

MAJOR IN GEOLOGY

Geology is the study of past and present processes shaping the Earth's surface, atmosphere, and interior. Geologists are responsible for understanding the fundamental tectonic processes operating on the Earth. They play important roles in sustainable critical minerals exploration, water resource management and protection, geologic hazard assessment, and understanding the evolution of life on our planet and beyond. Geology majors are prepared to enter successful careers in a range of geoscience industries (e.g., environmental consulting, state or federal scientific or regulatory agencies, resource exploration), to teach at the secondary level, or to attend graduate school. Students interested in the teaching certification in Earth and Space Sciences should investigate TU's Earth-Space Sciences major.

Requirements

The Geology major requires 47 units in geology and non-geology requirements, plus 17-20 additional units of electives for a total of 64-67 units.

Code	Title	Units
Required Geology Courses		
GEOL 121 or GEOL 122	PHYSICAL GEOLOGY HONORS PHYSICAL GEOLOGY	4
GEOL 123	HISTORICAL GEOLOGY	4
GEOL 305	ENVIRONMENTAL GEOLOGY	4
GEOL 321	STRUCTURAL GEOLOGY	4
GEOL 331	MINERALOGY	4
GEOL 333	PETROLOGY OF IGNEOUS AND METAMORPHIC ROCKS	4
GEOL 443	SEDIMENTOLOGY AND STRATIGRAPHY	4
Additional Required Courses		
CHEM 131 & 131L	GENERAL CHEMISTRY I LECTURE and GENERAL CHEMISTRY I LABORATORY	4
CHEM 132 & 132L	GENERAL CHEMISTRY II LECTURE and GENERAL CHEMISTRY II LABORATORY	4
MATH 211 or MATH 273	CALCULUS FOR APPLICATIONS CALCULUS I	3-4
Select one of the following sequences:		8
PHYS 211 & PHYS 212	GENERAL PHYSICS I; NON CALCULUS-BASED and GENERAL PHYSICS II; NON CALCULUS-BASED	
PHYS 241 & PHYS 242	GENERAL PHYSICS I CALCULUS-BASED and GENERAL PHYSICS II CALCULUS-BASED	
Electives		
Select minimum five courses from the following list. Minimum three courses must be from Geology (GEOL). ¹		17-20
ASTR 261	INTRODUCTION TO ASTROPHYSICS	
ASTR 371	PLANETARY ASTRONOMY	
BIOL 205	GENERAL BOTANY ²	
BIOL 310	CONSERVATION BIOLOGY ²	
CHEM 310	INSTRUMENTAL ANALYSIS ²	

CHEM 333 & 333L	ESSENTIALS OF ORGANIC CHEM [LECTURE] and ESSENTIALS OF ORGANIC CHEMISTRY LABORATORY	
or CHEM 334 & CHEM 336	ORGANIC CHEMISTRY I [LECTURE] and INTRODUCTORY ORGANIC CHEMISTRY LABORATORY	
CHEM 345	PRINCIPLES OF PHYSICAL CHEMISTRY	
GEOG 221	INTRODUCTION TO GEOSPATIAL TECHNOLOGY	
GEOG 232	INTRO TO GEOGRAPHIC INFORMATION SCIENCE	
GEOG 315	GEOMORPHOLOGY	
GEOG 319	SOILS AND VEGETATION	
GEOG 321	INTRODUCTION TO REMOTE SENSING AND PHOTOGRAMMETRY	
GEOG 373	CLIMATOLOGY	
GEOG 377	METEOROLOGY	
GEOG 409	APPLIED CLIMATOLOGY	
GEOG 416	ADVANCED REMOTE SENSING: DIGITAL IMAGE PROCESSING AND ANALYSIS	
GEOG 419	CLIMATE CHANGE: SCIENCE TO POLICY	
GEOL 301	SUSTAINABILITY AND THE USE OF NATURAL RESOURCES	
GEOL 307	PALEONTOLOGY	
GEOL 357	OCEANOGRAPHY	
GEOL 410	METHODS FOR ENVIRONMENTAL GEOCHEMISTRY	
GEOL 415	HYDROGEOLOGY	
GEOL 421	TECTONICS	
GEOL 470	SPECIAL TOPICS IN GEOLOGY	
GEOL 489	INTRODUCTION TO RESEARCH ³	
GEOL 490	INDEPENDENT RESEARCH IN GEOLOGY ⁴	
GEOL 492	GEOLOGICAL FIELD METHODS	
GEOL 494	TRAVEL STUDY	
GEOL 495	RESEARCH PROBLEMS IN GEOLOGY ³	
MATH 231	BASIC STATISTICS	
MATH 274	CALCULUS II	
PHYS 307	INTRODUCTORY MATHEMATICAL PHYSICS	
PHYS 351	MECHANICS	
PHYS 352	THERMODYNAMICS AND KINETIC THEORY ²	

Total Units **64-68**

¹ Other upper (300-400) level courses in Biology, Chemistry, Physics or Geography may substitute as electives, but must be approved by a student's adviser prior to registration.

² Course has prerequisite(s) not listed among the elective courses above.

³ Course requires department permission to be applied toward electives.

⁴ If selected as an elective, GEOL 490 must be taken for a minimum of 3 units with the experience culminating in a public oral or poster presentation or equivalent. The presentation should be given in the

semester that the 3rd unit of GEOL 490 is taken. Maximum 3 units total of GEOL 490 may be applied toward electives.

- Each graduate will conduct and present a basic geological research project using appropriate tools, technologies and methodologies.

Four-Year Plan of Study

Sample Four-Year Plan

The selected course sequence below is an example of the simplest path to degree completion. Based on course schedules, student needs, and student choice, individual plans may vary. Students should consult with their adviser to make the most appropriate elective choices and to ensure that they have completed the required number of units (120) to graduate.

(For students ready to take Calculus)

Freshman

Term 1	Units Term 2	Units
CHEM 131 & 131L (Core 7)	4 CHEM 132 & 132L (Core 8)	4
GEOL 121 or 122	4 GEOL 123	4
MATH 273 or 211 (Core 3)	4 PHYS 211 or 241	4
Core 1 (or Core 2)	3 Core 2 (or Core 1)	3
	Core 5	3
	15	18

Sophomore

Term 1	Units Term 2	Units
GEOL 331	4 GEOL 305	4
PHYS 212 or 242	4 GEOL 333	4
Geology Elective	3 Core 9	3
Core 6	3 Core 10	3
	14	14

Junior

Term 1	Units Term 2	Units
GEOL 321	4 GEOL 443	4
Geology Elective	3 Geology Elective	4
Core 4	3 Core 13	3
Core 11	3 Core 14	3
Core 12	3 Elective	3
	16	17

Senior

Term 1	Units Term 2	Units
Geology Elective	4 Geology Elective	3
Elective	3 Elective	3
Elective	3 Elective	3
Elective	3 Elective	3
	Elective	1
	13	13

Total Units 120

Learning Outcomes

- Each graduate shall demonstrate a general understanding of the physical constitution of the earth including the chemistry and origin of common earth materials.
- Each graduate shall demonstrate a general understanding of both the internal and external dynamic processes of the earth system.