

EARTH AND ENVIRONMENTAL SCIENCE, BA

The Earth and Environmental Science major provides graduates with a broad understanding of the physical, chemical and biological processes that operate in and on the planet and how direct and indirect methods are used to examine, quantify and understand the structure, composition, and dynamics of the Earth's atmosphere, hydrosphere, biosphere and lithosphere. Graduates appreciate how humans and ecosystems interact with the dynamic Earth, and how human activities such as non-sustainable resource extraction have generated climate change, exacerbated natural hazards, and disrupted hydrologic and biogeochemical cycles.

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: <https://earth.sas.upenn.edu/undergraduate/majors/eesc/> (<https://earth.sas.upenn.edu/undergraduate/majors/eesc/>)

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

Curriculum

Code	Title	Course Units
College General Education Requirements and Free Electives		
Foundational Approaches + Sectors + Arts & Sciences CU + Electives		20
Major Requirements		
<i>Gateway Course</i>		
EESC 1000	Earth Systems Science	1
<i>Math and Quantitative Analysis</i>		7
ANTH 5454	Quantitative Analysis of Anthropological Data	
BIOL 2510	Statistics for Biologists	
MATH 1400	Calculus, Part I	
MATH 1410	Calculus, Part II	
MATH 1510	Calculus, Part II with Probability and Matrices	
MATH 2400	Calculus, Part III	
MATH 2410	Calculus, Part IV	
PHYS 1100	Foundations of Data Science	
STAT 1110	Introductory Statistics	
<i>Physics, Chemistry, or Biology</i> Take one course in two out of the three disciplines		3
BIOL 1101	Introduction to Biology A	
BIOL 1102	Introduction to Biology B	
BIOL 1121 & BIOL 1123	Introduction to Biology - The Molecular Biology of Life and Introductory Molecular Biology Laboratory	
CHEM 1011 & CHEM 1101	Introduction to General Chemistry I and General Chemistry Laboratory I	

CHEM 1012 & CHEM 1101	General Chemistry I and General Chemistry Laboratory I
CHEM 1021 & CHEM 1102	Introduction to General Chemistry II and General Chemistry Laboratory II
CHEM 1022 & CHEM 1102	General Chemistry II and General Chemistry Laboratory II
PHYS 0101	General Physics: Mechanics, Heat and Sound
PHYS 0102	General Physics: Electromagnetism, Optics, and Modern Physics
PHYS 0150	Principles of Physics I: Mechanics and Wave Motion
PHYS 0151	Principles of Physics II: Electromagnetism and Radiation
PHYS 0170	Honors Physics I: Mechanics and Wave Motion
PHYS 0171	Honors Physics II: Electromagnetism and Radiation

Core Courses

Experiential Course 1

EESC 3003	Penn in the Alps
EESC 3600	Earth's Surface
ENVS 1615	Urban Environments: Speaking About Lead in West Philadelphia
ENVS 1650	The Role of Water in Urban Sustainability and Resiliency
ENVS 1665	Air Pollution: Sources & Effects in Urban Environments
ENVS 3103	Penn Global Seminar: Case Studies in Environmental Sustainability
ENVS 5404	Wetlands
BIOL 4600	Field Botany
BIOL 4615	Freshwater Ecology

Deep Time 1

ANTH 0030	Human Origins, Evolution and Diversity
BIOL 2410	Evolutionary Biology
EESC 1500	Paleontology
EESC 2500	Earth and Life Through Geologic Time

Climate Science 1

EESC 2300	Global Climate Change
EESC 3300	Glaciers, Ice & Climate
EESC 4336	Ocean-Atmosphere Dynamics and Implications for Future Climate Change

Spatial Analysis 1

ENVS 3700	GIS: Mapping Places & Analyzing Spaces
EESC 4700	Remote Sensing
ENVS 5706	Modeling Geographical Objects
URBS 3300	GIS Applications in Social Science

6 Electives with attribute AERE 6

Total Course Units 35

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Honors
GPA 3.25

Senior Honors Thesis 2

Two semesters of EESC 4997 (grade of B+ or higher) are required for Honors in the Major.

EESC 4997 Senior Thesis

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2023 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.
