

Geology (BS)

The degree of Bachelor of Science in Geology is offered in the Department of Marine, Earth and Atmospheric Sciences. Geological science — or Earth science — is a broad and interdisciplinary field that encompasses other disciplines such as biology, chemistry, math, and physics. Knowledge of Earth processes provides a critical framework for the assessment of resources, geologic hazards, and environmental stewardship. Many geologists work in the petroleum or natural gas exploration industry or in the mineral industry. Many other geoscientists find work related to natural hazards (e.g., earthquakes, volcanoes, and landslides), as geologists on some of the world's largest engineering projects (dams, tunnels, bridges, tall buildings), in the geothermal and alternative energy sectors, in the remediation of hazardous waste and groundwater pollution control, and in the field of environmental rehabilitation (e.g., stream restoration). Geoscientists work across industries — from Fortune 100 companies to small environmental consulting and law firms, state agencies and nonprofit organizations. Many others are employed in the education sector including at universities, community colleges and high schools.

For more information about our geology program, visit our website (<https://meas.sciences.ncsu.edu/undergraduate/programs/earth-science/>).

Contact

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Plan Requirements

Code	Title	Hours
Orientation/Computer Literacy		
COS 100	Science of Change ¹	2
Computer Science Option (p. 2) ^{2, 6}		3
Writing and Speaking		
COM 110	Public Speaking	3
ENG 101	Academic Writing and Research ²	4
Select one of the following:		3
ENG 331	Communication for Engineering and Technology	
ENG 332	Communication for Business and Management	
ENG 333	Communication for Science and Research	
Mathematics and Natural Sciences		
MA 131 or MA 141	Calculus for Life and Management Sciences A ² Calculus I	3-4
MA 231 or MA 241	Calculus for Life and Management Sciences B ² Calculus II	3-4
CH 101	Chemistry - A Molecular Science ²	3
CH 102	General Chemistry Laboratory	1
CH 201	Chemistry - A Quantitative Science	3
CH 202	Quantitative Chemistry Laboratory	1
PY 205 & PY 206 or PY 211	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory College Physics I	4

PY 208 & PY 209 or PY 212	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory College Physics II	4
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Geology Core Courses ²

MEA 100	Earth System Science: Exploring the Connections	4
MEA 101 or MEA 140 or MEA 150 or MEA 200	Geology I: Physical ³ Natural Hazards and Global Change Environmental Issues in Water Resources Introduction to Oceanography	3-4
MEA 110	Geology I Laboratory	1
MEA 202	Geology II: Historical	3
MEA 211	Geology II Laboratory	1
MEA 257	Visualizing Geology in 3D & 4D	1
MEA 410	Introduction to Mineralogy	3
MEA 440	Igneous and Metamorphic Petrology	3
MEA 450	Introductory Sedimentology and Stratigraphy	4
MEA 451	Structural Geology	4
MEA 465	Geologic Field Camp	4
MEA 466	Preparatory Course for Field Camp	1
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1

Restricted Electives

Restricted Electives: ²		15
MEA 300	Environmental Geology	
MEA 323	Geochemistry of Natural Waters	
MEA 369	Life on Earth: Principles of Paleontology	
MEA 411	Marine Sediment Transport	
MEA 415	Climate Dynamics	
MEA 470	Introduction to Geophysics	
MEA 471	Exploration and Engineering Geophysics	
MEA 481	Geomorphology: Earth's Dynamic Surface	
MEA 485	Introduction to Hydrogeology	

Math/Science Option (p. 2) ²		6
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Advised Electives

Advised Electives ^{2, 4}		9
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GEP Courses

GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		6
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
World Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (verify requirement)		

Free Electives

Free Electives (12 Hr S/U Lmt) ⁵	3
Total Hours	120

¹ COS 100 is for new freshmen only. Transfer students will need to select a course from the GEP Interdisciplinary Perspectives course list.

² A grade of a C- or higher is required. No more than one D will be allowed in Geology Core Courses, Restricted Electives, and Advised Electives. No more than one D will be allowed in other math and natural science courses.

³ Transfer students who have completed MEA 140, MEA 150, or MEA 200 can use those credits in lieu of MEA 101. All students must complete MEA 110.

⁴ Advised Electives are in the geosciences and related fields and are to be selected with the advice and consent of the advisor to meet the student's career objective.

