

PH.D. 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 Ph.D. 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 Ph.D. degree requires 60 total credits. ¹		
Core Courses		6
Choose 2 courses from the following:		
OCE 603	Physical Oceanography	
OCE 610	Ocean Biogeochemistry	
OCE 701	Mathematical Methods in Marine Physics	
Ocean Dynamics Track		6
OCE 611	Geophysical Fluid Dynamics I	
OCE 711	Geophysical Fluid Dynamics II	
Electives ²		15
Dissertation Research		33
OCE 830	Doctoral Dissertation	
Required Examinations		
Comprehensive Examination ³		
Qualifying Examination ⁴		
Additional Requirements		
Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)		
RSM 700	Research Ethics	
COMPASS Seminars ⁵		
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.

- 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.
- 2
- 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.
- 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. 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** is required for Ph.D. students.
 - Ph.D. students earning a grade of **MS-Pass** may pursue a Ph.D. after completing the M.S. degree, subject to approval by their M.S. Committee.
- 4
- Ph.D. students are expected to take the qualifying examination and dissertation proposal defense by the end of their third full year in the program. If a student needs to take the qualifying examination after that time, they will need to provide a written explanation to, and get approval from, the OCE Graduate Program Director.
 - The qualifying examination consists of a written and an oral component.
 - While the exact format is left to the discretion of the Ph.D. Committee, a typical written qualifying examination consists of take-home questions from all Committee members, which need to be completed within three days. The questions are usually related to the research described in the dissertation proposal.
 - A typical oral qualifying examination consists of an hour of questions based on the written questions and other related questions, and a second hour in which the student presents their dissertation proposal. It is recommended that the presentation emphasizes future work rather than a review of previous results, which are in the written dissertation proposal.
 - Expectations of the Qualifying Examination:
 - a. Written Examination: The student's written answers should be judged by Ph.D. Committee members to demonstrate that the student has adequately addressed each question.
 - b. Oral Examination: The student should demonstrate the ability to express themselves clearly while providing satisfactory responses to questions raised by the Ph.D. Committee that relate to the written examination questions, and any other questions asked by Committee members.
 - c. Dissertation Proposal: The dissertation proposal should be written by the student in clear English. The Proposal should demonstrate the student's capability 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 their advisor before submitting it to all Ph.D. Committee members.
 - Possible Outcomes of the Qualifying Examination:
 - **Pass:** Meets all expectations.
 - **Fail:** Unsatisfactory written dissertation proposal or unsatisfactory oral proposal defense.
 - In some cases, the Ph.D. Committee may require revisions to a proposal or question/answer, or a retake of the oral part of the qualifying examination. Normally there is no need to retake the entire qualifying examination or have an additional full Ph.D. Committee meeting in such cases.

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- 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 Ph.D. student is expected to give at least one 15-minute presentation each year after passing the comprehensive examination and at least one 45-minute presentation before defending the Ph.D.
- ⁶
- 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.

Air-Sea Interaction and Remote Sensing Track

Code	Title	Credit Hours
The OCE Ph.D. degree requires 60 total credits. ¹		
Core Courses		6
Choose 2 courses from the following:		
OCE 603	Physical Oceanography	
OCE 610	Ocean Biogeochemistry	
OCE 701	Mathematical Methods in Marine Physics	
Air-Sea Interaction and Remote Sensing Track		6
OCE 675	Fluid Mechanics	
OCE 676	Wave Propagation in the Ocean Environment	
Electives ²		15
Dissertation Research		33
OCE 830	Doctoral Dissertation	
Required Examinations		
Comprehensive Examination ³		
Qualifying Examination ⁴		
Additional Requirements		
Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)		
RSM 700	Research Ethics	
COMPASS Seminars ⁵		
Educational Training Program (TA) ⁶		
RSM 771	Educational Training 1	
RSM 772	Educational Training 2	
RSM 773	Educational Training 3	
Total Credit Hours		60

