

# ENVIRONMENTAL SCIENCES MAJOR

The major in Environmental Sciences has two tracks: one in science (Science Track) and one in economic policy (Policy Track). The tracks share foundation courses in science and math, and the core curriculum. Advanced coursework differs by track.

Students plan their academic paths with an environmental sciences adviser. Many foundation courses are prerequisites for advanced courses and should be completed as soon as possible. Students envisioning graduate training in Environmental Sciences are specifically encouraged to take additional math and the full sequence of either General Physics or 200 level Biological Sciences. Students interested in environmental health and medical professions are advised to take the full 200-level sequence in biological sciences and two additional quarters of organic chemistry.

Students must also complete the Undergraduate Registration Requirement (<https://catalogs.northwestern.edu/undergraduate/requirements-policies/undergraduate-registration-requirement/>) and the degree requirements of their home school.

**NOTE: This Catalog describes Weinberg College BA requirements that pertain to students who matriculated at Northwestern after spring quarter 2023. Refer to the Archives (<https://catalogs.northwestern.edu/archives/>) if you are following BA requirements described in the 2018-2019 through 2022-2023 editions.**

## Major Requirements: Program Courses (11 units)

### 3 Core Environmental Science Courses at the 200-Level

Course	Title
ENVR_SCI 201-0	Earth: A Habitable Planet
ENVR_SCI 202-0	The Health of the Biosphere
ENVR_SCI 203-0	Humans and the Environment

### 8 Advanced Studies Courses

Advanced studies courses differ by the chosen track. **In both the science track and the policy track at least 6 of the required 8 advanced studies courses must be at the 300-level.** See the Advanced Studies Course Lists (p. 2) below for lists of approved courses. See the Environmental Sciences webpage (<https://www.envsci.northwestern.edu/undergraduate-program/major-requirements.html>) for updates to these lists. Students who double-major in economics and environmental sciences are encouraged to do the science track in environmental sciences, and must take extra 300-level economics classes to fulfill the requirements for both majors.

#### Science Track Advanced Studies Course Requirements

- 6 courses from the Science List (p. 2). Up to 2 of these may be replaced with ENVR\_SCI 399-0 research courses.
- 2 courses from the Environment and Society List (p. 2).

#### Policy Track Advanced Studies Course Requirements

- 4 courses from the Science List (p. 2).
- 2 required economics courses: ECON 281-0 and ECON 310-1.
- 1 additional economics course chosen from: ECON 371-0, ECON 372-0, or ECON 373-0.

- 1 course selected from either the Science List (p. 2) or the Environment and Society List (p. 2).

## Major Requirements: Foundations in Science and Math (9.68-12.38 units)

### Required Math and Chemistry Courses

Students should complete all of the following math and chemistry courses in their first two years. Total units depend on math sequence taken. Courses may double-count with another major or minor.

Course	Title
MATH 220-1 or MATH 218-1 & MATH 218-2	Single-Variable Differential Calculus Single-Variable Calculus with Precalculus and Single-Variable Calculus with Precalculus
MATH 220-2 or MATH 218-3	Single-Variable Integral Calculus Single-Variable Calculus with Precalculus
CHEM 131-0 & CHEM 141-0 & CHEM 132-0 & CHEM 142-0	Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I and Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II (Pre-requisite: CHEM 110-0)
or CHEM 151-0 & CHEM 161-0 & CHEM 152-0 & CHEM 162-0	General Chemistry I and General Chemistry Laboratory I and General Chemistry II and General Chemistry Laboratory II
or CHEM 171-0 & CHEM 181-0 & CHEM 172-0 & CHEM 182-0	Advanced General Inorganic Chemistry and Advanced General Inorganic Chemistry Laboratory and Advanced General Physical Chemistry and Advanced General Physical Chemistry Laboratory

### 5 Additional Related Math and Science Courses

Students must take 5 courses (and their associated lab, if applicable) from the following options, with at least 2 from the same group. Required labs do not count toward the 5-course total.

