

GEOLOGICAL SCIENCES, B.S.

The geological sciences encompass the study of the interaction of physical, chemical and biological processes and systems that shape Earth's environments and their human impacts. Students in the geological science degree program work closely with the SEOE's large and diverse faculty with broad scientific expertise on earthquakes, volcanoes, groundwater, climate change and coastal oceans. The degree program offers optional concentrations in environmental geosciences and geophysics. All degree options emphasize field work and include a required capstone course in Field Geology that is taught annually in Colorado, Utah and New Mexico.

The Bachelor of Science in geological science prepares students for graduate or professional school but is also sufficient for entry-level positions on a variety of career paths including energy and mineral resources, as well as geotechnical and environmental consulting, especially in areas related to groundwater and water resources.

Learning Outcomes

1. Students will demonstrate their knowledge of fundamental concepts and laboratory skills in the geosciences by responding to written and laboratory-practical exam questions in at least one of the following courses: GEOL 302, GEOL 305, GEOL 315
2. Students will demonstrate knowledge of geological field skills by demonstrating a competency at the proficiency level on a geologic mapping exercise, preferably the Sheep Mountain project, in GEOL 500.

Admissions

Entrance Requirements

New freshmen who meet University admissions standards are eligible for admission to degree programs offered by the college. A student who wishes to enter the College of Arts and Sciences from another college on the Columbia campus must be in good standing and have a cumulative GPA of 2.00 or higher. A student who wishes to enter the College of Arts and Sciences from another USC campus must fulfill one of the following requirements:

1. Be in good standing, meet the admission requirements for a baccalaureate degree on the Columbia campus, and have a cumulative GPA of 2.00 or higher.
2. Be in good standing and have completed 30 semester hours with a GPA of 2.00 or higher on a USC campus.

Some programs in the College of Arts and Sciences have special admission requirements established by the department or committee that supervises the specific degree program, for example, Cardiovascular Technology, Biological Sciences, Chemistry, Biochemistry and Molecular Biology, Economics, Environmental Science, the Bachelor of Arts in Interdisciplinary Studies, and the Bachelor of Science in Interdisciplinary Studies. These requirements are listed in the sections of this bulletin that describe department and special degree programs.

Degree Requirements (120 hours)

Program of Study

Requirements	Credit Hours
1. Carolina Core	32-44
2. College Requirements	15-18

3. Program Requirements 24-46

4. Major Requirements 27-43

Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (<https://academicbulletins.sc.edu/undergraduate/founding-document-courses/>).

1. Carolina Core Requirement (32-44 hours)

CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)

must be passed with a grade of C or higher

- any CC-CMW courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

ARP – Analytical Reasoning and Problem Solving (6-8 hours)

- MATH 122* or MATH 141*
- MATH 170* or MATH 142*

SCI – Scientific Literacy (8 hours)

- CHEM 111* & CHEM 111L*
- PHYS 201* & PHYS 201L* or PHYS 211* & PHYS 211L*

GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)

Demonstration of proficiency in one foreign language equivalent to the minimal passing grade on the exit examination in the 122 course is required. Students can demonstrate this proficiency by successfully completing Phase II of the Proficiency Test or by successfully completing the 122 course, including the exit exam administered as part of that course.

- CC-GFL courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

It is strongly recommended that students continuing the study of a foreign language begin college-level study of that language in their first semester and continue in that language until their particular foreign language requirement is completed.

GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- any CC-GSS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

CMS – Effective, Engaged, and Persuasive Communication: Spoken Component ¹ (0-3 hours)

- any overlay or stand-alone CC-CMS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

INF – Information Literacy ¹ (0-3 hours)

- any overlay or stand-alone CC-INF course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

VSR – Values, Ethics, and Social Responsibility ¹ (0-3 hours)

any overlay or stand-alone CC-VSR course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

¹ **Carolina Core Stand Alone or Overlay Eligible Requirements** – Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours must add up to a minimum of 31 hours. Some programs may have a higher number of minimum Carolina Core hours due to specified requirements.