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- Minimum of 27 course credits and 12 dissertation credits.
 - Minimum of 9 course credits should be taken from 700-level courses.
 - 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.
- ²
- 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.
- 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. 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** is required for Ph.D. students.
 - Ph.D. students earning a grade of **MS-Pass** may pursue a Ph.D. after completing the M.S. degree, subject to approval by their M.S. Committee.
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- Ph.D. students are expected to take the qualifying examination and dissertation proposal defense by the end of their third full year in the program. If a student needs to take the qualifying examination after that time, they will need to provide a written explanation to, and get approval from, the OCE Graduate Program Director.
 - The qualifying examination consists of a written and an oral component.
 - While the exact format is left to the discretion of the Ph.D. Committee, a typical written qualifying examination consists of take-home questions from all Committee members, which need to be completed within three days. The questions are usually related to the research described in the dissertation proposal.
 - A typical oral qualifying examination consists of an hour of questions based on the written questions and other related questions, and a second hour in which the student presents their dissertation proposal. It is recommended that the presentation emphasizes future work rather than a review of previous results, which are in the written dissertation proposal.
 - Expectations of the Qualifying Examination:
 - a. Written Examination: The student's written answers should be judged by Ph.D. Committee members to demonstrate that the student has adequately addressed each question.
 - b. Oral Examination: The student should demonstrate the ability to express themselves clearly while providing satisfactory responses to questions raised by the Ph.D. Committee that relate to the written examination questions, and any other questions asked by Committee members.
 - c. Dissertation Proposal: The dissertation proposal should be written by the student in clear English. The Proposal should demonstrate the student's capability 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 their advisor before submitting it to all Ph.D. Committee members.
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 - **Pass:** Meets all expectations.
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 - In some cases, the Ph.D. Committee may require revisions to a proposal or question/answer, or a retake of the oral part of the qualifying examination. Normally there is no need to retake the entire qualifying examination or have an additional full Ph.D. Committee meeting in such cases.
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- 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 Ph.D. student is expected to give at least one 15-minute presentation each year after passing the comprehensive examination and at least one 45-minute presentation before defending the Ph.D.
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- Ph.D. students are expected to be a Teaching Assistant (TA) for two courses while pursuing their degree.
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 - 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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Marine Biogeochemistry Track

Code	Title	Credit Hours
The OCE Ph.D. degree requires 60 total credits. ¹		
Core Courses		6
OCE 603	Physical Oceanography	
OCE 610	Ocean Biogeochemistry	
Marine Biogeochemistry Track		12
OCE 612	Marine Organic Geochemistry	
OCE 622	Marine Microbial Dynamics	
MBE 704	Biological Oceanography	
OCE 705	Chemical Oceanography	
Electives ²		9
Dissertation Research		33
OCE 830	Doctoral Dissertation	
Required Examinations		
Comprehensive Examination ³		
Qualifying Examination ⁴		
Additional Requirements		
Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)		
RSM 700	Research Ethics	
COMPASS Seminars ⁵		
Educational Training Program (TA) ⁶		
RSM 771	Educational Training 1	
RSM 772	Educational Training 2	
RSM 773	Educational Training 3	
Total Credit Hours		60

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

Code	Title	Credit Hours
The OCE Ph.D. degree requires 60 total credits. ¹		
Core Courses		6
OCE 701	Mathematical Methods in Marine Physics	
OCE 603 or OCE 610	Physical Oceanography Ocean Biogeochemistry	
Biophysical Interactions Track		3
OCE 736	Modeling of Physical-Biological Interactions	
Electives ²		18

Dissertation Research		33
OCE 830	Doctoral Dissertation	
Required Examinations		
Comprehensive Examination ³		
Qualifying Examination ⁴		
Additional Requirements		
Dallas Murphy Writing Workshop or Writing Skills Course (RSM 780)		
RSM 700	Research Ethics	
COMPASS Seminars ⁵		
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.
 - 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.
- ²
- 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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Plan of Study Samples

