

Major in Applied Geosciences

The Applied Geosciences program integrates Earth system science, environmental inquiry, and geospatial analysis to examine how physical processes and natural resource systems interact across spatial and temporal scales. Students develop expertise in climate, hydrology, soils, earth materials, landforms, ecosystems, and environmental change while building empirical, spatial, and field-based skills to analyze and evaluate complex Earth data. The Earth and Ecosystem Resource Management concentration brings together geoscientific analysis of earth materials, hydrologic and climate systems, and surface processes with ecosystem stewardship, environmental governance, and resource policy, preparing students to assess land and water systems, evaluate socio-ecological resilience, and design evidence-informed management strategies. The Geodata and Geospatial Analytics concentration integrates Earth-system knowledge with advanced geospatial methods, spatial statistics, remote sensing, computational analysis, and systems modeling, developing proficiency in interpreting geoenvironmental datasets and translating spatial evidence into decisions-relevant insights. Through this integration of geoscientific depth, environmental analysis, analytical rigor, and applied systems thinking, graduates are prepared to confront pressing challenges and complex issues involving resource sustainability, environmental risk, and climate variability across professional and research contexts. By connecting geoscientific foundations with ecosystem management and policy, the program equips students to lead at the intersection of science, data, and environmental decision-making.

Admission to the Applied Geosciences program is open to students who meet the University's general admission requirements. There are no additional program-specific admission requirements beyond those required for admission to the University.

University Core Curriculum Requirements

General Education Distribution Area	Cr. Hrs.
Fine Arts (FA)*	6
2 courses, from at least two of the following areas of study: Art, CMT (Mass Media or Theatre), Music (includes Dance).	
Humanities (HU)*	9
3 courses, from at least two of the following areas of study: CMT (Communication), English, Linguistics, Philosophy, Women's and Gender Studies, World Languages and Cultures, (Note: No more than two foreign language courses may be used to fulfill this requirement.)	
Behavioral/Social Sciences (SB)*	9
3 courses, from at least two of the following areas of study: African & African American Studies, Anthropology, Computer Science, Economics, Geography & Environmental Studies, History, Justice Studies, Latino & Latin American Studies, Political Science, Psychology, Sociology, Social Work	
Natural Sciences (NS and NSL)**	9
3 courses, from at least two of the following areas of study; one course must have a laboratory component (NSL): Biology, Chemistry, Earth Science, Environmental Science, Physics (Note: If an FYE ANTH that counts as Natural Science is taken, only one Biology course may be used for Natural Science).	

Engaged Learning Experiences

Students must complete, at Northeastern, three courses designated as Engaged Learning Experiences courses. One of the Engaged Learning Experiences courses must be at the 300-level, and one Engaged Learning Experiences course must be designated as "Boundary Crossing".

Discipline Specific (ELE-DS)

These courses have pre-requisites that are specific courses within a program of study. Discipline Specific courses give students a deeper understanding of how knowledge is created and applied in their field.

Boundary Crossing (ELE-X)

These are courses that cross disciplinary boundaries and/or cross boundaries through engagements outside the classroom or University allowing students to see how knowledge gained in one field might inform other fields or other aspects of society.

Math/Quantitative Reasoning (MA)

1 Math course, that has intermediate Algebra as prerequisite OR is a course listed on the General Education Distributive Learning List of Approved Courses. Any 3 hour college level math course, beyond Intermediate Algebra, meets this requirement.

- * Majors in Fine Arts, Humanities or Social/Behavioral Sciences, may waive up to 6 credit hours of General Education requirements in the corresponding distribution area.
- ** Majors in Natural Sciences may waive up to 9 credit hours of General Education requirements in the Natural Sciences distribution area.

Students should also be aware of all other university requirements to obtain a degree - NEIU requirements (<https://catalog.neiu.edu/graduation-requirements/bachelors-degree/>)

Bachelor of Science (B.S.) Degree in Applied Geosciences

To obtain the Bachelor of Science (B.S.) degree in Applied Geosciences, students will complete a common core in geography, environmental studies, and geoscience foundations, required cognate courses, and choose one of two concentrations: Earth and Ecosystem Resource Management or Geodata and Geospatial Analytics. Both concentrations provide applied, interdisciplinary training that integrates Earth-system science with environmental analysis and geospatial methods to examine complex natural resource management and environmental challenges.

Core Courses (19-20 Credit Hours):

The program core establishes shared foundations in Geography, Environmental Studies, and Geosciences to develop the conceptual and methodological framework that supports advanced concentration-specific study.

Code	Title	Hours
GES-104	World Geography	3
GES-150	Introduction To Environmental Studies	3
GES-205 or ESCI-211	Physical Geography Physical Geology	3
GES-374	Research Methods	3
GES-391	Introduction To GIS	3
Capstone		

Cognate Courses (20-22 Credit Hours):

To support the scientific and quantitative rigor of the B.S. in Applied Geosciences, students must complete foundational coursework in mathematics, statistics, and complementary STEM disciplines. These courses provide analytical, laboratory, and computational competencies required for advanced study in Earth systems, resource management, and geospatial analysis.

Required (8 Credit Hours):

Code	Title	Hours
MATH-187	Calculus I	4
MATH-275	Applied And Computational Statistics	4

Additional Cognate Courses (12–14 Credit Hours):

Students must complete three additional courses selected from at least two different disciplines among the following blocks. Selection of additional cognate coursework should reflect the student's chosen concentration and professional goals. Students in the Earth and Ecosystem Resource Management concentration are encouraged to consider coursework in biology, chemistry, and physics to strengthen ecological, hydrologic, and material process understanding. Students in the Geodata and Geospatial Analytics concentration may benefit from additional preparation in biology, mathematics, or computer science to support quantitative modeling and computational analysis. Final course selection is made in consultation with a faculty advisor.

