

# M.S. IN OCEAN SCIENCES

## Overview

The Ocean Sciences (OCE) graduate program naturally fosters multidisciplinary research and education in a wide variety of topics at the interfaces between physical, chemical, and biological oceanography. OCE M.S. students learn first-hand about instrumentation and methods to measure the ocean using both in-situ and space-based sensors, and about laboratory, analytical, and numerical models to understand oceanic processes.

## Admission Requirements

The best OCE applicants have a strong foundation in science, with a bachelor's and/or master's degree in physics, mathematics, chemistry, biology, engineering, geophysics, oceanography, marine science, or a related field. The GRE score is not required for admission. Those whose first language is not English must pass the Test of English as a Foreign Language (TOEFL) with a score of at least 550. All application requirements are available here (<https://graduate.rsmas.miami.edu/admissions/application-information/>).

## Curriculum Requirements

The applicable requirements will be those in effect during that academic year when the student first registered in the Program, unless stated otherwise in the OCE Handbook or by the OCE Graduate Program Director. Any uncertainties regarding the procedures and requirements should be clarified with the OCE Graduate Program Director and the RSMAS Graduate Studies Office (GSO).

All RSMAS courses are listed on the RSMAS website. Students should consult their advisors and the OCE Graduate Program Director regarding their choices of courses; courses taken by students should be approved by their advisors. Any deviations from the requirements listed below must be approved by the advisor and the OCE Graduate Program Director.

OCE students follow one of four academic tracks: **Ocean Dynamics**, **Air-Sea Interaction and Remote Sensing**, **Marine Biogeochemistry**, or **Biophysical Interactions**.

### Ocean Dynamics Track

Code	Title	Credit Hours
The OCE M.S. degree requires 30 total credits. <sup>1</sup>		
<b>Core Courses</b>		<b>6</b>
Choose 2 courses from the following:		
OCE 603	Physical Oceanography	
OCE 610	Ocean Biogeochemistry	
OCE 701	Mathematical Methods in Marine Physics	
<b>Ocean Dynamics Track</b>		<b>6</b>
OCE 611	Geophysical Fluid Dynamics I	
OCE 711	Geophysical Fluid Dynamics II	
<b>Electives <sup>2</sup></b>		<b>12</b>
<b>Thesis Research</b>		<b>6</b>
OCE 810	Master's Thesis	
<b>Additional Requirements</b>		
RSM 700	Research Ethics	
Comprehensive Examination <sup>3</sup>		
COMPASS Seminars <sup>4</sup>		
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup>

- Minimum of 24 course credits and 6 thesis credits.
- Required courses are normally taken during the student's first full year of study (beginning in the fall semester). The Comprehensive Examination will focus on the required courses.

<sup>2</sup>

- The remaining course credits can be obtained by taking other graduate courses offered at RSMAS or, with permission of the advisor, at other departments of UM.

<sup>3</sup>

- All M.S. and Ph.D. students are required to take the comprehensive examination. For full-time students, the comprehensive examination should be taken before the end of their first full year of graduate studies at RSMAS. This examination will be arranged by a Comprehensive Examination Committee comprised of the OCE Graduate Program Director and the instructors (or their assignees) of the required courses taken by the students.

- The purpose of this examination is to evaluate students' understanding of materials in the required courses, and their ability to integrate and apply these materials. The outcome of the comprehensive examination determines whether students are permitted to proceed to the M.S. or Ph.D. program.
  - The comprehensive examination consists of written and oral components.
    - The written component, which lasts no longer than 8 hours, consists of a combination of open- and closed-book questions on the material covered in up to four of the required courses taken by each student (to be selected by the student and the OCE Graduate Program Director if the student's academic track has more than four required courses).
    - The oral component, which lasts no longer than 2 hours for each student, may include questions related to all the courses taken by the student.
  - Students and advisors will receive feedback from the comprehensive exam committee on the strengths and weaknesses of the student, and possible recommendations on how to address those.
  - The outcome of the exam, which is determined by the Comprehensive Examination Committee, is based on the student's performance on this examination, together with consideration of the student's first year academic record. Possible exam outcomes are:
    - **PhD-Pass:** Students with this result may bypass the M.S. degree and start working toward earning a Ph.D. If the student chooses to, they may complete an M.S. degree before pursuing a Ph.D.
    - **MS-Pass:** Students with this result are required to defend an M.S. thesis and get approval from their M.S. committee before pursuing a Ph.D.
    - **Fail:** Students with this result will have an opportunity to re-take the exam once.
  - A grade of **PhD-Pass** or **MS-Pass** is required for M.S. students.
- 4
- Regular attendance of the COMPASS seminar series (Combined OCE, MPO, ATM Seminar Series) is expected; each student is required to attend at least 10 seminar sessions per semester.
  - In the same seminar series, each M.S. student is expected to give at least one 15-minute presentation each year after the student passes the comprehensive examination.

