

# MARINE, ATMOSPHERIC, AND EARTH SCIENCE

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<https://graduate.earth.miami.edu/index.html>

## Introduction

The Rosenstiel School of Marine, Atmospheric, and Earth Science was established in 1943 as the Marine Laboratory of the University of Miami. It has grown from its modest beginnings in a boathouse to be one of the nation's leading institutions for oceanographic and atmospheric research and education.

Originally a tropical marine biological facility, the Marine Laboratory initiated a program of studies leading to the Master of Science degree in 1949. In 1953, laboratory and classroom buildings were constructed on the School's present campus on Virginia Key, and in the late fifties, the Marine Laboratory expanded its staff and developed its oceanographic capabilities in response to the increased interest in scientific research in the United States. It became the Institute of Marine Science in 1961. Ocean-going research vessels were acquired, and additional buildings were constructed to accommodate new wide-ranging projects. In 1969 the Institute, now a School, was named for Dorothy H. and Lewis Rosenstiel in recognition of a major contribution made through the Rosenstiel Foundation to encourage progress in the marine and atmospheric sciences at the University of Miami.

Today, the Rosenstiel School has a faculty of over 70 scientists who conduct sponsored research while offering graduate studies leading to the Master of Professional Science, Master of Science, and Doctor of Philosophy degrees. The School offers graduate programs in Atmospheric Sciences, Environmental Science and Policy, Marine Biology and Ecology, Marine Geosciences, Meteorology and Physical Oceanography, Ocean Engineering, and Ocean Sciences. Undergraduate programs leading to a Bachelor of Science in Marine and Atmospheric Science (with majors in Marine Science, and Meteorology), and a Bachelor of Arts in Marine Affairs are also offered.

The University of Miami Rosenstiel School uses multiple laboratories, high-performance computing facilities, and a state-of-the-art catamaran. The Marine Technology and Life Sciences Seawater Complex (MTLSSC), opened in 2014, houses studies that rely on seawater for observing air-sea interactions in a controlled environment and for holding, spawning, and rearing marine organisms. This complex is the centerpiece of an updated Rosenstiel campus. The catamaran, named the F. G. Walton Smith, in honor of the founder of the Rosenstiel School has been in service since 2000. The 96-foot-long catamaran is able to explore the deep ocean as well as normally inaccessible shallow environments such as reefs, mangroves and grassbeds.

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## Academic Programs

- Atmospheric Sciences (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/atmospheric-sciences/>)
- Environmental Science and Policy (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-ecosystems-and-society/>)
- Marine Biology and Ecology (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-biology-ecology/>)
- Marine Geosciences (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-geology-geophysics/>)
- Meteorology and Physical Oceanography (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/meteorology-physical-oceanography/>)
- Ocean Engineering (<http://bulletin.miami.edu/graduate-academic-programs/engineering/ocean-engineering/>)
  - The College of Engineering and the Rosenstiel School offers a joint program that leads to a non-thesis M.S. degree in Ocean Engineering.
- Ocean Sciences (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/ocean-sciences/>)

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## General Degree Requirements

### Master of Professional Science (M.P.S.) Program

The Master of Professional Science (M.P.S.) degree offers many tracks within the departments of Atmospheric Sciences, Environmental Science and Policy, Marine Biology and Ecology, Marine Geosciences, and Ocean Sciences. The curriculum is structured to allow students to complete their degree in as few as 12 months (for select tracks), with the training and real-world experience necessary to prepare them for careers in today's professional science job market.

#### Student Handbook and Program Checklist

All M.P.S. students should follow the M.P.S. Student Handbook (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) and M.P.S. Program Checklist (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>), which indicate all degree requirements and program milestones that must be completed to graduate with an M.P.S. degree from the Rosenstiel School.

### Credit Hour Requirements

M.P.S. students must complete at least 30 graduate-level credits with a minimum cumulative GPA of 3.0 to graduate with the M.P.S. degree. M.P.S. students must complete a minimum of 24 graduate-level course credits and two (2) internship (800-level) credits. The remaining four (4) required credits can be taken as either internship or course credits. Taking more than six (6) internship credits or 30 total credits must be approved by the M.P.S. Program Director. All Rosenstiel graduate students are required to complete the following online courses during their first semester in residence: RSM 700 Research Ethics, and Sexual Assault Prevention Training.

