

**Curriculum map**

Department of Geological Sciences

*\*NOTE: GEOLOGY HAS FOUR MAJORS TRACKS THAT SHARE SOME COMMON FEATURES BUT HAVE DIFFERENT EMPHASES*

**Learning outcomes (LOs):** Having completed a major in the \*Geology Track:

1. Students will be proficient with the measurement, mapping, analytical and/or modeling tools that are required to quantify and analyze important aspects of Earth materials, Earth processes and Earth history.
2. When confronted with the (real-world) problem of incomplete, inconsistent and noisy geological data sets, students will be able to develop and test hypotheses in a systematic way. Students will become comfortable qualifying their answers to problems by stating assumptions and caveats.
3. Students will use techniques from the traditional disciplines of mineralogy, petrology, geochemistry, structural geology, tectonics, stratigraphy, and field geology to solve complex problems across a diversity of scales through time and space that require consistent geological reasoning

**Key:** I = introduces outcome; D = develops outcome; A = assesses mastery of outcome

Course(s)	Title/description	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6
<b>Core Requirements</b>							
101-103 or 201-203	Introductory Geology	I	I	I			
315	Earth Physics	D	D				
316	Introduction to Hydrology	D	D				
318	Introduction to Field Methods	D	D	D			
Phys	Introductory sequence (201 & 202) or (251 & 252)	D					
Chem	Introductory sequence (221 & 222) or (224 & 225)	D					
Other Science	Phys 203 or Phys 253 or Ch 223 or Ch 226	D					
Math	Introductory sequence (251 & 252) or (246 & 247) and (253 or 343 or 425 or Geol 418 or Phys 481)	D					
<b>Track Requirements</b>							
331	Mineralogy	D		D			
332	Petrology	D		D			
334	Sedimentology and Stratigraphy	D	D	D			
350, 351, 352	Structural Geology	D	D	D			
406	Field Geology		A	A			
<b>Electives</b>							
353	Geologic Hazards		D	D			
363/463	MATLAB for Earth Scientists and Computational Earth Science	D/A	D/A				
416	Sedimentary Petrology	A	A	A			
418	Earth and Environmental Data Analysis	A	A				

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420	Geocommunication		A			
425	Geology of Ore Deposits	A	A	A		
431, 433-435	Advanced Paleontology	A	A	A		
438	Geobiology	A	A			
440	Sedimentary Basin Analysis	A	A	A		
441	Hillslope Geomorphology	A	A	A		
452	Neotectonics and Quaternary Geology	A	A	A		
453	Tectonics	A	A	A		
455	Mechanical Earth	A	A			
462	Environmental Geomechanics	A	A			
466	Geodynamics	A	A			
467	Fault Mechanics	A	A			
468	Introduction to Seismology	A	A			
471	Thermodynamic Geochemistry	A	A	A		
472	Aqueous-Mineral-Gas Equilibria	A	A	A		
473	Isotope Geochemistry	A	A	A		

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**Learning outcomes (LOs):** Having completed a major in the \*Environmental Science Track:

1. Students will be proficient with the measurement, mapping, analytical and/or modeling tools that are required to quantify and analyze important aspects of Earth materials, Earth processes and Earth history.
2. When confronted with the (real-world) problem of incomplete, inconsistent and noisy geological data sets, students will be able to develop and test hypotheses in a systematic way. Students will become comfortable qualifying their answers to problems by stating assumptions and caveats.
4. Students will recognize and describe the key dynamic processes that operate on the Earth's surface environments, including those that are dominated by the behavior of rivers, hill slopes, soils, ground water and oceans, as well as the interaction of humans with these environments.