Course	Title
BIOL_SCI 201-0	Molecular Biology
BIOL_SCI 202-0 & BIOL_SCI 232-0	Cell Biology and Molecular and Cellular Processes Laboratory
BIOL_SCI 203-0 & BIOL_SCI 233-0	Genetics and Evolution and Genetics and Molecular Processes Laboratory
CHEM 215-1 & CHEM 235-1	Organic Chemistry I and Organic Chemistry Lab I
CHEM 215-2 & CHEM 235-2	Organic Chemistry II and Organic Chemistry Lab II
ECON 201-0	Introduction to Macroeconomics
ECON 202-0	Introduction to Microeconomics
GEN_ENG 205-1	Engineering Analysis I
MATH 226-0	Sequences and Series
MATH 230-1	Multivariable Differential Calculus
MATH 230-2	Multivariable Integral Calculus
MATH 235-0	Series and Multiple Integrals
MATH 240-0	Linear Algebra (Pre-requisite: MATH 230-1)
MATH 250-0	Elementary Differential Equations (Pre-requisites: MATH 226-0, MATH 230-2 and MATH 240-0)
PHYSICS 135-1 & PHYSICS 136-1	General Physics and General Physics Laboratory

PHYSICS 135-2 & PHYSICS 136-2	General Physics and General Physics Laboratory
PHYSICS 135-3 & PHYSICS 136-3	General Physics and General Physics Laboratory
STAT 202-0 or STAT 210-0	Introduction to Statistics and Data Science Introduction to Probability and Statistics

## Advanced Studies Course Lists

Approved courses for the advanced studies course requirements (p. 1) may be selected from the below Science List (p. 2) and Environment and Society List (p. 2), dependent on track requirements outlined above. Check program webpage for dynamic list of pre-approved courses.

### Science List

Course	Title
ANTHRO 306-0	Evolution of Life Histories
ANTHRO 312-0	Human Population Biology
ANTHRO 359-0	The Human Microbiome and Health
BIOL_SCI 301-0	Principles of Biochemistry
BIOL_SCI 328-0	Microbiology
BIOL_SCI 332-0	Conservation Genetics
BIOL_SCI 333-0	Plant-Animal Interactions <sup>2</sup>
BIOL_SCI 336-0	Spring Flora
BIOL_SCI 337-0	Biostatistics
BIOL_SCI 338-0	Modeling Biological Dynamics
BIOL_SCI 339-0	Critical Topics in Ecology and Conservation
BIOL_SCI 341-0	Population Genetics
BIOL_SCI 342-0	Evolutionary Processes
BIOL_SCI 346-0	Field Ecology
BIOL_SCI 347-0	Conservation Biology
BIOL_SCI 349-0	Community & Population Ecology
BIOL_SCI 350-0	Plant Evolution and Diversity Lab
CHEM 306-0	Environmental Chemistry
CHEM 342-1	Thermodynamics
CHEM 342-2	Quantum Mechanics and Spectroscopy
CHEM 393-0	Green Chemistry
CHEM_ENG 321-0	Fluid Mechanics
CHEM_ENG 345-0	Process Optimization for Energy and Sustainability
CHEM_ENG 365-0	Sustainability, Technology, and Society
CHEM_ENG 367-0	Quantitative Methods in Life Cycle Analysis
CIV_ENV 260-0	Environmental Systems and Processes
CIV_ENV 295-0	Introductory topics in Civil and Environmental Engineering <sup>1</sup>
CIV_ENV 340-0	Hydraulics and Hydrology
CIV_ENV 346-0	Ecohydrology
CIV_ENV 361-1	Environmental Microbiology
CIV_ENV 361-2	Public & Environmental Health
CIV_ENV 364-0	Sustainable Water Systems
CIV_ENV 365-0	Environmental Laboratory
CIV_ENV 367-0	Chemical Processes in Aquatic Systems
CIV_ENV 368-0	Sustainability: The City
CIV_ENV 370-0	Emerging Organic Contaminants
CIV_ENV 371-0	Introduction to Transportation Planning and Analysis
CIV_ENV 376-0	Transportation System Operations
CIV_ENV 387-0	Design of Sustainable Urban Developments
EARTH 201-0	Earth Systems Revealed

