

Geophysics (BSGS)

Degree-Bachelor of Science in Geosciences (BSGS)

The Bachelor of Science in Geosciences (BSGS) serves as a professional degree for students planning careers as geologists, geophysicists, hydrologists, climate scientists, or teachers, as well as for those planning to pursue graduate work in geosciences or a profession such as law or business. Careers are available in the petroleum and related energy industries, resource evaluation, mineral exploration, geologic hazard monitoring, environmental control and reclamation, building foundation evaluation, groundwater contamination studies, soil testing, regional planning, watershed management, climate modeling, and college or secondary school teaching. Graduates may also work in state or federal agencies, in universities or museums, with consulting firms, or with service companies to the energy and mineral industries.

Degree requirements are divided into three categories:

1. university-wide undergraduate degree requirements (the University core curriculum),
2. prescribed work for the degree, and
3. major requirements. Taken together, these courses constitute a degree major, a degree plan with a particular concentration or emphasis. Thus, students may develop intellectually challenging yet different plans of study according to their personal interests and goals.

Students seeking the Bachelor of Science in Geosciences degree must choose one of five majors: General Geology, Geophysics, Hydrology and Water Resources, Climate System Science, or Geosciences.

Component Notes

- **Introduction to Earth and Planetary Science Component:** A introductory exposure to geosciences in the 21st Century and foundational techniques required to study processes on Earth and other planets.
- **Experiential Learning Component:** Courses that develop skills in observation, data gathering, and interpretation in the field and/or laboratory.
- **Disciplinary Breadth Component:** These courses that span all aspects of geosciences at a sophomore level and provide the foundation to pursue courses at the advanced level. All geoscience students regardless of major are required to take these courses that span from the interior planetary processes to the climate system.
- **Quantitative Analysis Component:** Courses that develop skills in the quantitative analysis of geosciences data and theories, including geostatistics, mathematics, numerical modeling, computer coding, and data analysis. The selection of courses includes courses where quantitative analysis of data and theories is the primary emphasis.
- **Geospatial Skills Component:** Courses that teach 3-D visualization and thinking skills and instruct in geospatial technologies and software.
- **Immersion Learning Component:** Intensive three week courses that require full time participation. Often, but not always, they occur off campus. Data acquisition and interpretation are a core component of these experiences.
- **Disciplinary Fundamentals Component:** Courses that survey the discipline at the advanced level, building upon introductory coursework, while also providing fundamental knowledge required for other advanced courses. Students will be guided through Areas of

Study that are a suggested menu of courses for students interested in different aspects of Fundamentals appropriate for sub-disciplines and key topical subjects.

Major-Geophysics

In the geophysics major, we study the dynamics and structure of the Earth and other planets using observational, forward, and inverse modeling approaches. Topics include environmental studies, marine processes, hydrology, glaciology, volcanoes, earthquakes, tectonics, impacts, resources, shallow hazards, and convection of planetary mantles. From global studies to microscopic scales, and from processes happening on timescales of seconds to billions of years, geophysicists contribute fundamental insights into physical processes and properties of the Earth. With a geophysics degree, students are well-equipped to solve cutting-edge problems in a wide range of disciplines, from fundamental Earth and climate science research to applications in the energy sector, data science and technology, and national Security.

Admissions

Information about admissions to this program is given in the school's [Admissions section](#).

Total Hours Required: 126

Plan of Study

The Plan of Study is a suggested four-year course sequence to support academic planning and serves as a helpful guide. Currently enrolled students should meet with their academic advisor to tailor their course selections and timelines to their individual goals and circumstances.

Course	Title	Hours
Year 1		
Semester 1		
Hours chosen from: Intro to Earth and Planetary Science course		3
M 408C	Differential and Integral Calculus	4
CH 301	Principles of Chemistry I	3
UGS 302 or UGS 303	First-Year Signature Course or First-Year Signature Course	3
RHE 306	Rhetoric and Writing	3
Hours		16
Semester 2		
Hours chosen from: Experiential Learning course		3
Humanities (040)		3
M 408D	Sequences, Series, and Multivariable Calculus	4
CH 302	Principles of Chemistry II	3
PHY 301	Mechanics	3
PHY 101L	Laboratory for Physics 301	1
Hours		17
Year 2		
Semester 1		
Hours chosen from: Disciplinary Breadth course		8
PHY 316	Electricity and Magnetism	3
PHY 116L	Laboratory for Physics 316	1
M 427J	Differential Equations with Linear Algebra	4
Hours		16
Semester 2		
Hours chosen from: Geophysics Component 1 course		3
Hours chosen from: Quantitative Analysis course		3
PHY 315	Wave Motion and Optics	3
PHY 115L	Laboratory for Physics 315	1
M 427L	Advanced Calculus for Applications II	4
Hours chosen from: Immersion Learning course		3
Hours		17