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Course(s)	Title/description	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6
<b>Core Requirements</b>							
101-103 or 201-203	Introductory Geology	I	I		I		
311	Earth Materials	D			D		
315	Earth Physics	D	D		D		
316	Introduction to Hydrology	D	D		D		
318	Introduction to Field Methods	D	D		D		
331	Mineralogy	D					
332	Petrology	D					
Phys	Introductory sequence (201 & 202 or Bi 211) or (251 & 252)	D					
Chem	Introductory sequence (221 & 222) or (224 & 225)	D					
Other Science	Phys 203 or Phys 253 or Ch 223 or Ch 226 or Bi 212 or Bi 213	D					
Math	Introductory sequence (251 & 252) or (246 & 247) and (253 or 343 or 425 or Geol 418 or Phys 481)	D					
<b>Track Requirements</b>							
GEOG 323	Biogeography	D			D		
310	Earth Resources	D	D		D		
334	Sedimentology and Stratigraphy	D	D		D		
353	Geologic Hazards		D		D		
451	Hydrogeology				A		
<b>Electives</b>							
350-352	Structural Geology	D	D		D		
363/463	MATLAB for Earth Scientists and Computational Earth Science	D/A	D/A				

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406	Field Geology	A	A		A		
416	Sedimentary Petrology	A	A		A		
418	Earth and Environmental Data Analysis	A	A		A		
420	Geocommunication		A				
425	Geology of Ore Deposits	A	A		A		
431, 433-435	Advanced Paleontology	A	A		A		
438	Geobiology	A	A		A		
440	Sedimentary Basin Analysis	A	A		A		
441	Hillslope Geomorphology	A	A		A		
452	Neotectonics and Quaternary Geology	A	A		A		
453	Tectonics	A	A				
455	Mechanical Earth	A	A		A		
462	Environmental Geomechanics	A	A		A		
466	Geodynamics	A	A				
467	Fault Mechanics	A	A				
468	Introduction to Seismology	A	A				
471	Thermodynamic Geochemistry	A	A		A		
472	Aqueous-Mineral-Gas Equilibria	A	A		A		
473	Isotope Geochemistry	A	A		A		

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Department of Geological Sciences

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**Learning outcomes (LOs):** Having completed a major in the \*Paleontology Track:

1. Students will be proficient with the measurement, mapping, analytical and/or modeling tools that are required to quantify and analyze important aspects of Earth materials, Earth processes and Earth history.
2. When confronted with the (real-world) problem of incomplete, inconsistent and noisy geological data sets, students will be able to develop and test hypotheses in a systematic way. Students will become comfortable qualifying their answers to problems by stating assumptions and caveats.
5. Students will develop the tools and techniques necessary to recognize geological evidence and reconstruct geological history for specific stages in biological activity and adaptation related to the evolution of life, as preserved in fossils extracted from ancient rocks.

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Course(s)	Title/description	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6
<b>Core Requirements</b>							
101-103 or 201-203	Introductory Geology	I	I			I	
311	Earth Materials	D				D	
315	Earth Physics	D					
316	Introduction to Hydrology	D	D				
318	Introduction to Field Methods	D	D			D	
331	Mineralogy	D	D			D	
332	Petrology	D				D	
Phys	Introductory 201 or 251	D					
Chem	Introductory sequence (221, 222, 223) or (224, 225, 226)	D					
Other Science	(Bi 211 & 212 or 213) or (Phys 202 & 203) or (Phys 252 & 253)	D					
Math	Introductory sequence (251 & 252) or (246 & 247) and (253 or 343 or 425 or Geol 418 or Phys 481)	D					
<b>Track Requirements</b>							
334	Sedimentology and Stratigraphy	D				D	
350, 351, 352	Structural Geology	D	D			D	
406	Field Geology	A	A			A	
Any two of 431, 433, 434, 435	Advanced Paleontology	A	A			A	
<b>Electives</b>							
353	Geologic Hazards		D				

