEOG Elective 3	3
GEOL/GEOG Elective 2	3	Non-GEOL/GEOG Elective 4	3
GEOL/GEOG Elective 3	3	General Elective	3
	15		15

Fourth Year

Fall	Hours	Spring	Hours
GEOL 400 (Capstone)	1	General Electives	15
Research-Intensive GEOL/GEOG course	3		
General Electives	11		
	15		15

Total credit hours: 120

Degree Progress

By end of their 4th semester in the major, students should have successfully completed

- 8 hours of introductory GEOL sequences;
- GEOL 200; GEOG 107&107L; MATH 124;
- CHEM 111 or CHEM 115.
- All majors must meet with a G&G department adviser each semester.

Students who do no meet these benchmarks may be removed from their major.

Major Learning Outcomes

ENVIRONMENTAL GEOSCIENCE

Upon successful completion of the B.A. degree, **Environmental Geoscience** majors will be able to:

1. Identify the presence of conditions that create natural environmental problems/hazards.
2. Identify the activities of humans that create environmental problems/hazards.
3. Detail the potential economic and social costs of remediation of natural and anthropogenic environmental problems.

4. Critically access reports, news articles, news reports, and debates and analyze the arguments so they can come to form an opinion on what is being debated.
5. Recognize that sources of information on environmental issues may be biased and that additional opinions must be sought in order to set forth conclusions which have merit.
6. Communicate clearly and effectively in writing and the spoken word about environmental issues to audiences of diverse backgrounds and formal education levels.
7. Demonstrate an understanding of content terminology required to communicate information regarding natural and manmade environmental problems/hazards.

WVUTeach: Earth and Space Science

Code	Title	Hours
ARSC 120	Inquiry Approaches to Teaching	1
ARSC 220	Inquiry-Based Lesson Design	1
GEOL 376L	Research Methods Laboratory	3
MATH 318	Perspectives on Mathematics and Science	3
UTCH 221	Knowing and Learning in Mathematics and Science	3
UTCH 322	Classroom Interactions in Math and Science	3
UTCH 420	Project-Based Instruction in Mathematics and Science	3
UTCH 430	Apprentice Teaching in Math and Science	10
Total Hours		27