⁵ Free electives may not be MA 100, MA 101, MA 103, MA 107, MA 108, or MA 111.

⁶ GIS 280 or MEA 217 is recommended.

Computer Science Option

Code	Title	Hours
GIS 280	Introduction to GIS ⁶	3
or MEA 217	Introduction to Computing in the Geosciences	
or MA 116	Introduction to Scientific Programming (Math)	
or CSC 111	Introduction to Computing: Python	
or CSC 112	Introduction to Computing-FORTRAN	
or CSC 113	Introduction to Computing - MATLAB	
or CSC 116	Introduction to Computing - Java	

Restricted Electives

Code	Title	Hours
MEA 300	Environmental Geology	4
MEA 323	Geochemistry of Natural Waters	3
MEA 369	Life on Earth: Principles of Paleontology	3
MEA 411	Marine Sediment Transport	3
MEA 415	Climate Dynamics	3
MEA 470	Introduction to Geophysics	3
MEA 471	Exploration and Engineering Geophysics	3
MEA 481	Geomorphology: Earth's Dynamic Surface	3
MEA 485	Introduction to Hydrogeology	3

Math/Science Option

Code	Title	Hours
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
BIO 183	Introductory Biology: Cellular and Molecular Biology	4
BIO 310	Quantitative Approaches to Biological Problems	3
BIO 315	General Parasitology	3
BIO 325	Paleontological Field Methods	4
BIO 330	Evolutionary Biology	3
BIO 361	Developmental Biology	3
BIO 370	Developmental Anatomy of the Vertebrates	3
BIO 375	Developmental Anatomy Laboratory	2

BIO 405	Functional Histology	3
BIO 414	Cell Biology	3
BIO 416	Cancer Cell Biology	3
BIO 418	Cell Biology Research Lab	2
BIO 424	Endocrinology	3
BIO 432	Evolutionary Medicine	3
BIO 434	Hormones and Behavior	3
BIO 440	The Human Animal: An Evolutionary Perspective	3
BIO 444	The Biology of Love and Sex	3
BIO 481	Senior Capstone Project	1
BIO 482	Capstone Course in Molecular, Cellular, and Developmental Biology	3
BIO 483	Capstone Course in Integrative Physiology and Neurobiology	3
BIO 484	Capstone Course in Human Biology	3
BIO 485	Capstone Course in Ecology, Evolution, and Conservation Biology	3
BIO 488	Neurobiology	3
BIO 498		3
BIO 499		3
BSC 492	Professional Experience	1-3
BSC 493	Research Experience	1-3
BSC 495	Special Topics in Biological Sciences	1-6
CH 220	Introductory Organic Chemistry	3
CH 221	Organic Chemistry I	3
CH 222	Organic Chemistry I Lab	1
CH 315	Quantitative Analysis	3
CH 316	Quantitative Analysis Laboratory	1
CH 331	Introductory Physical Chemistry	4
CH/PSE 335	Principles of Green Chemistry	4
CH 345	Chemistry and War	3
CH 401	Systematic Inorganic Chemistry I	3
CH 403	Systematic Inorganic Chemistry II	3
CH 415	Analytical Chemistry II	3
CH 431	Physical Chemistry I	3
CH 433	Physical Chemistry II	3
CH 435	Introduction to Quantum Chemistry	3
CH 437	Physical Chemistry for Engineers	4
CH 441	Forensic Chemistry	3
CH 442	Advanced Synthetic Techniques	4
CH 444	Advanced Synthetic Techniques II	4
CH 452	Advanced Measurement Techniques I	4
CH 454	Advanced Measurement Techniques II	4
CH 463/563	Molecular Origins of Life	3
CH 495	Special Topics in Chemistry	1-4
CH 499	Undergraduate Research in Chemistry	1-3
MA 242	Calculus III	4
MA 302	Numerical Applications to Differential Equations	1
MA 303	Linear Analysis	3
MA 305	Introductory Linear Algebra and Matrices	3
MA/MEA 315	Mathematics Methods in Atmospheric Sciences	4
MA 325	Introduction to Applied Mathematics	3
MA 331	Differential Equations for the Life Sciences	3

