MAJOR IN GEOSCIENCES, ENVIRONMENTAL GEOLOGY CONCENTRATION

The Environmental Geology Concentration within the Geosciences major enables students to develop expertise in processes that occur at the surface and in the shallow-subsurface of the Earth and address environmental implications of geological process and human activities. The curriculum emphasizes courses spanning the fundamentals of geology, surface, and shallow-subsurface processes, field-based methodologies, and environmental geology.

Learning Objectives

Upon successful completion of this program, students will be able to:

1. Demonstrate foundational skills and knowledge in all sub-disciplines of geology (physical and historical geology, earth materials, sedimentology and stratigraphy, structural geology)
2. Exhibit valuable skills in scientific reasoning, quantitative data analysis and reasoning; field, analytical, and remote sensing skills; spatial thinking and map use enabling them to contribute effectively to professional work and engage in original research.
3. Use visualization tools, theory, computation, and simulations to explain field observations and experimental results, make interpretations and test hypotheses.
4. Obtain, organize, and critically evaluate geologic information, and effectively present it through oral and written discourse with specialists and non-specialists.
5. Ethically and responsibly engage their knowledge of geology to address current global and scientific challenges.
6. Apply sustainability principles that incorporate complex environmental, economic, and social factors.
7. Demonstrate proficiency in investigating human interactions with Earth, its climate, and ecosystems, particularly from depths of groundwater to the top of the vegetation canopy.
8. Exhibit valuable professional skills related to environmental resource management and protection.

Requirements Effective Fall 2026

Freshman

		AUCC	Credits
CHEM 111	General Chemistry I (GT-SC2)	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	1
CO 150	College Composition (GT-CO2)	1A	3
GEOL 150[1]	Dynamic Earth (GT-SC2)	3A	4
GEOL 154	Earth and Climate Change Through Time		4
GEOL 192	New Student Seminar--Exploring Geosciences		1
MATH 160[2]	Calculus for Physical Scientists I (GT-MA1)	1B	4
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-bahvioral-sciences)		3C	3
Elective			3
	Total Credits		**30**

Sophomore

CHEM 113	General Chemistry II		3
CHEM 114	General Chemistry Lab II		1
GEOL 310	Earth Materials		4
GEOL 311	Earth's Interior		3
GEOL 312	Earth's Surface		2
GEOL 313	Earth Systems		2
GEOL 314	Earth's Surface Laboratory		1
MATH 161[3]	Calculus for Physical Scientists II (GT-MA1)	1B	4
Select one course from the folllowing			3
CO 300	Writing Arguments (GT-CO3)	2	
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)	2	
JTC 300	Strategic Writing and Communication (GT-CO3)	2	
Select one course from the following:			5
PH 121	General Physics I (GT-SC1)	3A	
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	

Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
	Total Credits		**31**
Junior			
GEOL 344	Stratigraphy and Sedimentology	4A	3
GEOL 372	Structural Geology	4B	4
GEOL 376	Geologic Field Methods	4A,4C	2
GEOL 446	Environmental Geology		3
NR 319	Introduction to Geospatial Science		4
SOCR 240	Introductory Soil Science		4
Select one course from the following:			3
STAT 301	Introduction to Applied Statistical Methods		
STAT 315	Intro to Theory and Practice of Statistics		
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	3
	Total Credits		**26**
Summer			
GEOL 476	Field Geoscience Capstone	4A,4C	4
	Total Credits		**4**
Senior			
GEOL 454	Geomorphology		3
Environmental Geoscience list: Select one of the following courses			3-4
GEOL 366	Low-Temperature Geochemistry		
GEOL 415	Critical Zone Science		
GEOL 452	Hydrogeology		
SOCR 470	Soil Physics		
Directed Technical Electives (See list below):			12
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	3
Electives[4]			7-8
	Total Credits		**29**
	Program Total Credits:		**120**

Directed Technical Electives

Code	Title	Credits
Select a minimum of 12 credits from a minimum of four courses. A minimum of 6 credits must be from GEOL subject code:		
AREC 342	Water Law, Policy, and Institutions	3
ATS 440/GES 440	Sea Level Rise and a Sustainable Future	3
BZ 471 & BZ 472	Stream Biology and Ecology and Stream Biology and Ecology Laboratory	4
CIVE 322	Basic Hydrology	3
CIVE 440	Nonpoint Source Pollution	3
CIVE 515	River Mechanics	3
CIVE 529	Environmental Organic Chemistry	3
CIVE 538	Aqueous Chemistry	3
DSCI 335	Inferential Reasoning in Data Analysis	3
ECON 340/AREC 340	Introduction-Economics of Natural Resources	3
GEOL 332	Optical Mineralogy	2
GEOL 342	Paleontology	3
GEOL 343	Dinosaur Paleontology Field Camp	1
GEOL 364	Igneous and Metamorphic Petrology	3
GEOL 366	Low-Temperature Geochemistry [6]	3
GEOL 415	Critical Zone Science [6]	3
GEOL 440	Geodetic and Near-Surface Geophysical Methods	4
GEOL 442	Applied Geophysics	4
GEOL 447	Mineral Deposits	3
GEOL 452	Hydrogeology [6]	4
GEOL 476	Field Geoscience Capstone [7]	1-6
GEOL 494A	Independent Study: Environmental/ Engineering Geology [5]	1-18
GEOL 498	Research [5]	1-6
GEOL 541	Geostatistics	2
GEOL 546	Sedimentary Basin Analysis	3
GEOL 548	Petroleum Geology	4
GEOL 551	Groundwater Modeling	3

