GEOLOGY

Geology

The bachelor of science major in Geology prepares the student for a professional career and/or graduate study in the geological sciences. Graduates work to understand natural processes on Earth and other planets. They are able to apply their knowledge of forces and factors that shape the Earth to reconstruct past environments and anticipate future problems. Graduates provide essential information for solving problems for resource management, environmental protection, and public health, safety, and welfare. They work as consultants on engineering and environmental problems, explorers for new minerals and hydrocarbon resources, researchers, staff members in state and U.S. geological surveys, government regulators, teachers, writers, editors, and museum curators. Graduates are able to integrate field and laboratory data and to prepare reports. They are able to make presentations that include maps and diagrams that illustrate the results of their studies.

Geology as an Additional Major: The Geology program has identified the core of 31 credits of geology courses that can complement a BS degree or major in materials engineering, civil engineering, environmental science, meteorology, or biology for students wishing to earn an additional major in geology. This pathway to earning a Geology major allows students in these academic programs with affinity to geology to complete both programs. Students should work closely with their advisors in each department to ensure that all requirements are met. These programs prepare students for careers or graduate study in the geosciences.

Student Learning Outcomes

Upon graduation, students should be able to:

- Demonstrate the ability to think critically;
- Exhibit a broad understanding of Earth systems and processes;
- Demonstrate scientific literacy and its application to scientific inquiry and societal concerns;
- Demonstrate proficiency in data collection, management, and analysis including understanding sources of error and/or uncertainty;
- Demonstrate competency with geoscience-specific techniques and field methods.
- Read and critically evaluate relevant literature and information;
- Use appropriate tools from chemistry, physics, biology, mathematics, and data science to solve discipline-specific problems;
- Present information effectively in written and oral forms;
- Work in a team environment in alignment with the ISU principles of community;
- Work independently;
- Attain employment in the geosciences or related fields, or pursue graduate studies.

Combined Degrees: A concurrent program (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofliberalartsandsciences/geology/#combinedundergraduateandgraduateprogramstext) is offered which combines a bachelor of science degree in geology and a master of science degree in geology.

Geology

Required courses for BS in Geology include:

GEOL 100	How the Earth Works	3
or GEOL 101	Environmental Geology: Earth in Crisis	
or GEOL 201	Geology for Engineers and Environmental Scientists	
GEOL 100L	How the Earth Works: Laboratory	1
GEOL 102	History of the Earth	3
GEOL 102L	History of the Earth: Laboratory	1
GEOL 302	Summer Field Studies	6
GEOL 315	Mineralogy and Earth Materials	3
GEOL 315L	Laboratory in Mineralogy and Earth Materials	1
GEOL 316	Optical Mineralogy	1
GEOL 356	Structural Geology and Tectonics	4
GEOL 357	Geological Mapping and Field Methods	1
GEOL 365	Igneous and Metamorphic Petrology	3
GEOL 368	Sedimentary Geology	4
GEOL 479	Surficial Processes	3
And 9 credits of geology electives		9
Total Credits		**43**

Required supporting courses include:

MATH 165	Calculus I	4
MATH 166	Calculus II	4
CHEM 177	General Chemistry I	4
CHEM 177L	Laboratory in General Chemistry I	1
CHEM 178	General Chemistry II	3
CHEM 178L	Laboratory in College Chemistry II	1
PHYS 131	General Physics I	4
PHYS 131L	General Physics I Laboratory	1
PHYS 132	General Physics II	4
PHYS 132L	General Physics II Laboratory	1

And 6 additional credits of either geology electives or courses from an approved departmental list of science, engineering, and mathematical disciplines outside of geology.	6
Total Credits	**33**

Geology as an Additional Major: The requirements of the 31 credit core are below. Please review information on the department website and contact the current program head for more information and sample four year plans for the Geology as an additional major program.

Required courses in Geology as an Additional Major

GEOL 100	How the Earth Works	3
or GEOL 101	Environmental Geology: Earth in Crisis	
or GEOL 201	Geology for Engineers and Environmental Scientists	
GEOL 100L	How the Earth Works: Laboratory	1
GEOL 102	History of the Earth	3
GEOL 102L	History of the Earth: Laboratory	1
GEOL 302	Summer Field Studies	6
GEOL 315	Mineralogy and Earth Materials	3
GEOL 315L	Laboratory in Mineralogy and Earth Materials	1
GEOL 316	Optical Mineralogy	1
GEOL 356	Structural Geology and Tectonics	4
GEOL 357	Geological Mapping and Field Methods	1
GEOL 365	Igneous and Metamorphic Petrology	3
GEOL 368	Sedimentary Geology	4
Total Credits		**31**

No more than 9 credits in 490 may be counted toward a degree in Geology.

Communication Proficiency requirement: According to the university-wide Communication Proficiency Grade Requirement (http://catalog.iastate.edu/previouscatalogs/2022-2023/academics/#communicationproficiencypolicytext), students must demonstrate their communication proficiency by earning a grade of C or better in ENGL 250. The department requires a grade of C or better in ENGL 309 or ENGL 314.