MA/LOG 335	Symbolic Logic	3
MA 341	Applied Differential Equations I	3
MA 351	Introduction to Discrete Mathematical Models	3
MA 401	Applied Differential Equations II	3
MA 402	Mathematics of Scientific Computing	3
MA 403	Introduction to Modern Algebra	3
MA 405	Introduction to Linear Algebra	3
MA 407	Introduction to Modern Algebra for Mathematics Majors	3
MA 408	Foundations of Euclidean Geometry	3
MA 410	Theory of Numbers	3
MA 412	Long-Term Actuarial Models	3
MA 413	Short-Term Actuarial Models	3
MA/CSC 416	Introduction to Combinatorics	3
MA 421	Introduction to Probability	3
MA 425	Mathematical Analysis I	3
MA 426	Mathematical Analysis II	3
MA/CSC 427	Introduction to Numerical Analysis I	3
MA/CSC 428	Introduction to Numerical Analysis II	3
MA 430	Mathematical Models in the Physical Sciences	3
MA 432	Mathematical Models in Life Sciences	3
MA 437	Applications of Algebra	3
MA 444	Problem Solving Strategies for Competitions	1
MA 450	Methods of Applied Mathematics I	3
MA 451	Methods of Applied Mathematics II	3
MA 491	Reading in Honors Mathematics	1-6
MA 493	Special Topics in Mathematics	1-6
MA 494	Major Paper in Mathematics	1
MA 499	Independent Research in Mathematics	1-6
PY 301	Introduction to Quantum Mechanics	3
PY 328	Stellar and Galactic Astrophysics	3
PY 341	Relativity, Gravitation and Cosmology	3
PY 401	Quantum Physics I	3
PY 402	Quantum Physics II	3
PY 407	Introduction to Modern Physics	3
PY 411	Mechanics I	3
PY 412	Mechanics II	3
PY 413	Thermal Physics	3
PY 414	Electromagnetism I	3
PY 415	Electromagnetism II	3
PY 452	Advanced Physics Laboratory	3
PY/ECE/MSE 489	Solid State Solar and Thermal Energy Harvesting	3
PY 495	Special Topics in Physics	1-4
PY 499	Independent Research in Physics	1-6
ST 307	Introduction to Statistical Programming- SAS	1
ST 308	Introduction to Statistical Programming - R	1
ST 311	Introduction to Statistics	3
ST 312	Introduction to Statistics II	3
ST/BUS 350	Economics and Business Statistics	3
ST 370	Probability and Statistics for Engineers	3
ST 371	Introduction to Probability and Distribution Theory	3

ST 372	Introduction to Statistical Inference and Regression	3
ST 401	Experiences in Data Analysis	4
ST 405	Applied Nonparametric Statistics	3
ST/GPH 404	Epidemiology and Statistics in Global Public Health	3
ST 412	Long-Term Actuarial Models	3
ST 413	Short-Term Actuarial Models	3
ST 421	Introduction to Mathematical Statistics I	3
ST 422	Introduction to Mathematical Statistics II	3
ST 430	Introduction to Regression Analysis	3
ST 431	Introduction to Experimental Design	3
ST 432	Introduction to Survey Sampling	3
ST 433	Applied Spatial Statistics	3
ST 434	Applied Time Series	3
ST 435	Statistical Methods for Quality and Productivity Improvement	3
ST 437	Applied Multivariate and Longitudinal Data Analysis	3
ST 440	Applied Bayesian Analysis	3
ST/CSC 442	Introduction to Data Science	3
ST 445	Introduction to Statistical Computing and Data Management	3
ST 446	Intermediate SAS Programming with Applications	3
ST 491	Statistics in Practice	3
ST 495	Special Topics in Statistics	1-6
ST 497	Professional Experience in Statistics	1-3
ST 498	Independent Study In Statistics	1-6
ST 499	Research Experience in Statistics	1-3

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
MEA 100	Earth System Science: Exploring the Connections ²	4
MA 141 or MA 131	Calculus I ² or Calculus for Life and Management Sciences A	3-4
MEA 101 & MEA 110	Geology I: Physical and Geology I Laboratory ²	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
COS 100	Science of Change ¹	2
Hours		14

Spring Semester

CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory ²	4
ENG 101	Academic Writing and Research ²	4
MA 241 or MA 231	Calculus II ² or Calculus for Life and Management Sciences B	3-4