GEOL 552	Advanced Topics in Hydrogeology	2-3
GEOL 554	Remote Sensing of the Earth System	3
GR 410	Climate Change: Science, Policy, Implications	3
GR 430	Land Change Science and Remote Sensing	3
MATH 261	Calculus for Physical Scientists III	4
MATH 340	Intro to Ordinary Differential Equations	4
MATH 369	Linear Algebra I	3
NR 323/GR 323	Remote Sensing and Image Interpretation	3
NR 400	Public Communication in Natural Resources	3
NR 422	GIS Applications in Natural Resource Management	4
NR 426	Programming for GIS I	2
NR 427	Programming for GIS II	2
NR 450	Geospatial Project Design and Analysis	4
NR 453	Geospatial Field Methods in Natural Resources	2
NR 503/GR 503	Remote Sensing and Image Analysis	4
PHIL 565	Seminar in Environmental Philosophy	3
POLS 361	U.S. Environmental Politics and Policy	3
SOC 461	Water and Social Justice	3
SOCR 375	Soil Biogeochemistry	3
SOCR 440	Pedology and Soil Survey	4
SOCR 467	Soil and Environmental Chemistry	3
SOCR 470	Soil Physics [6]	3
STAT 315	Intro to Theory and Practice of Statistics [8]	3
WR 417	Watershed Measurements	3
WR 418	Land Use and Water Quality	3
WR 419	Water Quality Analyses	3
WR 474	Snow Hydrology	3
WR 524/CIVE 524	Modeling Watershed Hydrology	3

1 GEOL 110, GEOL 120, GEOL 122, or GEOL 124 in combination with GEOL 121 may be substituted for GEOL 150.

2 MATH 155 may be substituted for MATH 160.

3 Students who substituted MATH 155 for MATH 160 should substitute MATH 255 for MATH 161.

4 Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

5 A maximum of one credit may be counted toward Directed Technical Electives.

6 May be selected as a Directed Technical Elective if not taken in to fulfill the Environmental Geoscience requirement.

7 Additional credits of GEOL 476 in addition to the 4 required credits to satisfy the major may be taken as electives.

8 May be selected as a Directed Technical Elective if not taken in the junior year to fulfill the statistics requirement.

Major Completion Map

Freshman

Semester 1		**Critical**	**Recommended**	**AUCC**	**Credits**
CO 150	College Composition (GT-CO2)	X		1A	3
GEOL 150	Dynamic Earth (GT-SC2)	X		3A	4
GEOL 192	New Student Seminar--Exploring Geosciences	X			1
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioural-sciences)			X	3C	3
	Total Credits				**15**
Semester 2		**Critical**	**Recommended**	**AUCC**	**Credits**
CHEM 111	General Chemistry I (GT-SC2)	X		3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	X		3A	1
GEOL 154	Earth and Climate Change Through Time	X			4
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		X		1C	3
Elective			X		3
CO 150 and MATH 160 must be completed by the end of Semester 2.		X			
	Total Credits				**15**

Sophomore

Semester 3		**Critical**	**Recommended**	**AUCC**	**Credits**
CHEM 113	General Chemistry II	X			3
CHEM 114	General Chemistry Lab II	X			1
GEOL 310	Earth Materials	X			4
GEOL 311	Earth's Interior	X			3
MATH 161	Calculus for Physical Scientists II (GT-MA1)	X		1B	4
	Total Credits				**15**

Semester 4		Critical	Recommended	AUCC	Credits
GEOL 312	Earth's Surface	X			2
GEOL 313	Earth Systems	X			2
GEOL 314	Earth's Surface Laboratory	X			1
Select one course from the following:		X			3
CO 300	Writing Arguments (GT-CO3)			2	
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)			2	
JTC 300	Strategic Writing and Communication (GT-CO3)			2	
Select one course from the following:		X			5
PH 121	General Physics I (GT-SC1)			3A	
PH 141	Physics for Scientists and Engineers I (GT-SC1)			3A	
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			X	3D	3
CHEM 113 must be completed by the end of Semester 4.		X			
	Total Credits				**16**

Junior

Semester 5		Critical	Recommended	AUCC	Credits
GEOL 344	Stratigraphy and Sedimentology	X		4A	3
NR 319	Introduction to Geospatial Science	X			4
SOCR 240	Introductory Soil Science	X			4
Select one course from the following:		X			3
STAT 301	Introduction to Applied Statistical Methods				
STAT 315	Intro to Theory and Practice of Statistics				
GEOL 344 and PH 121 or 141 must be completed by the end of Semester 5.		X			
	Total Credits				**14**

Semester 6		Critical	Recommended	AUCC	Credits
GEOL 372	Structural Geology	X		4B	4
GEOL 376	Geologic Field Methods	X		4A,4C	2
GEOL 446	Environmental Geology	X			3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	3
MATH 161 and STAT 301 or STAT 315 must be completed by the end of Semester 6.		X			
	Total Credits				**12**

Summer		Critical	Recommended	AUCC	Credits
GEOL 476	Field Geoscience Capstone	X		4A,4C	4
	Total Credits				**4**

Senior

Semester 8		Critical	Recommended	AUCC	Credits
Environmental Geosciences (select one from the following):		X			3-4
GEOL 366	Low-Temperature Geochemistry				
GEOL 415	Critical Zone Science				
GEOL 452	Hydrogeology				
SOCR 470	Soil Physics				
Directed Technical Elective (See List on Concentration Requirements tab)		X			6
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanites)			X	3B	3
	Total Credits				**12-13**

Semester 9		Critical	Recommended	AUCC	Credits
GEOL 454	Geomorphology	X			3
Directed Technical Elective (See Department List on Concentration Requirements tab)		X			6
Electives		X			7-8

The benchmark courses for the 9th semester are the remaining courses in the entire program of study.	X	
Total Credits		**16-17**
Program Total Credits:		**120**