ENGL 150	Critical Thinking and Communication	3
ENGL 250	Written, Oral, Visual, and Electronic Composition	3
or ENGL 250H	Written, Oral, Visual, and Electronic Composition: Honors	
One of the following:		3
ENGL 309	Proposal and Report Writing	
ENGL 314	Technical Communication	
Total Credits		**9**

Students in all ISU majors must complete a three-credit course in U.S. diversity and a three-credit course in international perspectives. Check (http://www.registrar.iastate.edu/courses/div-ip-guide.html) for a list of approved courses. Discuss with your advisor how the two courses that you select can be applied to your graduation plan.

LAS majors require a minimum of 120 credits, including a minimum of 45 credits at the 300/400 level. At least 8 credits in the major from 300+ courses must earn grade C or better. The average grade of all courses in the major must be 2.0 or higher. You must also complete the LAS world language requirement.

FOUR YEAR PLAN

Below is a suggested pathway for new majors.

Geology, B.S.

Freshman

Fall	Credits	Spring	Credits
GEOL 112	1	GEOL 113	1
GEOL 100 or 101	3	GEOL 102	3
GEOL 100L	1	GEOL 102L	1
CHEM 177	4	CHEM 178	3
CHEM 177L	1	CHEM 178L	1
ENGL 150	3	MATH 166	4
MATH 165	4	Arts-and-Humanities Choice	3
	17		**16**

Sophomore

Fall	Credits	Spring	Credits
GEOL 315	3	GEOL 365	3
GEOL 315L	1	Advanced Geology Elective Choice[1]	3
GEOL 316	1	PHYS 132	4
LIB 160	1	PHYS 132L	1
ENGL 250	3	U.S. Diversity Choice	3
PHYS 131	4	Elective (300+ level)	3
PHYS 131L	1		

Social Science Choice		3			
		17		**17**	
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
GEOL 368		4 GEOL 356		4 GEOL 302	6
GEOL 357		1 Social Science Choice		3	
Advanced Geology Elective Choice[1]		3 Advanced Geology Elective Choice[1]		3	
Arts & Humanities Choice		3 Arts & Humantities Choice		3	
ENGL 309 or 314 (Advanced Writing)		3			
		14		**13**	**6**
Senior					
Fall	**Credits**	**Spring**	**Credits**		
GEOL 479		3 Advanced Geology Elective Choice		3	
Advanced Geology Elective Choice[1]		3 Elective (300+ level)		3	
Social Science Choice		3 Elective (300+ level)		3	
International Perspective Choice		3 World Language 102 Choice		4	
World Language 101 Choice		4			
		16		**13**	

[1] Choose from list of approved courses available from an advisor or the departmental office.

Minor - Geology

A minor in Geology may be earned by taking 15 credits of geology coursework, including:

GEOL 100	How the Earth Works	3
or GEOL 201	Geology for Engineers and Environmental Scientists	
or GEOL 101	Environmental Geology: Earth in Crisis	
GEOL 100L	How the Earth Works: Laboratory	1
GEOL 102	History of the Earth	3
GEOL 102L	History of the Earth: Laboratory	1

Although many students will take GEOL 100 as the first course in this sequence, GEOL 101 or GEOL 201 may be taken in place of GEOL 100. Note: all students must take GEOL 100L (How the Earth Works: Laboratory). The remainder of the coursework should be at the 300 level or above. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement.

Concurrent Undergraduate and Graduate Programs

A concurrent program is offered which combines a bachelor of science degree in geology and a master of science degree in geology. This program gives well-qualified Iowa State juniors and seniors the opportunity to begin working on the M.S. degree before completing the B.S. degree, reducing by at least one year the normal time period necessary to complete both degrees separately. Additionally, a concurrent program exists that gives highly motivated and career-focused students the opportunity to receive a bachelor of science in geology and an M.B.A. (master of business administration). Review the department website (https://ge-at.iastate.edu/) or contact Dr. Cinzia Cervato for more information regarding these programs

Graduate Study

The department offers programs leading to the master of science and doctor of philosophy with majors in Geology, Earth Science, and Meteorology. Students desiring a major in the above fields normally will have a strong undergraduate background in the physical and mathematical sciences. Individuals desiring to enter a graduate program are evaluated by considering their undergraduate preparation and performance along with their expressed goals in the statement of purpose. All prospective students should reach out to individual faculty members who they wish to work with prior to applying.

Programs of study are designed on an individual basis in accordance with requirements of the Graduate College and established requirements for each departmental major. Additional coursework is normally taken in complementary areas such as aerospace engineering, agronomy (soil science), chemistry, civil and construction engineering, computer

engineering, computer science, engineering mechanics, environmental science, materials engineering, mathematics, mechanical engineering, microbiology, physics, or statistics. Departmental requirements provide a strong, broad background in the major and allow considerable flexibility in the program of each individual.

A dissertation is required of all Ph.D. candidates.

M.S. students in Geology are required to complete a thesis. The M.S. in Earth Science is available to students electing the non-thesis (Creative Component) option in Geology or Meteorology.

Graduates in Geology specialize in a subdiscipline, but they comprehend and can communicate the basic principles of geology and supporting sciences. They possess the capacity for critical and independent thinking. They are able to write a fundable research proposal, evaluate current relevant literature, carry out the proposed research, and communicate the results of their research to peers at national meetings and to the general public. They work as consultants on engineering and environmental problems, explorers for new minerals and hydrocarbon resources, researchers, teachers, writers, editors, and museum curators.