2. College Requirements (15-18 hours)

Foreign Language (0-3 hours)

- only if needed to meet 122-level proficiency

Analytical Reasoning (6 hours)

Course	Title	Credits
STAT 515	Statistical Methods I (*)	3
Select one of the following:		3
CSCE 102	General Applications Programming (*)	
or a higher level CSCE course		
MSCI 305	Ocean Data Analysis (*)	
MSCI 509	MATLAB-Based Data Analysis in Ocean Sciences (*)	
Total Credit Hours		6

Note: Courses used to fulfill the College requirements may not also be used to fulfill other degree requirements.

History (3 hours)

The College of Arts and Sciences requires one additional GHS course beyond the Carolina Core GHS requirement.

- If the Carolina Core GHS requirement is fulfilled by a **U.S. history** course, the College of Arts and Sciences history requirement must be fulfilled by a **non-U.S. history** course.

- If the Carolina Core GHS requirement is fulfilled by a **non-U.S. history** course, the College of Arts and Sciences history requirement must be fulfilled by a **U.S. history** course.

Please select the College of Arts and Sciences history requirement from the approved list of U.S. and non-U.S. history courses (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/history-requirement/>).

Social Science and Fine Arts or Humanities (6 hours)

- Social Science (3 hours)**
 - The College of Arts and Science requires one 3- hour Social Science Course (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-social-science/>)
- Fine Arts/Humanities (3 Hours)**
 - A Bachelor of Science from the College of Arts and Sciences requires one 3-hour Fine Arts/Humanities Course (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-fine-arts-humanities/>)

3. Program Requirements (24-46 hours)

Supporting Courses (12 hours)

Course	Title	Credits
Select one of the following:		4
GEOL 101	Introduction to the Earth (*)	
GEOL 103	Environment of the Earth (*)	
GEOL 201	Observing the Earth (*)	
Select two of the following:		8
PHYS 202 & 202L	General Physics II and General Physics Laboratory II (*)	
or PHYS 212 Essentials of Physics II & 212L and Essentials of Physics II Lab		
CHEM 112 & 112L	General Chemistry II and General Chemistry II Lab (*)	
BIOL 101 & 101L	Biological Principles I and Biological Principles I Laboratory (*)	
BIOL 102 & 102L	Biological Principles II and Biological Principles II Laboratory (*)	
Total Credit Hours		12

Cognate or Minor (12-18 hours)

Students must complete a cognate (12 hours) or a minor as part of this program. In lieu of a cognate or minor, an additional major may be added to a student's program of study. **Additional majors must include all major courses as well as any prescribed courses noted (*) in the bulletin.**

Prescribed courses noted in the bulletin may be shared with Carolina Core, College requirements, and Program requirements in the primary program.

Cognate (12 hours)

The cognate must consist of twelve (12) hours of courses at the advanced level, outside of but related to the major. The cognate may be taken in one or more departments or programs.

Courses offered by departments and programs that are acceptable for cognate credit are outlined in the section titled Courses Acceptable for Cognate Credit in Degree Programs in the College of Arts and Sciences (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses->

acceptable-cognate/). Some major programs have specific cognate requirements. It should be emphasized that the cognate is not a second set of elective courses to be chosen at random by the student. Students are urged to consult their major advisors for specific requirements in their major.

Unless otherwise noted, for Bachelor of Science degrees, cognate courses passed with a grade of D or higher are acceptable.

Minor (18 hours) *optional*

In place of the cognate a student in the College of Arts and Sciences may choose a minor consisting of at least 18 credit hours of prescribed courses.

The minor is intended to develop a coherent basic preparation in a second area of study. It differs from the cognate inasmuch as the courses must follow a structured sequence.

Courses applied toward general education requirements cannot be counted toward the minor. No course may satisfy both major and minor requirements. **All minor courses must be passed with a grade of C or higher.** At least half of the courses in the minor must be completed in residence at the University.

A list of minor programs of study can be found at Programs A-Z (<https://academicbulletins.sc.edu/undergraduate/programs-az/>).

