EARTH SCIENCE: ENVIRONMENTAL SCIENCE, BA

The Earth Science major provides graduates with a broad understanding of the physical and chemical processes that operate in and on the planet and how direct and indirect methods are used to examine and understand the structure, composition, and dynamics of the Earth. Graduates appreciate how humans and ecosystems interact with the dynamic Earth, and they have an in-depth knowledge of the atmosphere and climate change, the rock cycle, natural hazards, and the hydrologic and biogeochemical cycles. Additionally, they understand how to measure and use the structure, sequence, and properties of rocks, sediments, and fossils to reconstruct events in Earth's history and identify potential natural hazards or earth resources.

The Environmental Science concentration within the Earth Science major integrates geology, biology, chemistry, and physics in an effort to have students undertake a scientific study of the environment and the effects of humans on Earth systems.

The minimum total course units (https://www.college.upenn.edu/credits-needed-major) for graduation in this major is 35. Double majors may entail more course units.

For more information: http://www.sas.upenn.edu/earth/earth-science/environmental-science-concentration

For information about the General Education requirements, please visit the College of Arts & Sciences Curriculum (https://www.college.upenn.edu/curriculum) page.

Code	Title	Course Units
College General Education Requirements and Free Electives		
Foundational Approaches + Sectors[1] + Free Electives		20
Major Requirements		
Core Requirement		
ENVS 100	Introduction to Environmental Science	1
Select one of the following:		1
GEOL 100	Introduction to Geology (if not taken)	
GEOL 103	Natural Disturbances and Human Disasters	
GEOL 125	Earth and Life Through Time	
GEOL 130	Oceanography	
GEOL 204	Global Climate Change	
Math, Physics & Chemistry Requirement		
Select 3 course units of Math, Physics and Chemistry courses with at least one course from two different disciplines.		3
Mathematics:		
MATH 104	Calculus, Part I	
or MATH 114	Calculus, Part II	
or MATH 115	Calculus, Part II with Probability and Matrices	
or STAT 111	Introductory Statistics	
Physics:		
PHYS 101	General Physics: Mechanics, Heat and Sound	
or PHYS 150	Principles of Physics I: Mechanics and Wave Motion	
or PHYS 170	Honors Physics I: Mechanics and Wave Motion	
PHYS 102	General Physics: Electromagnetism, Optics, and Modern Physics	
or PHYS 151	Principles of Physics II: Electromagnetism and Radiation	
or PHYS 171	Honors Physics II: Electromagnetism and Radiation	
GEOL 420	Introduction to Geophysics	
Chemistry:		
CHEM 101 & CHEM 053	General Chemistry I and General Chemistry Laboratory I	
CHEM 102 & CHEM 054	General Chemistry II and General Chemistry Laboratory II	
GEOL 418	Geochemistry	
Earth & Environmental Systems		
Select 5 course units in Earth & Environmental Systems with at least one ENVS, one GEOL course and two at the 300-level or above		5
Living Systems		*5*
BIOL 101	Introduction to Biology A	
BIOL 102	Introduction to Biology B (and AP Credit)	
Or		
BIOL 121	Introduction to Biology - The Molecular Biology of Life (+ AP Credit)	
BIOL 240	Ecology: From individuals to ecosystems	
BIOL Course		
Curriculum Related Practical Experience		
Field Course or Equivalent Experience		
Total Course Units		35

[1] You may count no more than one course toward both a Major and a Sector requirement. For Exceptions, check the Policy Statement (http://www.college.upenn.edu/sectors-policy).

Honors

Applicants must have a 3.25 GPA in the major and complete a Senior Thesis with a B+ or above.

Code	Title	Course Units
Select 2 course units of courses from the approved list on EESC website		2
ENVS 399	Environmental Studies Research Seminar for Juniors	
ENVS 498	Senior Thesis	

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2018 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.