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363/463	MATLAB for Earth Scientists and Computational Earth Science	D/A	D/A				
416	Sedimentary Petrology	A	A			A	
418	Earth and Environmental Data Analysis	A	A			A	
420	Geocommunication		A				
425	Geology of Ore Deposits	A	A				
438	Geobiology	A	A			A	
440	Sedimentary Basin Analysis	A	A			A	
441	Hillslope Geomorphology	A	A				
442	Neotectonics and Quaternary Geology	A	A			A	
453	Tectonics	A	A				
455	Mechanical Earth	A	A				
462	Environmental Geomechanics	A	A				
466	Geodynamics	A	A				
467	Fault Mechanics	A	A				
468	Introduction to Seismology	A	A				
471	Thermodynamic Geochemistry	A	A				
472	Aqueous-Mineral-Gas Equilibria	A	A				
473	Isotope Geochemistry	A	A			A	

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Department of Geological Sciences

*\*NOTE: GEOLOGY HAS FOUR MAJORS TRACKS THAT SHARE SOME COMMON FEATURES BUT HAVE DIFFERENT EMPHASES*

**Learning outcomes (LOs):** Having completed a major in the \*Geophysics Track:

1. Students will be proficient with the measurement, mapping, analytical and/or modeling tools that are required to quantify and analyze important aspects of Earth materials, Earth processes and Earth history.
2. When confronted with the (real-world) problem of incomplete, inconsistent and noisy geological data sets, students will be able to develop and test hypotheses in a systematic way. Students will become comfortable qualifying their answers to problems by stating assumptions and caveats.
6. Students will develop a foundation in mathematics and physics that enables them to quantitatively describe key aspects of fundamental Earth processes such as earthquakes, mantle flow, plate movements, heat flow, and crustal deformation.

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Course(s)	Title/description	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6
<b>Core Requirements</b>							
101-103 or 201-203	Introductory Geology	I	I				I
311	Earth Materials	D					
315	Earth Physics	D					D
316	Introduction to Hydrology	D	D				D
318	Introduction to Field Methods	D	D				
331	Mineralogy	D	D				
332	Petrology	D					
Phys	Introductory sequence 251, 252, 253	D					
Chem	Introductory sequence (221 & 222) or (224 & 225)	D					
Math	Introductory sequence 251, 252, 253	D					
<b>Track Requirements</b>							
334	Sedimentology and Stratigraphy	D					
455	Mechanical Earth	D	D				A
MATH 256, 281, 282	Differential Equations, Vector Calculus	I					I
PHYS	Intermediate sequence (351, 352, 353 or 411, 412, 413)	I					I
<b>Electives</b>							
350-352	Structural Geology	D	D				D
353	Geologic Hazards		D				D
363/463	MATLAB for Earth Scientists and Computational Earth Science	D/A	D/A				D
406	Field Geology	A	A				

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416	Sedimentary Petrology	A	A				
418	Earth and Environmental Data Analysis	A	A				A
420	Geocommunication		A				
425	Geology of Ore Deposits	A	A				
431, 433-435	Advanced Paleontology	A	A				
438	Geobiology	A	A				
440	Sedimentary Basin Analysis	A	A				
441	Hillslope Geomorphology	A	A				A
452	Neotectonics and Quaternary Geology	A	A				
453	Tectonics	A	A				A
462	Environmental Geomechanics	A	A				A
466	Geodynamics	A	A				A
467	Fault Mechanics	A	A				A
468	Introduction to Seismology	A	A				A
471	Thermodynamic Geochemistry	A	A				A
472	Aqueous-Mineral-Gas Equilibria	A	A				A
473	Isotope Geochemistry	A	A				A



**General Education offerings**  
Department of Geological Sciences

The Geological Sciences focus on developing and promoting an understanding of our planet, its resources, the marine and terrestrial environments, and past and future global change. Seventeen courses in the Geological Sciences can be applied for credit towards the Science group requirement. These courses introduce students to the foundations of geoscience and its many sub-disciplines and the fundamental methods that are widely used to advance our understanding of the Earth. These courses range from broad introductory surveys to more focused investigations of specific earth components and systems. Considerable time and emphasis is given to the formulation and testing of hypotheses, critical evaluation of conflicting information, synthesis of quantitative information into effective graphics, and clear, concise written communication, all of which are essential to scientific work.