PH.D. IN OCEAN SCIENCES

Program 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 Handbook or by the Program Director.

All RSMAS courses are listed on the GSO website. All courses taken by students should be approved by their advisors. Students are recommended to consult with their advisors and the OCE Program Director regarding their choices of courses. Deviations from the requirements must be approved by the advisor and the OCE Academic Committee.

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

Ocean Dynamics Track

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The OCE Ph.D. degree requires 60 total credits.</td>
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<tr>
<td>Core Courses</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Choose 2 courses from the following:</td>
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<tr>
<td>OCE 610</td>
<td>Ocean Biogeochemistry</td>
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<tr>
<td>OCE 603</td>
<td>Physical Oceanography</td>
<td></td>
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<tr>
<td>Ocean Dynamics Track</td>
<td></td>
<td>6</td>
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<tr>
<td>OCE 611</td>
<td>Geophysical Fluid Dynamics I</td>
<td></td>
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<tr>
<td>OCE 711</td>
<td>Geophysical Fluid Dynamics II</td>
<td></td>
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<tr>
<td>Electives</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Dissert. Research</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>OCE 830</td>
<td>Doctoral Dissertation</td>
<td></td>
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<tr>
<td>Required Examinations</td>
<td></td>
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<tr>
<td>Comprehensive Examination</td>
<td></td>
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<tr>
<td>Qualifying Examination</td>
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<td>4</td>
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<tr>
<td>Additional Requirements</td>
<td></td>
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<tr>
<td>Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)</td>
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<tr>
<td>RSM 700</td>
<td>Research Ethics</td>
<td></td>
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<tr>
<td>OCE Seminar</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Educational Training Program (TA)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>RSM 771</td>
<td>Educational Training 1</td>
<td></td>
</tr>
<tr>
<td>RSM 772</td>
<td>Educational Training 2</td>
<td></td>
</tr>
<tr>
<td>RSM 773</td>
<td>Educational Training 3</td>
<td></td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

1. Minimum of 27 course credits and 12 dissertation credits. Minimum of 9 course credits should be taken from 700 level courses.

2. At least one 3-credit course must be taken outside the OCE program, unless the student came to RSMAS with an M.S. degree from another institution. Courses with the 'RSM' designation count as outside courses. The remaining course credits can be obtained by taking other graduate courses offered by OCE, RSMAS, or UM.
The OCE Ph.D. degree requires 60 total credits.

### Core Courses

- Choose 2 courses from the following:
  - OCE 610: Ocean Biogeochemistry
  - OCE 603: Physical Oceanography
  - OCE 701: Mathematical Methods in Marine Physics

### Air-Sea Interaction and Remote Sensing Track

- OCE 675: Fluid Mechanics
- OCE 676: Wave Propagation in the Ocean Environment

### Electives

- 15 credits

### Dissertation Research

- 33 credits

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1. Material from the required core courses will appear on the Comprehensive Examination (along with material from other courses from the first year).
2. A grade of PhD-Pass is required to bypass the M.S. degree and begin working towards the Ph.D.
   - Students earning a grade of MS-Pass may pursue a Ph.D. after completing the M.S. degree, subject to approval from their M.S. thesis committee.
3. 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 (beginning in the fall semester). 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.
4. 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.
5. The comprehensive examination consists of oral and written 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 the required courses taken by each student.
   - The oral component, which lasts no longer than 2 hours for each student, may include questions from all the courses taken by the student.
6. 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.

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### Air-Sea Interaction and Remote Sensing Track

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<tr>
<td>OCE 701</td>
<td>Mathematical Methods in Marine Physics</td>
<td>6</td>
</tr>
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1. These guidelines complement those given in the UM Graduate Student Handbook.
2. Ph.D. students are expected to take the qualifying exam and proposal defense by the end of their third full year in the program (beginning in the fall semester). If a student needs to take the exam after that time, he/she will need to provide a written explanation to, and get approval from, the OCE academic committee.
3. While the exact format is left to the discretion of the Ph.D. committee, a typical oral qualifying exam consists of an hour of questions based on the written qualifying exam and other related questions, and a second hour in which the student presents his/her dissertation proposal. It is recommended that the presentation emphasizes future work, rather than a review of previous results, which are in the written proposal.
4. Expectations of the Qualifying Exam

1. Written Exam. The student's written answers should be judged by committee members to demonstrate that the student has adequately addressed each question on the exam. The questions are usually related to the research described in the dissertation proposal.
2. Oral Exam. The student should demonstrate the ability to express him/herself clearly while providing satisfactory responses to questions raised by the committee that relate to the written qualifying exam questions, and any other questions asked by the committee members.
3. Dissertation Proposal. The proposal should be written by the student in clear English. The proposal should demonstrate the capability of the student to produce and present research of a quality that, when completed, is suitable for submission to a peer-reviewed journal. Emphasis should be placed on the proposed research: the questions and hypotheses to be tested, the data and methodology used to test the hypotheses, and some anticipated results (which may or may not be realized). A student is encouraged to discuss the proposal with the advisor.

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5. Attendance to the OCE, MPO or AMP seminars is required every semester.
6. In the same seminar series, each student is expected to give at least one 15-minute presentation each year after the student passes the comprehensive examination.

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### Ph.D. in Ocean Sciences

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7. Specific requirements for TAs are outlined in the RSMAS Student Handbook.
8. Ph.D. students are expected to be a Teaching Assistant (TA) for two courses while pursuing their degree.
9. The mandatory TA program will include training of new TAs, evaluation of their performance, and recognition of excellence. The goal is to make the experience as valuable as possible for the TA, the faculty, and the students taking our courses.
10. A training session and two teaching opportunities are offered as courses in educational training (RSM 771, RSM 772, RSM 773). Students will be registered accordingly.