EARTH 202-0	Earth's Interior
EARTH 300-0	Earth and Planetary Materials
EARTH 301-0	Petrology: Evolution of Crustal and Mantle Rocks
EARTH 310-0	Aqueous Geochemistry
EARTH 312-0	Stable Isotope Geochemistry
EARTH 313-0	Radiogenic Isotope Geochemistry
EARTH 314-0	Organic Geochemistry
EARTH 330-0	Sedimentary Geology
EARTH 340-0	Physics of Weather & Climate
EARTH 341-0	Quaternary Climate Change: Ice Ages to the Age of Oil
EARTH 342-0	Contemporary Energy and Climate Change
EARTH 343-0	Earth System Modeling
EARTH 353-0	Mathematical Inverse Methods in Earth and Environmental Sciences
EARTH 360-0	Instrumentation and Field Methods
EARTH 361-0	Scientific Programming in Python
EARTH 370-0	Geobiology
EARTH 371-0	Biogeochemistry
EARTH 373-0	Microbial Ecology
EARTH 390-0	Special Topics in Earth and Planetary Science <sup>1</sup>
ENVR_SCI 390-0	Special Topics in Environmental Sciences
ENVR_SCI 399-0	Independent Study
ISEN 210-0	Introduction to Sustainability: Challenges and Solutions
ISEN 220-0	Introduction to Energy Systems for the 21st Century
MECH_ENG 241-0	Fluid Mechanics I
MECH_ENG 367-0	Quantitative Methods in Life Cycle Analysis
MECH_ENG 380-0	Thermal Energy Systems Design
MECH_ENG 395-0	Special Topics in Mechanical Engineering <sup>1</sup>

<sup>1</sup> Approved sections only.

<sup>2</sup> Take as ENVR\_SCI 390-0

### Environment and Society List

Course	Title
ANTHRO 383-0	Environmental Anthropology
CIV_ENV 303-0	Environmental Law and Policy
CIV_ENV 368-0	Sustainability: The City
CIV_ENV 395-0	Special Topics in Civil and Environmental Engr <sup>1</sup>
ECON 281-0	Introduction to Applied Econometrics
ECON 310-1	Microeconomics
ECON 372-0	Environmental Economics
ECON 373-0	Natural Resource Economics
ENVR_POL 211-0	Food and Society: An Introduction
ENVR_POL 212-0	Environment and Society
ENVR_POL 309-0	American Environmental History
ENVR_POL 336-0	The Climate Crisis, Policies, and Society
ENVR_POL 337-0	Hazard, Disaster and Society
ENVR_POL 338-0	Environmental Justice
ENVR_POL 340-0	Global Environments and World History
ENVR_POL 383-0	Environmental Anthropology
ENVR_POL 384-0	Political Ecology
ENVR_POL 390-0	Special Topics in Environmental Policy and Culture
ENVR_POL 395-0	Special Topics Seminar <sup>1</sup>
GBL_HLTH 201-0	Introduction to Global Health
GBL_HLTH 302-0	Global Bioethics
GBL_HLTH 325-0	History of Reproductive Health

GBL_HLTH 390-0	Special Topics in Global Health
HISTORY 200-0	New Introductory Courses in History <sup>1</sup>
HISTORY 251-0	The Politics of Disaster: A Global Environmental History
HISTORY 300-0	New Lectures in History <sup>1</sup>
HISTORY 309-0	American Environmental History
HISTORY 376-0	Global Environments and World History
INTL_ST 393-0	Development in the Global Context: Participation, Power, and Social Change
ISEN 230-0	Climate Change and Sustainability: Ethical Dimensions
ISEN 390-0	Special Topics in Energy and Sustainability
PHIL 254-0	Introduction to Philosophy of the Natural Sciences
PHIL 262-0	Ethical Problems and Public Issues
PHIL 268-0	Ethics and the Environment
PHIL 269-0	Bioethics
PHIL 275-0	Climate Change and Sustainability: Ethical Dimensions
POLI_SCI 329-0	U.S. Environmental Politics
POLI_SCI 349-0	International Environmental Politics
SOCIOI 212-0	Environment and Society
SOCIOI 276-0	Introductory Topics in Sociology <sup>1</sup>
SOCIOI 301-0	The City: Urbanization and Urbanism
SOCIOI 305-0	Population Dynamics

<sup>1</sup> Approved sections only.

## Honors in Environmental Sciences

Students with strong academic records and an interest in pursuing honors should approach a faculty member by the end of junior year to discuss possible projects; these may involve field, experimental, or computational research. Research is completed during a minimum 2 quarters of ENVR\_SCI 399-0 Independent Study with their faculty research mentor, which may count toward major requirements. Students then prepare a written thesis. Those whose theses and grades meet program criteria are recommended to the college by their faculty mentor for graduation with honors. For more information consult the program director and see Honors in the Major (<https://catalogs.northwestern.edu/undergraduate/arts-sciences/#academicoptionstext>).