### Air-Sea Interaction and Remote Sensing Track

Code	Title	Credit Hours
The OCE M.S. degree requires 30 total credits. <sup>1</sup>		
<b>Core Courses</b>		<b>6</b>
Choose 2 courses from the following:		
OCE 603	Physical Oceanography	
OCE 610	Ocean Biogeochemistry	
OCE 701	Mathematical Methods in Marine Physics	
<b>Air-Sea Interaction and Remote Sensing Track</b>		<b>6</b>
OCE 675	Fluid Mechanics	
OCE 676	Wave Propagation in the Ocean Environment	
<b>Electives <sup>2</sup></b>		<b>12</b>
<b>Thesis Research</b>		<b>6</b>
OCE 810	Master's Thesis	
<b>Additional Requirements</b>		
RSM 700	Research Ethics	
Comprehensive Examination <sup>3</sup>		
COMPASS Seminars <sup>4</sup>		
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup>

- Minimum of 24 course credits and 6 thesis credits.
- Required courses are normally taken during the student's first full year of study (beginning in the fall semester). The Comprehensive Examination will focus on the required courses.

<sup>2</sup>

- The remaining course credits can be obtained by taking other graduate courses offered at RSMAS or, with permission of the advisor, at other departments of UM.

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  - In the same seminar series, each M.S. student is expected to give at least one 15-minute presentation each year after the student passes the comprehensive examination.

## Marine Biogeochemistry Track

Code	Title	Credit Hours
The OCE M.S. degree requires 30 total credits. <sup>1</sup>		
<b>Core Courses</b>		<b>6</b>
OCE 603	Physical Oceanography	
OCE 610	Ocean Biogeochemistry	
<b>Marine Biogeochemistry Track</b>		<b>12</b>
OCE 612	Marine Organic Geochemistry	
OCE 622	Marine Microbial Dynamics	
MBE 704	Biological Oceanography	
OCE 705	Chemical Oceanography	
<b>Electives <sup>2</sup></b>		<b>6</b>
<b>Thesis Research</b>		<b>6</b>
OCE 810	Master's Thesis	
<b>Additional Requirements</b>		
RSM 700	Research Ethics	
Comprehensive Examination <sup>3</sup>		
COMPASS Seminars <sup>3</sup>		
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup>

- Minimum of 24 course credits and 6 thesis credits.
- Required courses are normally taken during the student's first full year of study (beginning in the fall semester). The Comprehensive Examination will focus on the required courses.

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## Biophysical Interactions Track

Code	Title	Credit Hours
The OCE M.S. degree requires 30 total credits. <sup>1</sup>		
<b>Core Courses</b>		<b>6</b>
OCE 701	Mathematical Methods in Marine Physics	
OCE 603 or OCE 610	Physical Oceanography Ocean Biogeochemistry	
<b>Biophysical Interactions Track</b>		<b>3</b>
OCE 736	Modeling of Physical-Biological Interactions	
<b>Electives</b> <sup>2</sup>		<b>15</b>
<b>Thesis Research</b>		<b>6</b>
OCE 810	Master's Thesis	
<b>Additional Requirements</b>		
RSM 700	Research Ethics	
Comprehensive Examination <sup>3</sup>		
COMPASS Seminars <sup>4</sup>		
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup>

- Minimum of 24 course credits and 6 thesis credits.
- Required courses are normally taken during the student's first full year of study (beginning in the fall semester). The Comprehensive Examination will focus on the required courses.