Ocean Dynamics

Year One		Credit Hours
Fall		
OCE 603	Physical Oceanography (or Approved Elective)	3
OCE 611	Geophysical Fluid Dynamics I	3
OCE 701	Mathematical Methods in Marine Physics (or Approved Elective)	3
RSM 700	Research Ethics	0
Credit Hours		9
Spring		
OCE 610	Ocean Biogeochemistry (or Approved Elective)	3
OCE 711	Geophysical Fluid Dynamics II	3
Approved Elective		3
Credit Hours		9
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Year Two		
Fall		
Approved Elective		3

OCE 830	Doctoral Dissertation	1
	Credit Hours	4
Spring		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Three		
Fall		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 771	Educational Training 1	0
RSM 772	Educational Training 2	0
	Credit Hours	4
Spring		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 773	Educational Training 3	0
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Four		
Fall		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Spring		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Five		
Fall		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Spring		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
	Total Credit Hours	70

Air-Sea Interaction and Remote Sensing Track

Year One		
Fall		Credit Hours
OCE 603	Physical Oceanography (or Approved Elective)	3
OCE 675	Fluid Mechanics	3
OCE 701	Mathematical Methods in Marine Physics (or Approved Elective)	3

RSM 700	Research Ethics	0
	Credit Hours	9
Spring		
OCE 610	Ocean Biogeochemistry (or Approved Elective)	3
OCE 676	Wave Propagation in the Ocean Environment	3
Approved Elective		3
	Credit Hours	9
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Two		
Fall		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
	Credit Hours	4
Spring		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Three		
Fall		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 771	Educational Training 1	0
RSM 772	Educational Training 2	0
	Credit Hours	4
Spring		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 773	Educational Training 3	0
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Four		
Fall		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Spring		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Summer		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4
Year Five		
Fall		
OCE 830	Doctoral Dissertation	4
	Credit Hours	4

Spring		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Total Credit Hours		70

Marine Biogeochemistry Track

Year One		
Fall		Credit Hours
OCE 603	Physical Oceanography	3
OCE 705	Chemical Oceanography	3
MBE 704	Biological Oceanography	3
RSM 700	Research Ethics	0
Credit Hours		9
Spring		
OCE 610	Ocean Biogeochemistry	3
OCE 622	Marine Microbial Dynamics	3
Approved Elective		3
Credit Hours		9
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Year Two		
Fall		
OCE 612	Marine Organic Geochemistry	3
OCE 830	Doctoral Dissertation	1
Credit Hours		4
Spring		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
Credit Hours		4
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Year Three		
Fall		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 771	Educational Training 1	0
RSM 772	Educational Training 2	0
Credit Hours		4
Spring		
OCE 830	Doctoral Dissertation	4
RSM 773	Educational Training 3	0
Credit Hours		4
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4

Year Four			
Fall			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
Spring			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
Summer			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
Year Five			
Fall			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
Spring			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
Summer			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
	Total Credit Hours		70

Biophysical Interactions Track

Year One			
Fall			Credit Hours
OCE 603	Physical Oceanography (or Approved Elective)		3
OCE 701	Mathematical Methods in Marine Physics		3
Approved Elective			3
RSM 700	Research Ethics		0
	Credit Hours		9
Spring			
OCE 610	Ocean Biogeochemistry (or Approved Elective)		3
OCE 736	Modeling of Physical-Biological Interactions		3
Approved Elective			3
	Credit Hours		9
Summer			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4
Year Two			
Fall			
Approved Elective			3
OCE 830	Doctoral Dissertation		1
	Credit Hours		4
Spring			
Approved Elective			3
OCE 830	Doctoral Dissertation		1
	Credit Hours		4
Summer			
OCE 830	Doctoral Dissertation		4
	Credit Hours		4

Year Three		
Fall		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 771	Educational Training 1	0
RSM 772	Educational Training 2	0
Credit Hours		4
Spring		
Approved Elective		3
OCE 830	Doctoral Dissertation	1
RSM 773	Educational Training 3	0
Credit Hours		4
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Year Four		
Fall		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Spring		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Year Five		
Fall		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Spring		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Summer		
OCE 830	Doctoral Dissertation	4
Credit Hours		4
Total Credit Hours		70

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 to be leaders 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 a continuing academic career and for employment as a highly qualified 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 a competitive environment similar to a session at a scientific conference or a professional project meeting.