

# Marine Sciences (BS): Physics 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.

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

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## Plan Requirements

**Marine Sciences (BS): Physics Concentration: 120 Total Units**

Code	Title	Hours
<b>Core Courses/Marine Science</b>		
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 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
<b>Physics Concentration</b>		
MEA 463	Fluid Physics	3
MEA 464	Ocean Circulation Systems	3
MEA 467	Marine Meteorology	3
PY 203	University Physics III <sup>1</sup>	4
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

Technical Elective <sup>2</sup>		3
<b>Basic Math &amp; Sciences</b>		
CH 101	Chemistry - A Molecular Science <sup>1</sup>	3
CH 102	General Chemistry Laboratory	1
CH 201	Chemistry - A Quantitative Science <sup>1</sup>	3
CH 202	Quantitative Chemistry Laboratory	1
PY 201	University Physics I <sup>1</sup>	4
PY 202	University Physics II <sup>1</sup>	4
MA 141	Calculus I <sup>1</sup>	4
MA 241	Calculus II <sup>1</sup>	4
MA 242	Calculus III	4
MA 341	Applied Differential Equations I	3
MA 401	Applied Differential Equations II	3
ST 370	Probability and Statistics for Engineers	3
Select one of the following:		
CSC 111	Introduction to Computing: Python	
CSC 112	Introduction to Computing-FORTRAN	
CSC 113	Introduction to Computing - MATLAB	
CSC 116	Introduction to Computing - Java	
PY 251	Introduction to Scientific Computing	
<b>College Requirements</b>		
COS 100	Science of Change	2
ENG 101	Academic Writing and Research <sup>1</sup>	4
Select one of the following:		
ENG 331	Communication for Engineering and Technology	
ENG 332	Communication for Business and Management	
ENG 333	Communication for Science and Research	
<b>GEP Courses</b>		
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		6
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		6
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		2
GEP Additional Breadth ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> ) (Humanities/Social Sciences/Visual and Performing Arts)		3
GEP U.S. Diversity ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/</a> ) (verify requirement)		
GEP Global Knowledge ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/</a> ) (verify requirement)		
Foreign Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/</a> ) (verify requirement)		
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> A grade of C- or higher is required.

<sup>2</sup> Students should consult their academic advisors to determine which courses fill this requirement.

## 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.

Course	Title	Hours
<b>First Year</b>		
<b>Fall Semester</b>		
MA 141	Calculus I (CP) <sup>1</sup>	4
MEA 100	Earth System Science: Exploring the Connections <sup>2</sup>	4
COS 100	Science of Change	2
PY 201	University Physics I (CP) <sup>1</sup>	4
Hours		14
<b>Spring Semester</b>		
CH 101	Chemistry - A Molecular Science <sup>1</sup>	3
CH 102	General Chemistry Laboratory <sup>3</sup>	1
ENG 101	Academic Writing and Research <sup>1</sup>	4
MA 241	Calculus II (CP) <sup>1</sup>	4
PY 202	University Physics II (CP) <sup>1</sup>	4
Hours		16
<b>Second Year</b>		
<b>Fall Semester</b>		
MA 242	Calculus III <sup>3</sup>	4
MEA 200	Introduction to Oceanography (CP) <sup>2</sup>	3
MEA 210	Oceanography Lab <sup>2</sup>	1
PY 203	University Physics III <sup>1</sup>	4
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3
Hours		15
<b>Spring Semester</b>		
CH 201	Chemistry - A Quantitative Science <sup>1</sup>	3
CH 202	Quantitative Chemistry Laboratory <sup>3</sup>	1
Computer Science Option Elective <sup>3</sup>		3
MA 341	Applied Differential Equations I <sup>3</sup>	3
MEA 250	Introduction to Coastal Environments <sup>2</sup>	3
PY 411	Mechanics I <sup>2</sup>	3
Hours		16
<b>Third Year</b>		
<b>Fall Semester</b>		
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
MA 401	Applied Differential Equations II <sup>3</sup>	3
MEA 460	Principles of Physical Oceanography <sup>2</sup>	3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
PY 411	Mechanics I <sup>2</sup>	3
Hours		13
<b>Spring Semester</b>		
MEA 462	Observational Methods and Data Analysis in Marine Physics <sup>2</sup>	3
MEA 467	Marine Meteorology <sup>2</sup>	3

MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1
PY 413	Thermal Physics <sup>2</sup>	3
ST 370	Probability and Statistics for Engineers <sup>3</sup>	3
GEP Additional Breadth ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
Hours		16
<b>Summer</b>		
MEA 459	Field Investigation of Coastal Processes <sup>2</sup>	5
Hours		5
<b>Fourth Year</b>		
<b>Fall Semester</b>		
Advanced Writing Elective		3
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
MEA 463	Fluid Physics <sup>2</sup>	3
PY 414	Electromagnetism I <sup>2</sup>	3
Hours		13
<b>Spring Semester</b>		
MEA 464	Ocean Circulation Systems <sup>2</sup>	3
PY 415	Electromagnetism II <sup>2</sup>	3
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
Technical Elective <sup>2</sup>		3
Hours		12
Total Hours		120

<sup>1</sup> A grade of C- or higher is required.

<sup>2</sup> No more than one D will be accepted in MEA core courses and concentration courses.

<sup>3</sup> No more than one D will be accepted in other basic math or science courses.

## 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.