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### Air-Sea Interaction and Remote Sensing Track

- OCE 610: Ocean Biogeochemistry
- OCE 603: Physical Oceanography
- OCE 701: Mathematical Methods in Marine Physics

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### Electives

- 15 credits

### Dissertation Research

- 33 credits

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1. The OCE Ph.D. degree requires 60 total credits.
Required Examinations

Comprehensive Examination³
Qualifying Examination⁴

Additional Requirements

Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)
RSM 700  Research Ethics
OCE Seminar⁵
Educational Training Program (TA)⁶
RSM 771  Educational Training 1
RSM 772  Educational Training 2
RSM 773  Educational Training 3

Total Credit Hours 60

1. Minimum of 27 course credits and 12 dissertation credits.
   - Minimum of 9 course credits should be taken from 700 level courses.

2. At least one 3-credit course must be taken outside the OCE program, unless the student came to RSMAS with an M.S. degree from another institution.
   - Courses with the 'RSM' designation count as outside courses.
   - The remaining course credits can be obtained by taking other graduate courses offered by OCE, RSMAS, or UM.

3. Material from the required core courses will appear on the Comprehensive Examination (along with material from other courses from the first year).
   - A grade of Ph.D-Pass is required to bypass the M.S. degree and begin working towards the Ph.D.
   - Students earning a grade of MS-Pass may pursue a Ph.D. after completing the M.S. degree, subject to approval from their M.S. thesis committee.
   - 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 (beginning in the fall semester). 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 oral and written 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 the required courses taken by each student.
     - The oral component, which lasts no longer than 2 hours for each student, may include questions from 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, he/she may complete a M.S. degree before pursuing a Ph.D.
       - MS-Pass: Students with this result are required to defend a master's thesis and get approval from his/her M.S. thesis committee before pursuing a Ph.D.
       - Fail: Students with this result will have an opportunity to re-take the exam once.

4. These guidelines complement those given in the UM Graduate Student Handbook.
   - Ph.D. students are expected to take the qualifying exam and proposal defense by the end of their third full year in the program (beginning in the fall semester). If a student needs to take the exam after that time, he/she will need to provide a written explanation to, and get approval from, the OCE academic committee.
   - While the exact format is left to the discretion of the Ph.D. committee, a typical oral qualifying exam consists of an hour of questions based on the written qualifying exam and other related questions, and a second hour in which the student presents his/her dissertation proposal. It is recommended that the presentation emphasizes future work, rather than a review of previous results, which are in the written proposal.
   - Expectations of the Qualifying Exam
     1. Written Exam. The student's written answers should be judged by committee members to demonstrate that the student has adequately addressed each question on the exam. The questions are usually related to the research described in the dissertation proposal.
     2. Oral Exam. The student should demonstrate the ability to express him/herself clearly while providing satisfactory responses to questions raised by the committee that relate to the written qualifying exam questions, and any other questions asked by the committee members.
     3. Dissertation Proposal. The proposal should be written by the student in clear English. The proposal should demonstrate the capability of the student to produce and present research of a quality that, when completed, is suitable for submission to a peer-reviewed journal. Emphasis should be placed on the proposed research: the questions and hypotheses to be tested, the data and methodology used to test the hypotheses, and some anticipated results (which may or may not be realized). A student is encouraged to discuss the proposal with the advisor.

5. Attendance to the OCE, MPO or AMP seminars is required every semester.
   - In the same seminar series, each student is expected to give at least one 15-minute presentation each year after the student passes the comprehensive examination.
Ph.D. students are expected to be a Teaching Assistant (TA) for two courses while pursuing their degree. The mandatory TA program will include training of new TAs, evaluation of their performance, and recognition of excellence. The goal is to make the experience as valuable as possible for the TA, the faculty, and the students taking our courses. A training session and two teaching opportunities are offered as courses in educational training (RSM 771, RSM 772, RSM 773). Students will be registered accordingly. Specific requirements for TAs are outlined in the RSMAS Student Handbook.

### Marine Biogeochemistry Track

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<td></td>
</tr>
<tr>
<td>MBE 704</td>
<td>Biological Oceanography</td>
<td></td>
</tr>
<tr>
<td>OCE 705</td>
<td>Chemical Oceanography</td>
<td></td>
</tr>
<tr>
<td>OCE 612</td>
<td>Marine Organic Geochemistry</td>
<td></td>
</tr>
<tr>
<td>or OCE 622</td>
<td>Marine Microbial Dynamics</td>
<td></td>
</tr>
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Total Credit Hours: 60

1. Minimum of 27 course credits and 12 dissertation credits. Minimum of 9 course credits should be taken from 700 level courses.

2. At least one 3-credit course must be taken outside the OCE program, unless the student came to RSMAS with an M.S. degree from another institution. Courses with the 'RSM' designation count as outside courses. The remaining course credits can be obtained by taking other graduate courses offered by OCE, RSMAS, or UM.
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### Core Courses
- Choose 2 courses from the following:
  - OCE 610: Ocean Biogeochemistry
  - OCE 603: Physical Oceanography
  - OCE 701: Mathematical Methods in Marine Physics

### Biophysical Interactions Track
- MBE 704: Biological Oceanography
- OCE 6XX - Math for Biophysical Interactions

### Electives
- 15 Credit Hours

### Dissertation Research
- OCE 830: Doctoral Dissertation

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1. The OCE Ph.D. degree requires 60 total credits.
### Required Examinations

- Comprehensive Examination
- Qualifying Examination

### Additional Requirements

- Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)
- RSM 700 Research Ethics
- OCE Seminar
- Educational Training Program (TA)
- RSM 771 Educational Training 1
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