

Marine Sciences (BS): Geology Concentration

To see more about what you will learn in this program, visit the Learning Outcomes website (<https://apps.oirp.ncsu.edu/pgas/>)!

The degree of Bachelor of Science in Marine Science may be obtained by selecting one of five concentrations: Biological Oceanography, Chemistry, Geology, Meteorology, or Physics.

The degree of Bachelor of Science in Natural Resources is available with a concentration in Marine and Coastal Resources.

Marine scientists explore all aspects of the seas and coastal regions, seeking to understand how the oceans, their biological communities, the solid earth and the atmosphere interact. As professionals with interdisciplinary training, marine scientists are needed to advise business, industry and governments on the potential impact of human activities and the wise use of marine resources. Marine scientists work for consulting firms; regulatory agencies; the mass media; business and industry; federal, state and local governments; academic laboratories; research and education organizations; and nonprofit environmental watchdog groups.

Contact

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

Maggie Puryear

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Plan Requirements

Code	Title	Hours	Counts towards
Core Courses/Marine Science ¹			
MEA 100	Earth System Science: Exploring the Connections	4	
MEA 200	Introduction to Oceanography	3	
MEA 210	Oceanography Lab	1	
MEA 250	Introduction to Coastal Environments	3	
MEA 251	Introduction to Coastal Environments Laboratory	1	
MEA 459	Field Investigation of Coastal Processes	5	

MEA 460	Principles of Physical Oceanography	3
MEA 462	Observational Methods and Data Analysis in Marine Physics	3
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1
Geology Concentration ¹		
MEA 101	Geology I: Physical	3
MEA 110	Geology I Laboratory	1
MEA 202	Geology II: Historical	3
MEA 211	Geology II Laboratory	1
MEA 410	Introduction to Mineralogy	3
MEA 450	Introductory Sedimentology and Stratigraphy	4
MEA 451	Structural Geology	4
MEA 570	Geological Oceanography	3
MEA 470	Introduction to Geophysics	3
or MEA 471	Exploration and Engineering Geophysics	
Advised Elective (p. 2) ^{1, 3}		8
Select one of the following		3
Restricted Electives:		
MEA 449/549	Principles of Biological Oceanography	
MEA 467	Marine Meteorology	
MEA 473/573	Principles of Chemical Oceanography	
Basic Math & Sciences		
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory	1
CH 201	Chemistry - A Quantitative Science ¹	3

CH 202	Quantitative Chemistry Laboratory	1
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ¹	4
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4
MA 141	Calculus I ¹	4
MA 241	Calculus II ¹	4
MA 242	Calculus III	4
Statistics Elective (p. 3)		3
Select one of the following		3
Computer Science electives:		
CSC 111	Introduction to Computing: Python	
CSC 112	Introduction to Computing-FORTRAN	
CSC 113	Introduction to Computing - MATLAB	
CSC 116	Introduction to Computing - Java	
GIS 280	Introduction to GIS	
PY 251	Introduction to Scientific Computing	

College Requirements

COS 100	Science of Change ²	2
ENG 101	Academic Writing and Research ¹	4
Select one of the following		3
Advanced Writing courses:		
ENG 331	Communication for Engineering and Technology	
ENG 332	Communication for Business and Management	
ENG 333	Communication for Science and Research	

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)	
Foreign Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/) (verify requirement)	

Total Hours **120**

- ¹ A grade of C- or higher is required. No more than one D will be accepted in MEA core courses and concentration courses. No more than one D will be accepted in other basic math or science courses.
- ² COS 100 is for new freshmen only. Transfer students will need to select a course from the GEP Interdisciplinary Perspectives course list.
- ³ Any MEA course at the 300 level or higher. Select in consultation with your advisor.

Advised Elective

Code	Title	Hours	Counts towards
MEA 300	Environmental Geology	4	
MEA 369	Life on Earth: Principles of Paleontology	3	
MEA 312	Atmospheric Thermodynamics	4	
MEA 315	Mathematics Methods in Atmospheric Sciences	4	
MEA 320	Fundamentals of Air Pollution	3	
MEA 321	Fundamentals of Air Quality and Climate Change	3	
MEA 323	Geochemistry of Natural Waters	3	

MEA 350	Marine Conservation Biology	3
MEA 409	Watershed Forensics	3
MEA 412	Atmospheric Physics	3
MEA 415	Climate Dynamics	3
MEA 421	Atmospheric Dynamics I	3
MEA 422	Atmospheric Dynamics II	3
MEA 425	Introduction to Atmospheric Chemistry	3
MEA 440	Igneous and Metamorphic Petrology	3
MEA 443	Synoptic Weather Analysis and Forecasting	4
MEA 444	Mesoscale Analysis and Forecasting	4
MEA 449/549	Principles of Biological Oceanography	3
MEA 455	Micrometeorology	3
MEA 458	Introduction to Tropical Meteorology	3
MEA 463	Fluid Physics	3
MEA 464	Ocean Circulation Systems	3
MEA 466	Preparatory Course for Field Camp	1
MEA 467	Marine Meteorology	3
MEA 468	Aquatic Microbiology	3
MEA 469	Ecology of coastal Resources	3
MEA 473/573	Principles of Chemical Oceanography	3
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts	3
MEA 479	Air Quality	3
MEA 481	Geomorphology: Earth's Dynamic Surface	3

