

GEOLOGY AND GEOPHYSICS, BS

The interdisciplinary department of Geoscience offers an undergraduate degree in geology and geophysics, with graduate degrees offered in both disciplines.

The Geology and Geophysics major offers unusual opportunities to integrate knowledge and technology from chemistry, biology, physics, engineering, space science, and other disciplines to understand processes that have shaped the Earth, its environments, and the life that it has sustained over billions of years. Geoscientists provide insight on surface and groundwater resources and how to protect and preserve them. They probe the causes and potential risks associated with natural hazards including earthquakes, volcanoes, floods, hurricanes, landslides, climate change, and sea level rise. Sustainable exploration and extraction of key mineral resources needed to build and power a resilient and green society depends on well-trained geoscientists. To explore Earth history, develop materials and energy resources, and take the pulse of a dynamic planet, geoscientists use an extraordinary array of tools, including satellites to measure changes of Earth's surface, sensitive instruments to detect seismic waves for exploring resources underground, cutting-edge instrumentation to measure the composition of minerals and rocks at microscopic scales, and computational approaches to assemble and interrogate enormous sets of data acquired from rocks and fossils across the globe.

Geology students have a strong interest in the natural environment as it is today and as it has developed over the past 4.5 billion years. The Department of Geoscience challenges students to develop skills in sequential thought, inductive reasoning, and three-dimensional perception. Moreover, students who concentrate in geophysics learn basic physical laws and processes involving gravity, magnetism, heat flow, and seismic wave propagation within Earth. Opportunities also include learning how satellite-based measurements, and computational approaches, are used to measure and monitor geothermal resources, volcanic activity, earthquakes, and groundwater movement.

Geology and Geophysics students prepare for careers in hydrogeology, energy, mining, engineering, and education. Students are exceptionally well-prepared for graduate studies in a broad array of geoscience fields.

HOW TO GET IN

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Requirements	Details
How to get in	No application required. All students who meet the requirements listed below are eligible to declare. For information on how to declare, visit Advising & Careers.
Courses required to get in	None
GPA requirements to get in	None

Credits required to get in	None
Other	None

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin-Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<https://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the Guide.

General Education	• Breadth—Humanities/Literature/Arts: 6 credits
	• Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
	• Breadth—Social Studies: 3 credits
	• Communication Part A & Part B *
	• Ethnic Studies *
	• Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF SCIENCE (BS)

Students pursuing a Bachelor of Science degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either the Bachelor of Arts or the Bachelor of Science degree requirements.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics	Complete two courses of 3+ credits at the Intermediate or Advanced level in MATH, COMP SCI, or STAT subjects. A maximum of one course in each of COMP SCI and STAT subjects counts toward this requirement.
Language	Complete the third unit of a language other than English.

L&S Breadth Complete:

- 12 credits of Humanities, which must include at least 6 credits of Literature; and
- 12 credits of Social Science; and
- 12 credits of Natural Science, which must include 6 credits of Biological Science and 6 credits of Physical Science.

Liberal Arts and Science Coursework Complete at least 108 credits.

Depth of Intermediate/Advanced Coursework Complete at least 60 credits at the Intermediate or Advanced level.

Advanced Coursework

Major Declare and complete at least one major.

Total Credits Complete at least 120 credits.

UW-Madison Experience Complete both:

- 30 credits in residence, overall, and
- 30 credits in residence after the 86th credit.

Quality of Work

- 2.000 in all coursework at UW-Madison
- 2.000 in Intermediate/Advanced level coursework at UW-Madison

NON-L&S STUDENTS PURSUING AN L&S MAJOR

Non-L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

REQUIREMENTS FOR THE MAJOR

Prospective majors are strongly encouraged to seek assistance from a faculty advisor in order to choose courses appropriate to their interests and career plans. Advisors can also assist students in choosing a pathway that is appropriate for their interests and career goals.