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## Plan of Study Samples

### Ocean Dynamics Track

First Year		Credit Hours
<b>Fall</b>		
OCE 603	Physical Oceanography	3
OCE 611	Geophysical Fluid Dynamics I	3
OCE 701	Mathematical Methods in Marine Physics (or Approved Elective)	3
RSM 700	Research Ethics	0
<b>Credit Hours</b>		<b>9</b>
<b>Spring</b>		
OCE 610	Ocean Biogeochemistry (or Approved Elective)	3
OCE 711	Geophysical Fluid Dynamics II	3
Approved Elective		3
<b>Credit Hours</b>		<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
Approved Elective		3
Approved Elective		3
<b>Credit Hours</b>		<b>6</b>
<b>Spring</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Summer</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Total Credit Hours</b>		<b>30</b>

**Air-Sea Interaction and Remote Sensing Track**

<b>First Year</b>		<b>Credit Hours</b>
<b>Fall</b>		
OCE 603	Physical Oceanography	3
OCE 675	Fluid Mechanics	3
OCE 701	Mathematical Methods in Marine Physics (or Approved Elective)	3
RSM 700	Research Ethics	0
<b>Credit Hours</b>		<b>9</b>
<b>Spring</b>		
OCE 610	Ocean Biogeochemistry (or Approved Elective)	3
OCE 676	Wave Propagation in the Ocean Environment	3
Approved Elective		3
<b>Credit Hours</b>		<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
Approved Elective		3
Approved Elective		3
<b>Credit Hours</b>		<b>6</b>
<b>Spring</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Summer</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Total Credit Hours</b>		<b>30</b>

**Marine Biogeochemistry Track**

<b>First Year</b>		<b>Credit Hours</b>
<b>Fall</b>		
OCE 603	Physical Oceanography	3
OCE 612	Marine Organic Geochemistry	3
MBE 704	Biological Oceanography	3
RSM 700	Research Ethics	0
<b>Credit Hours</b>		<b>9</b>
<b>Spring</b>		
OCE 610	Ocean Biogeochemistry	3
OCE 622	Marine Microbial Dynamics	3
Approved Elective		3
<b>Credit Hours</b>		<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
OCE 705	Chemical Oceanography	3
Approved Elective		3
<b>Credit Hours</b>		<b>6</b>
<b>Spring</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Summer</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Total Credit Hours</b>		<b>30</b>

## Biophysical Interactions Track

First Year		Credit Hours
<b>Fall</b>		
OCE 603 or 610	Physical Oceanography or Ocean Biogeochemistry	3
OCE 701	Mathematical Methods in Marine Physics	3
Approved Elective		3
RSM 700	Research Ethics	0
<b>Credit Hours</b>		<b>9</b>
<b>Spring</b>		
OCE 736	Modeling of Physical-Biological Interactions	3
Approved Elective		3
Approved Elective		3
<b>Credit Hours</b>		<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
Approved Elective		3
Approved Elective		3
<b>Credit Hours</b>		<b>6</b>
<b>Spring</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Summer</b>		
OCE 810	Master's Thesis	3
<b>Credit Hours</b>		<b>3</b>
<b>Total Credit Hours</b>		<b>30</b>

## Mission

The Department of Ocean Sciences (OCE) seeks to advance knowledge and understanding of physical, chemical and biological processes in the oceans. We train graduate students and young scientists to be leaders in ocean-science-related fields. With distinct strengths in ocean dynamics, air-sea interaction and remote sensing, ocean biogeochemical cycles, biophysical interactions and coastal processes, we strive to achieve excellence in research and education. We seek to promote, among the public and policy makers, responsible science-based stewardship of the oceans. Our program commits to inspire graduates to continued scholarship, service, and innovation in an environment that is inclusive and diverse.

## Goals

To train graduate students and young scientists for positions in ocean-science-related fields.

## Student Learning Outcomes

- **Proof of Fundamental Knowledge:** Students will demonstrate a broad understanding of fundamentals of ocean science and an awareness of how scientific research in their topical areas relate to current societal issues.
- **Capability to Explain and Defend Own Work:** Students will demonstrate a comprehensive understanding of their field of work and the ability to explain their work and defend their results in oral and written communication in a way adequate for employment as a research scientist or equivalent professional level scientist.
- **Capability to Give Short Presentations:** Students will demonstrate the ability to explain their work and defend their key results in a short oral presentation in an environment similar to a session at a scientific conference or a professional project meeting.