Code	Title	Hours
BIOLOGY		
BIO-201	General Biology I	4
BIO-202	General Biology II	4
CHEMISTRY		
CHEM-211	General Chemistry I	5

CHEM-212	General Chemistry II	4
CHEM-331	Instrumental Analysis: Quantitative Methods	5
PHYSICS		
PHYS-201L	College Physics I With Lab	5
or PHYS-206L	University Physics I With Lab	
PHYS-202L	College Physics II With Lab	5
or PHYS-207L	University Physics II With Lab	
PHYS-305	Modern Physics I	3
PHYS-330	Writing Intensive Program: Experimental Methods	3
MATHEMATICS		
MATH-202	Calculus II	4
COMPUTER SCIENCE		
CS-200	Programming Fundamentals	4
CS-351	Data Wrangling For Data Analysis	3

Earth and Ecosystem Resource Management Concentration

The Earth and Ecosystem Resource Management concentration emphasizes Earth surface processes, hydrologic and climatic systems, and the sustainable management of natural and ecosystem resources. Students gain field-based, analytical, and policy-informed skills applicable to land, soil, water, and ecosystems, preparing them for professional roles in applied geoscience, resource management, environmental stewardship, consulting, and related fields.

In addition to completion of the program core and required cognate coursework, students must complete the following concentration requirements and approved electives.

Required Courses (17 Credit Hours):

Students must complete the required number of courses from each of the following course blocks.

Block 1: Earth Materials and Dynamics (Select 2 courses - 8 Credit Hours):

Code	Title	Hours
ESCI-306	Writing Intensive Program: Earth Materials	4
ESCI-312	Historical Geology	4
ESCI-329	Soil Science	4
ESCI-337	Principles Of Hydrogeology	4
ESCI-307	Climate Change: Evidence, Causes, Effects	4
ESCI-347	Climate Change: Past, Present, Future	4
ESCI-317	Sedimentology And Stratigraphy	4
ESCI-330	Structural Geology	4

Block 2: Environment and Resource Management (Select 2 courses - 6 Credit Hours):

Code	Title	Hours
GES-301	Great Lakes Environmental Management	3
GES-311	Social Dimensions Of Water Resources Management	3
GES-323	Green Infrastructure Planning And Management	3
GES-327	Forest Resource Management	3
GES-328	Wildlife Resource Management	3
GES-344	Chicago River Issues	3

Block 3: Sustainability and Policy (Select 1 courses - 3 Credit Hours):

Code	Title	Hours
GES-308	Conservation Psychology	3
GES-314	Political Geography	3
GES-319	Environmental And Natural Resources Policy	3
GES-329	Sustainable Energy Policy	3
GES-338	Sustainable Development	3

GES-350	Climate Change: International Policy And Politics	3
GES-359	Environmental Planning	3

Elective Courses (12 Credit Hours):

Students must also complete additional approved elective coursework selected from concentration-appropriate offerings to meet total credit hours required for the degree.

Geodata and Geospatial Analytics Concentration

The Geodata and Geospatial Analytics concentration emphasizes advanced geospatial and quantitative analysis, including remote sensing, spatial statistics, computational methods, and system modeling applied to earth, environmental, and resource systems. Students gain proficiency in interpreting large geoscientific and environmental datasets and translating spatial evidence into decision-relevant insights for governmental, private-sector, and research settings.

In addition to completion of the program core and required cognate coursework, students must complete the following concentration requirements and approved electives.

Required Courses (18 Credit Hours):

Code	Title	Hours
GES-390	Remote Sensing And Digital Image Processing	3
GES-351	Spatial Statistics	3
ESCI-381	Working With Earth Data In Python	4
ESCI-384	Modeling Dynamic Systems	4
or ESCI-307	Climate Change: Evidence, Causes, Effects	
ESCI-385	Community Data Lab	4

Elective Courses (12 Credit Hours):

Students must also complete additional approved elective coursework selected from concentration-appropriate offerings to meet total credit hours required for the degree.

This sample curricular map is provided to guide program planning for students who plan to attend as full-time students. This guide should not replace regular consultations with your program advisor. For specific recommendations of courses not identified, please consult your program advisor.

First Year

Term 1		Hours
FYE Course (e.g., ESCI-109)		3
GES-104	World Geography	3
ENGL-101	Writing I	3
General Education Course (FA1)		3
General Education Course (H1)		3
Term Hours		15
Term 2		
GES-350	Climate Change: International Policy And Politics	3
ESCI-211	Physical Geology	4
MATH-173	College Algebra	4
ENGL-102	Writing II	3
Term Hours		14
Second Year		
Term 1		
GES-374	Research Methods	3
MATH-185	Precalculus	4
BIO-201	General Biology I	4
Concentration Requirement 1		4
Term Hours		15
Term 2		
GES-391	Introduction To GIS	3
MATH-187	Calculus I	4
Concentration Requirement 2		4

General Education Course (H2)		3
	Term Hours	14
Third Year		
Term 1		
MATH-275	Applied And Computational Statistics	4
Concentration Requirement 3		4
Concentration Elective 1		4
General Education Course (FA2)		3
	Term Hours	15
Term 2		
CHEM-211	General Chemistry I	5
Concentration Requirement 4		4
Concentration Elective 2		4
General Education Course (SS3)		3
	Term Hours	16
Fourth Year		
Term 1		
PHYS-206L	University Physics I With Lab	5
Concentration Requirement 5		3
Concentration Elective 3		4
General Education Course (H3)		3
	Term Hours	15
Term 2		
300-level course		4
300-level course		4
300-level course		4
Capstone		3
	Term Hours	15
	Total Hours:	119