BACKGROUND REQUIREMENTS

Code	Title	Credits
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Calculus

Complete one sequence: 9-14

MATH 221 & MATH 222	Calculus and Analytic Geometry 1 and Calculus and Analytic Geometry 2	
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MATH 171 & MATH 217 & MATH 222	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II and Calculus and Analytic Geometry 2	
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Chemistry

Complete one sequence: 5-10

CHEM 109	Advanced General Chemistry	
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CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
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CHEM 115 & CHEM 116	Chemical Principles I and Chemical Principles II	
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Physics

First Introductory Course

Complete one of the following: 5-6

PHYSICS 207	General Physics	
	or PHYSICS 201 General Physics	
	or PHYSICS 247A Modern Introduction to Physics	

E M A 201 & E M A 202	Statics and Dynamics	
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Second Introductory Course

Complete one of the following: 5

PHYSICS 208	General Physics	
	or PHYSICS 202 General Physics	
	or PHYSICS 248A Modern Introduction to Physics	

Total Credits 24-35

GEOLOGY & GEOPHYSICS CORE COURSEWORK

Code	Title	Credits
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Core

Complete all of the following:

GEOSCI 100	Introductory Geology: How the Earth Works	3
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	or GEOSCI/ ENVIR ST 106	
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GEOSCI 202	Introduction to Geologic Structures	4
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GEOSCI 204	Geologic Evolution of the Earth	4
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GEOSCI/G L E 360	Principles of Mineralogy	3
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GEOSCI/G L E 370	Elementary Petrology	3
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Advanced Breadth

Complete one: 3-4

GEOSCI/ G L E 350	Introduction to Geophysics: The Dynamic Earth	
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GEOSCI 375	Principles of Geochemistry	
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GEOSCI 430	Sedimentology and Stratigraphy ¹	
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GEOSCI/ G L E 455	Structural Geology	
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Total Credits 20-21

¹ GEOSCI 430 (<https://guide.wisc.edu/?P=GEOSCI%20430>) may be taken to satisfy both Advanced Breadth and Communication requirement, but the credit will only count once towards total credits needed to complete the major.

GEOLOGY & GEOPHYSICS COMMUNICATION REQUIREMENT

Code	Title	Credits
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Complete one of the following:

GEOSCI 402	Research and Communication in the Geological Sciences	3
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GEOSCI/ATM OCN/ ENVIR ST/ GEOG 335	Climatic Environments of the Past	3
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GEOSCI 430	Sedimentology and Stratigraphy ¹	3
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GEOSCI 610	Geochronology, Timescales, and Rates of Geologic Processes	3
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GEOSCI/G L E 629	Contaminant Hydrogeology	3
INTEREGR 397	Engineering Communication	3

¹ GEOSCI 430 (<https://guide.wisc.edu/?P=GEOSCI%20430>) may be taken to satisfy both Advanced Breadth and Communication requirement, but the credit will only count once towards total credits needed to complete the major.

GEOLOGY & GEOPHYSICS MAJOR ELECTIVES

Complete additional upper-level coursework to reach a minimum of 34 credits in the major. GEOSCI courses numbered 300–692, except GEOSCI 331, are considered upper-level. Complete additional upper-level coursework to reach a minimum of 34 credits in the major.

RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in all GEOSCI and major courses
- 2.000 on 15 upper-level major credits, taken in residence ¹
- 15 credits in GEOSCI, taken on campus

¹ GEOSCI 300–699, excluding GEOSCI 331, are considered Upper Level in the Major

HONORS IN THE MAJOR

Students may declare Honors in the Geology and Geophysics Major in consultation with the departmental undergraduate advisor.

HONORS IN THE MAJOR: GEOLOGY AND GEOPHYSICS: REQUIREMENTS

To earn Honors in the Geology and Geophysics Major, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a 3.300 University GPA
- Earn a 3.400 GPA in all GEOSCI and major courses
- Complete GEOSCI 681 and GEOSCI 682, for a total of 6 credits, with a grade of B or better.

UNIVERSITY DEGREE REQUIREMENTS

Total Degree To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

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1. Acquire a working knowledge of Earth history and the evidence used to constrain that history.
2. Explain how various Earth systems operate and describe the basis for that understanding. Earth systems include the lithosphere, hydrosphere, cryosphere, biosphere, and atmosphere.
3. Apply field/lab-based methods, spatial reasoning skills, temporal reasoning skills, and/or quantitative approaches to solve problems in geoscience.
4. Analyze geological, biological, chemical, and/or physical information to understand Earth processes and the rates of those processes.
5. Read the scientific literature and understand the employed methods, results, and emergent interpretations.
6. Communicate scientific data, concepts, and models effectively.