Electives (0-22 hours)

120 (or 128) degree applicable credits are required to complete any degree at UofSC. After the cognate, minor or second major is complete, any additional credits needed to reach 120 (or 128) total credits can be fulfilled by electives. No courses of a remedial, developmental, skill-acquiring, or vocational nature may apply as credit toward degrees in the College of Arts and Sciences. The College of Arts and Sciences allows the use of the Pass-Fail option on elective courses. Further clarification on inapplicable courses can be obtained from the College of Arts and Sciences.

4. Major Requirements (27-43 hours)

a minimum grade of C is required in all major courses

Major Courses (28-30 hours)

Course	Title	Credits
GEOL 302	Rocks and Minerals	4
GEOL 325	Stratigraphy and Sedimentary Basins	4
GEOL 345	Igneous and Metamorphic Processes	4
GEOL 355	Structural Geology and Tectonics	4
GEOL 500	Field Geology	4-6
Select two of the following:		8
GEOL 305	Earth Systems through Time	
GEOL 315	Surface and Near Surface Processes	
GEOL 335	Processes of Global Environmental Change	
Total Credit Hours		28-30

Concentrations (27-43 hours) *optional*

As an alternative to the general Geological Sciences major, students may choose one of the following concentrations:

General Geologic Sciences Major with Environmental Geosciences Concentration (27-30 hours)

Course	Title	Credits
GEOL 302	Rocks and Minerals	4
GEOL 315	Surface and Near Surface Processes	4
GEOL 325	Stratigraphy and Sedimentary Basins	4
GEOL 335	Processes of Global Environmental Change	4
GEOL 355	Structural Geology and Tectonics	4
GEOL 500	Field Geology	4-6
Select one of the following:		3-4
GEOL 305	Earth Systems through Time	
GEOL 371	A View of the River	
GEOL 548	Environmental Geophysics	
Total Credit Hours		27-30

General Geological Sciences Major with Geophysics Concentration (40-43 hours)

Students complete the requirements for the General Geological Sciences Major (28-30 hours) with the MATH 141 and MATH 142 Carolina Core option, and also complete an additional 12-13 credit hours from the courses listed here:

Course	Title	Credits
MATH 241	Vector Calculus	3
MATH 242	Elementary Differential Equations	3
Select two of the following:		6-7
GEOL 501	Principles of Geomorphology	
GEOL 520	Isotope Geology and Geochronology	
GEOL 531	Plate Tectonics	
GEOL 546	Marine Geophysics	
GEOL 548	Environmental Geophysics	
GEOL 570	Environmental Hydrogeology	
GEOL 575	Numerical Modeling for Earth Science Applications	

Intensive Geological Sciences Major (41-43 hours)

Course	Title	Credits
GEOL 302	Rocks and Minerals	4
GEOL 305	Earth Systems through Time	4
GEOL 315	Surface and Near Surface Processes	4
GEOL 325	Stratigraphy and Sedimentary Basins	4
GEOL 335	Processes of Global Environmental Change	4
GEOL 345	Igneous and Metamorphic Processes	4
GEOL 355	Structural Geology and Tectonics	4
GEOL 500	Field Geology (senior capstone experience)	4-6
Select 9 credits of GEOL courses numbered 399 or higher		9
Total Credit Hours		41-43

Degree with Distinction in Geological Sciences

Available to students majoring in Geological Sciences who wish to participate in significant research activities in their major field under the supervision of a faculty mentor. Students who successfully fulfill all of these requirements will be awarded their degree with "Distinction in Geological Sciences" upon graduation. South Carolina Honors College

students taking this route would graduate with both Honors in SCHC and "Distinction in Geological Sciences".

Requirements:

- A minimum GPA of 3.5 in the major and 3.3 institutional.
- A written sponsorship agreement from the faculty mentor on file in the department.
- Public presentation of the Senior Thesis research accompanied by a written document approved by the faculty mentor and a second reader that follows the guidelines of the School of the Earth, Ocean and Environment.
- 3 courses (9 hours) in addition to the general major requirements, including:
 - GEOL 498 or GEOL 499
 - GEOL 699
 - A minimum of one GEOL 500-level course appropriate to the research

Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

Geological Sciences, BS General Geology

Geological Sciences, BS General Geology Major in Environmental Geosciences Concentration

Geological Sciences, BS Intensive Geology Major Concentration