MEA 202 & MEA 211	Geology II: Historical and Geology II Laboratory ²	4
Hours		16

Second Year**Fall Semester**

Math/Science Option (p. 2) ²		3
MEA 410	Introduction to Mineralogy ²	3
PY 205 & PY 206 or PY 211	Physics for Engineers and Scientists I ² or College Physics I	4
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory ²	4
Hours		14

Spring Semester

Computer Science Option (p. 2) ⁶		3
COM 110	Public Speaking	3
MEA 257	Visualizing Geology in 3D & 4D	1
MEA 440	Igneous and Metamorphic Petrology	3
PY 208 & PY 209 or PY 212	Physics for Engineers and Scientists II or College Physics II	4
Hours		14

Third Year**Fall Semester**

Math/Science Option (p. 2) ²		3
MEA 451	Structural Geology ²	4
Restricted Elective (p. 2) ²		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
Hours		13

Spring Semester

Advanced Writing Elective (p. 1)		3
Advised Elective ^{2, 4}		3
MEA 450	Introductory Sedimentology and Stratigraphy ²	4
MEA 466	Preparatory Course for Field Camp ²	1
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences ²	1
Restricted Elective (p. 2) ²		3
Hours		15

Summer

MEA 465	Geologic Field Camp ²	4
Hours		4

Fourth Year**Fall Semester**

Restricted Elective (p. 2) ²		3
Advised Elective ^{2, 4}		3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
Hours		15

Spring Semester

Advised Elective ^{2, 4}		3
Restricted Elective (p. 2) ²		6
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
Free Elective ⁵		3
Hours		15
Total Hours		120

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³ Transfer students who have completed MEA 140, MEA 150, or MEA 200 can use those credits in lieu of MEA 101. All students must complete MEA 110.

⁴ Advised Electives are in the geosciences and related fields and are to be selected with the advice and consent of the advisor to meet the student's career objective.

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⁶ GIS 280 or MEA 217 is recommended.

Career Opportunities

MEAS undergraduate degree programs provide talented students with the foundation of scientific knowledge required for careers in government, industry, or academia. Many students pursue graduate degrees after completion of an MEAS undergraduate degree.

Geology graduates address society's needs for dealing effectively with earth processes, such as water resources and the stability of land forms. They work for engineering firms, permit-issuing agencies, and industries that rely on geological resources. Historical geologists are familiar with the evolution of earth through time and provide a perspective on potential long-term reactions of the earth systems to change. Those who concentrate in Environmental Geology are trained to assess and monitor geological resources such as ground water. Marine geologists are experts in the complex issues facing industry, municipalities, and residents in the dynamic and ecologically vulnerable coastal zone.

MEAS graduates play a key service role for the State of North Carolina, assisting in everything from forecasting severe storms and analyzing the impact of atmospheric pollutants on agriculture and our estuaries, to determining the effects of toxic waste disposal on quality of surface and ground water.

Career Titles

- Agricultural Engineer
- Architect
- Astronomer
- Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary
- Cartographer and Photogrammetrists
- Environmental Compliance Inspector
- Environmental Engineer
- Environmental Planner

- Environmental Research Analyst
- Geographer
- Geological Data Technicians
- Geological Technicians, Except Hydrologic Technicians
- Geologist
- Geophysicist
- Geothermal Production Manager
- Hazardous Waste Management Analyst
- Hydrographer
- Hydrologist
- Industrial Waste Inspector
- Irrigation Engineer
- Landscape Architect
- Materials Scientist
- Meteorologist
- Mining Engineer
- Oceanographer
- Paleontologist
- Park Naturalist
- Petroleum Engineer
- Petroleum Geologist
- Petroleum Laboratory Assistant
- Petroleum Technician
- Seismologist
- Soil Conservation Technician
- Soil Conservationist
- Soil Engineer
- Soil Scientist
- Urban and Regional Planner
- Water Pollution Control Inspector
- Water Resource Specialists
- Weather Forecaster

Learn More About Careers

NCcareers.org (<https://nccareers.org/>)

Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)

Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)

View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)

This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an

account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)

A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

The Geological Society of America (<https://www.geosociety.org/>)

American Geosciences Institute (<https://www.americangeosciences.org/>)

Geology.com - Geology Jobs, Earth Science Jobs, Oil and Gas Jobs (<http://geology.com/jobs/>)