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.

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
Associate Director of Undergraduate Programs
mwpollar@ncsu.edu
919.513.1093

Plan Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
<th>Counts towards</th>
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<tr>
<td>MEA 100</td>
<td>Earth System Science: Exploring the Connections</td>
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<td>Core Courses/Marine Science</td>
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<tr>
<td>MEA 200</td>
<td>Introduction to Oceanography</td>
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<td>MEA 210</td>
<td>Oceanography Lab</td>
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<td>MEA 250</td>
<td>Introduction to Coastal Environments</td>
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<td>MEA 459</td>
<td>Field Investigation of Coastal Processes</td>
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<td>MEA 460</td>
<td>Principles of Physical Oceanography</td>
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<tr>
<td>MEA 462</td>
<td>Observational Methods and Data Analysis in Marine Physics</td>
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<td>MEA 495</td>
<td>Junior Seminar in the Marine, Earth, and Atmospheric Sciences</td>
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Physics Concentration

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<tr>
<td>MEA 463</td>
<td>Fluid Physics</td>
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<td>MEA 464</td>
<td>Ocean Circulation Systems</td>
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<td>MEA 467</td>
<td>Marine Meteorology</td>
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<tr>
<td>PY 203</td>
<td>University Physics III ¹</td>
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<td>PY 411</td>
<td>Mechanics I</td>
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<td>PY 412</td>
<td>Mechanics II</td>
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<td>PY 413</td>
<td>Thermal Physics</td>
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<td>PY 414</td>
<td>Electromagnetism I</td>
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<td>PY 415</td>
<td>Electromagnetism II</td>
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Technical Elective ² 3

Basic Math & Sciences

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<th>Code</th>
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<tr>
<td>CH 101</td>
<td>Chemistry - A Molecular Science ¹</td>
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<td>CH 102</td>
<td>General Chemistry Laboratory</td>
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<td>CH 201</td>
<td>Chemistry - A Quantitative Science ¹</td>
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<td>CH 202</td>
<td>Quantitative Chemistry Laboratory</td>
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<tr>
<td>PY 201</td>
<td>University Physics I ¹</td>
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<tr>
<td>PY 202</td>
<td>University Physics II ¹</td>
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<tr>
<td>MA 141</td>
<td>Calculus I ¹</td>
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<td>MA 241</td>
<td>Calculus II ¹</td>
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<td>MA 242</td>
<td>Calculus III</td>
<td>4</td>
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<td>MA 341</td>
<td>Applied Differential Equations I</td>
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<td>MA 401</td>
<td>Applied Differential Equations II</td>
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<tr>
<td>ST 370</td>
<td>Probability and Statistics for Engineers</td>
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Select one of the following

Computer Science electives: 3
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

College Requirements
COS 100  Science of Change 3
ENG 101  Academic Writing and Research 1

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

GEP Courses
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)
GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-additional-breadth/)(Humanities/Social Sciences/Visual and Performing Arts)
GEP U.S. Diversity (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/) (verify requirement)
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.
2 Students should consult their academic advisors to determine which courses fill this requirement.
3 COS 100 is for new freshmen only. Transfer students will need to select a course from the GEP Interdisciplinary Perspectives course list.

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
MA 141  Calculus I (CP) 1  4
MEA 100  Earth System Science: Exploring the Connections 2  4
COS 100  Science of Change 2  2
PY 201  University Physics I (CP) 1  4

Hours 14

Spring Semester
CH 101  Chemistry - A Molecular Science 1  3
CH 102  General Chemistry Laboratory 3  1
ENG 101  Academic Writing and Research 1  4
MA 241  Calculus II (CP) 1  4
PY 202  University Physics II (CP) 1  4

Hours 16

Second Year
Fall Semester
MA 242  Calculus III 3  4
MEA 200  Introduction to Oceanography (CP) 2  3
MA 210  Oceanography Lab 2  1
PY 203  University Physics III 1  4
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/) 3

Hours 15

Spring Semester
CH 201  Chemistry - A Quantitative Science 1  3
CH 202  Quantitative Chemistry Laboratory 3  1
Computer Science Option Elective (p. 1) 3  3
MA 341  Applied Differential Equations I 3  3
MEA 250  Introduction to Coastal Environments 2  3
PY 411  Mechanics I 2  3

Hours 16
### Third Year
#### Fall Semester
- **GEP Humanities** ([link](http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)) 3
- MA 401 Applied Differential Equations II 3
- MEA 460 Principles of Physical Oceanography 3
- **GEP Health and Exercise Studies** ([link](http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)) 1
- PY 412 Mechanics II 3

**Hours** 13

#### Spring Semester
- MEA 462 Observational Methods and Data Analysis in Marine Physics 3
- MEA 467 Marine Meteorology 3
- MEA 495 Junior Seminar in the Marine, Earth, and Atmospheric Sciences 1
- PY 413 Thermal Physics 3
- ST 370 Probability and Statistics for Engineers 3
- **GEP Additional Breadth** ([link](http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)) 3

**Hours** 16

#### Summer
- MEA 459 Field Investigation of Coastal Processes 5

**Hours** 5

### Fourth Year
#### Fall Semester
- Advanced Writing Elective (p. 1) 3
- **GEP Social Sciences** ([link](http://catalog.ncsu.edu/undergraduate/gep-social-sciences/)) 3
- **GEP Health and Exercise Studies** ([link](http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)) 1
- MEA 463 Fluid Physics 3
- PY 414 Electromagnetism I 3

**Hours** 13

#### Spring Semester
- MEA 464 Ocean Circulation Systems 3
- PY 415 Electromagnetism II 3
- **GEP Humanities** ([link](http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)) 3
- Technical Elective 3

**Hours** 12

**Total Hours** 120

1 A grade of C- or higher is required.
2 No more than one D will be accepted in MEA core courses and concentration courses.
3 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.