Year 3		
Semester 1		
Hours chosen from: Disciplinary Breadth course		4
Hours chosen from: Geophysics Component 1 Course		3
Hours chosen from: Upper-division Disciplinary Fundamental course		3
GOV 310L	American and Texas Government	3
Free Elective		3
Hours		16
Semester 2		
Hours chosen from: Geophysics Component 1 Course		4
GOV 312L	Issues and Policies in American Government	3
Hours chosen from: Upper-division Disciplinary Fundamental course		3
Hours chosen from: Immersion Learning course (May Term)		3
Free Elective		3
Hours		16
Year 4		
Semester 1		
Hours chosen from: Geophysics Component 2 course		3
<u>Visual and Performing Arts (050)</u>		3
Free Elective		1
<u>Social and Behavioral Sciences (080)</u>		3
<u>U.S. History (060)</u>		3
Hours		13
Semester 2		
Geophysics Component 2 Course		3
Free Elective (upper-division)		6
Free Elective		3
<u>U.S. History (060)</u>		3
Hours		15
Total Hours		126

Requirements

All requirements are listed below, starting with the most specialized moving to the most general. Additional requirements may follow the table, so be sure to read the entire page. Some required courses listed below may also satisfy [General Education](#) requirements, including [Core Curriculum](#).

Code	Title	Hours
Major		
Hours chosen from: a single sequence		8
Sequence 1		
M 408C	Differential and Integral Calculus	
M 408D	Sequences, Series, and Multivariable Calculus	
Sequence 2		
M 408K	Differential Calculus	
M 408L	Integral Calculus	
M 408M	Multivariable Calculus	
Hours chosen from: a single sequence		8
Sequence 1		
PHY 301	Mechanics	
PHY 101L	Laboratory for Physics 301	
PHY 316	Electricity and Magnetism	
PHY 116L	Laboratory for Physics 316	
Sequence 2		
PHY 303K	Engineering Physics I	
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	
PHY 303L	Engineering Physics II	
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	
CH 301	Principles of Chemistry I	3

CH 302	Principles of Chemistry II	3
M 427J	Differential Equations with Linear Algebra	4
M 427L	Advanced Calculus for Applications II	4
PHY 315	Wave Motion and Optics	3
PHY 115L	Laboratory for Physics 315	1

Introduction to Earth and Planetary Science Component

Hours chosen from:		3
GEO 401	Physical Geology	
GEO 302C	Climate: Past, Present, and Future	
GEO 302D	Age of Dinosaurs	
GEO 302E	Earth, Wind, and Fire	
GEO 302G	Earth Science and Sustainability	
GEO 302J	Crisis of Our Planet	
GEO 302M	The Age of Mammals	
GEO 302N	Geology of National Parks	
GEO 302Q	Gems and Gem Minerals	
GEO 303	Introduction to Geology	
GEO 303C	Introduction to the Solar System	
GEO 303E	Earth in 2100	

Experiential Learning Component

Hours chosen from:		3
GEO 405	Life through Time	
GEO 311D	Geodata	
GEO 315L	Earth From Lab to Planet	
GEO 420K	Introduction to Field and Stratigraphic Methods	

Disciplinary Breadth Component

GEO 416E	Solid Earth Processes	4
GEO 416S	Earth and Planetary Processes Through Time	4
GEO 416W	Climate, Water, and the Environment	4

Quantitative Analysis Component

Hours chosen from:		3
GEO 325G	Computational Applications in the Geosciences	
GEO 352P	Python for Geoscience Research	
GEO 378D	Introduction to Machine Learning and Geosciences	

Geophysics Component 1

GEO 114G	Geophysics Colloquium	1
GEO 325C	Continuum Mechanics	3
GEO 325K	Computational Methods	3
or GEO 325M	Numerical Modeling in the Geosciences	
GEO 354	Physics of Earth	3

Geophysics Component 2

Hours chosen from:		6
GEO 365P	Potential Field Applications in Geophysics	
GEO 366M	Mathematical Methods in Geophysics	
GEO 465K	Seismic Exploration	

Immersion Learning Component

Hours chosen from:		6
GEO 660	Field Geology (given as GEO 660A and 660B)	
GEO 348K	Marine Geology and Geophysics Field Course	
GEO 376L	Field Methods in Groundwater Hydrology	
GEO 661	Geophysics Field Camp	
GEO 679G	Special Studies in Geophysics Research, Fieldwork, or Internship	

Disciplinary Fundamentals Component

Hours chosen from: Upper-division GEO coursework	6
<i>Subtotal</i>	<i>83</i>
Degree	
Free electives: Additional coursework to reach total hours required.	1
<i>Subtotal</i>	<i>1</i>
General Education	
Core Curriculum	42
Foreign Language other than English, Beginning Proficiency	
<i>Subtotal</i>	<i>42</i>
College Requirements - Geosciences	
General University Requirements	
Total Hours	126

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A course in one prescribed work area may not also be used to fulfill the requirements of another prescribed work or major requirement.

A grade point average of at least 2.00 is required in geological sciences courses counted toward the major requirement.

Algebra courses at the level of Mathematics 301 or the equivalent may not be counted toward the total number of hours for the degree.

Course Grades: A grade of at least C- is required in each course used to fulfill any of the requirements for the degree. The official grade in a course is the last one made; however, if a student repeats a course and has two or more grades, all grades and all semester hours are used to calculate the University grade point average and to determine the student's scholastic eligibility to remain in the University and the student's academic standing in the Jackson School of Geosciences.

Individual degree(s) or degree options may contain course residency requirements in addition to University requirements. BSGS majors must complete at least 36 semester hours of upper-division coursework in residence at the University.