FOUR-YEAR PLAN

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This Four-Year Plan is only one way a student may complete an L&S degree with this major. Many factors can affect student degree planning, including placement scores, credit for transferred courses, credits earned by examination, and individual scholarly interests. In addition, many students have commitments (e.g., athletics, honors, research, student organizations, study abroad, work and volunteer experiences) that necessitate they adjust their plans accordingly. Informed students engage in their own unique Wisconsin Experience by consulting their academic advisors, Guide, DARS, and Course Search & Enroll for assistance making and adjusting their plan.

First Year

Fall	Credits Spring	Credits
MATH 221 (Quantitative Reasoning B)	5 MATH 222	4
CHEM 103	4 CHEM 104	5
GEOSCI 100 or 106	3 GEOSCI 204	4
Language	4 Comm A (take during first year)	3
16		16

Second Year

Fall	Credits Spring	Credits
PHYSICS 207	5 PHYSICS 208	5
GEOSCI 202	4 GEOSCI/G L E 370	3
GEOSCI/G L E 360	3 Ethnic Studies (take within first 60 credits)	3
L&S Breadth	3 L&S Breadth	3
15		14

Third Year

Fall	Credits Spring	Credits
GEOSCI Elective 300 level and above	4 GEOSCI Elective 300 level and above	3
GEOSCI Elective 300 level and above	4 GEOSCI Elective 300 level and above	3
L&S Breadth	3 L&S Breadth	3
L&S Breadth	4 L&S Breadth	3
	Elective	3
	15	15

Fourth Year

Fall	Credits Spring	Credits
GEOSCI elective 300 level and above	4 GEOSCI elective 300 level and above	4
GEOSCI elective 300 level and above	3 L&S Breadth	3
Comm B / GEOSCI 402	3 L&S Breadth	3
Elective	5 Elective	4
	15	14

Total Credits 120**ADVISING AND CAREERS****ADVISING AND CAREERS
DECLARE OR CANCEL THIS MAJOR**

Please follow the process described on the Geoscience website (<https://geoscience.wisc.edu/academics/undergraduate-program/>).

Any student interested in the Geology and Geophysics major should meet with the advisor or program manager to discuss steps to complete the necessary coursework for the major.

CAREERS

More than half of all professional geologists and geophysicists work in hydrogeology, engineering geology, technical consulting, mining, or energy resource industries. The need for energy, environmental protection, and responsible land and resource management is expected to spur future demand for geoscientists. Geoscientists will be involved in discovering and developing next-generation energy and mineral resources (U.S. Bureau of Labor Statistics, November, 2022). Such careers involve an unusual breadth of training and personal adaptability, and the MS degree is generally required. About one-fifth of all geoscientists work in state and federal geological surveys or research activities. These positions largely involve problems in geologic mapping, mineral resources, groundwater, and engineering. Geophysics offers opportunities in earthquake studies, seismic verification of nuclear test bans, and rock characterization techniques for waste disposal and groundwater modeling. Many geology students continue on to obtain a PhD degree and become faculty members at colleges or universities. A geology and geophysics major is also appropriate for those interested in careers in elementary or secondary education, environmental policy, or environmental law. Faculty advisors can provide additional information on career opportunities.

SUCCESSWORKS

SuccessWorks (<https://successworks.wisc.edu/>) at the College of Letters & Science helps you turn the academic skills learned in your classes

into a fulfilling life, guiding you every step of the way to securing jobs, internships, or admission to graduate school.

Through one-on-one career advising, events, and resources, you can explore career options, build valuable internship and research experience, and connect with supportive alumni and employers who open doors of opportunity.

- What you can do with your major (<https://successworks.wisc.edu/what-you-can-do-with-your-major/>) (Major Skills & Outcomes Sheets)
- Make a career advising appointment (<https://successworks.wisc.edu/make-an-appointment/>)
- Learn about internships and internship funding (<https://successworks.wisc.edu/finding-a-job-or-internship/>)
- Try "Jobs, Internships, & How to Get Them," (<https://successworks.wisc.edu/canvas/>) an interactive guide in Canvas for enrolled UW-Madison students