MEA 485	Introduction to Hydrogeology	3
MEA 488	Meteorology for Media	3
MEA 493	Special Topics in MEAS	1-6

Statistics Electives

Code	Title	Hours	Counts towards
ST 311	Introduction to Statistics	3	
ST 312	Introduction to Statistics II	3	
ST 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	

Semester Sequence

Critical Path Courses – Identify using the code (CP) which courses are considered critical path courses which represent specific major requirements that are predictive of student success in a given program/plan. Place the (CP) next to the credit hours for the course.

This is a sample.

First Year

Fall Semester		Hours
COS 100	Science of Change ²	2
MA 141	Calculus I (CP) ¹	4
MEA 100	Earth System Science: Exploring the Connections ¹	4
MEA 101 & MEA 110	Geology I: Physical and Geology I Laboratory (CP) ¹	4
Hours		14

Spring Semester

CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory (CP) ¹	4
ENG 101	Academic Writing and Research ¹	4
MA 241	Calculus II ¹	4
MEA 202 & MEA 211	Geology II: Historical and Geology II Laboratory ¹	4
Hours		16

Second Year**Fall Semester**

CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory ¹	4
MA 242	Calculus III ¹	4
MEA 200 & MEA 210	Introduction to Oceanography and Oceanography Lab (CP) ¹	4
MEA 410	Introduction to Mineralogy ¹	3

Hours **15**

Spring Semester

MEA 250	Introduction to Coastal Environments ¹	3
MEA 251	Introduction to Coastal Environments Laboratory ¹	1
MEA 450	Introductory Sedimentology and Stratigraphy ¹	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ¹	4
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3

Hours **15**

Third Year**Fall Semester**

MEA 460	Principles of Physical Oceanography ¹	3
MEA 451	Structural Geology ¹	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory ¹	4
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3

Hours **15**

Spring Semester

Advanced Writing Elective (p. 1)		3
Computer Science Option Elective (p. 1) ¹		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
MEA 462	Observational Methods and Data Analysis in Marine Physics ¹	3
Statistical Science Option Elective (p. 3) ¹		3
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1

Hours **14**

Summer

MEA 459	Field Investigation of Coastal Processes ²	5
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Hours **5**

Fourth Year**Fall Semester**

GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
MEA 570	Geological Oceanography ¹	3
MEA Restricted Elective (p. 1) ¹		3

Advised Elective (p. 2) ¹ 4

Hours **13**

Spring Semester

Advised Elective (p. 2) ¹ 4

MEA 470 or MEA 471	Introduction to Geophysics ² or Exploration and Engineering Geophysics	3
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GEP Humanities (<http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/>) 3

GEP Social Sciences (<http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/>) 3

Hours **13**

Total Hours **120**

¹ Grade of C- or higher is required in CH 101, 201; ENG 101; MA 141, 241; PY 205. No more than one D will be accepted in MEA core courses and concentration courses. No more than one D will be accepted in other basic math or science courses.

² COS 100 is for new freshmen only. Transfer students will need to select a course from the GEP Interdisciplinary Perspectives course list.

³ Any MEA course at the 300 level or higher. Select in consultation with your advisor.

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 and pursue careers in industry, at government agencies and in academia.

Marine Sciences graduates go on to become oceanographers, to manage our coastal resources, model air-sea interaction, and explore global climate change. They conduct basic and applied research, serving as environmental consultants for industry and governmental agencies, policy and management experts for governmental agencies, and environmental science educators. Graduates with a Natural Resources degree are versed in the fundamental processes and interdisciplinary nature of the coastal zone. As scientists, managers, administrators, and regulators, they make decisions regarding use and conservation of coastal and marine resources.

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.

Meteorology graduates enjoy careers in weather forecasting, air quality assessment, development of weather products and services, broadcast communications, and advanced research. Marine meteorologists study ocean-generated weather systems. Their research is yielding practical benefits such as refined prediction of storm surge, which has streamlined evacuation efforts during severe storms along the Carolina coast. Meteorology graduates with an air quality emphasis work for environmental firms, regulatory agencies, and in applied research. Study

of air quality and how air pollution is transported and dispersed is a rapidly expanding field in the atmospheric sciences.

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.