### Academic Advisor and Committee Chair

Students will be assigned an Academic Advisor before their first semester in residence. This individual will offer guidance regarding university expectations, coursework, registration, program details, and graduation requirements. At the beginning of the first semester, the student and the Academic Advisor will establish the curriculum to be followed, based on the student's personal and professional goals and M.P.S. track requirements.

During a student's second semester in residence, they will begin forming their internship committee, starting with the Committee Chair. This person can be different from the student's Academic Advisor. The Committee Chair acts as a resource to the student regarding career guidance and the selection of an appropriate internship, as well as providing guidance during the internship and writing/presentation stages. Any Rosenstiel faculty member with a doctoral degree may act as a Committee Chair, but it should be someone with relevant experience in the student's chosen career/internship path. Part-time Rosenstiel lecturers may serve as Committee Chairs with approval from the M.P.S. Program Director. Students should identify their Committee Chair no later than the end of their second semester in the program. Extensions must be approved by the M.P.S. Program Director.

### Committee

All M.P.S. students must have a graduate committee of at least two (2) members. This committee will include a Committee Chair from the Rosenstiel faculty (described above), and an Internship Supervisor, who is usually the direct supervisor at the student's internship host organization. Students may add a third committee member if recommended by the Committee Chair. If a student completes an internship under the direct supervision of a Rosenstiel faculty member who is listed as the Committee Chair, this person may also be listed as the Internship Supervisor. In this case, the student still needs a second committee member. Active students at any institution (M.S., M.P.S., Ph.D., etc.) cannot serve as committee members.

Each member should be an expert in the student's chosen project topic or methodology. Though deviations from these guidelines are possible, they must be approved by the M.P.S. Program Director. The M.P.S. Internship Commitment Form (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) solidifies the committee and is due two (2) weeks before starting an internship.

### Comprehensive Examination

Students must pass four (4) comprehensive exams during their time in residence. The exams will be written and based on core course content. Students' overall evaluation for all four comprehensive exams is cumulative. The M.P.S. Program Director will collect the exam scores from course instructors and submit the Comprehensive Exam Final Report (indicating the overall result) to each student via email upon completion of their fourth comprehensive exam. In the event of a failure, a student may be re-examined once, or choose a different course's exam. Successful completion of four comprehensive exams is a requirement for graduation.

### Pre-Internship

Before commencing an internship, a student must:

- Submit all missing admissions items listed in their Acceptance Packet
- Complete RSM 700 Research Ethics
- Complete Sexual Assault Prevention Training
- Complete at least 12 graduate-level course credits\* with a minimum cumulative GPA of 3.0.
- Reconcile all I (Incomplete) and NG (No Grades) grades.
- Address all grades below a C-; a mandatory meeting with the course instructor and the M.P.S. Program Director is required.
- Receive approval from Committee Chair and the M.P.S. Program Director.

*\*Exceptions must be approved ahead of time by the M.P.S. Program Director.*

### Internship

Each student will be required to complete an internship with an approved agency, institution, business, or organization engaged in some activity associated with marine, atmospheric, or Earth science that will culminate in a Final Report and Oral Presentation. Such organizations include national or international agencies, private corporations, or non-profit and for-profit organizations. Internships can be paid or unpaid by the organization, or students can complete the internship requirement by completing an independent project with a long-term employer.

Institutions may release an intern before the end of the proposed time commitment, and an intern may also terminate the position with an institution at any time, provided there are significant reasons not to proceed. In either case, due process will include a conference with the intern, the supervisor, and the student's academic committee members. The resolution of any problems should occur during this meeting. However, should the problems continue, or are deemed to be irreparable/irrevocable, the internship may be terminated, and the plans for the involved student will be reevaluated by the student's committee.

### Internship Commitment Form and Proposal

The M.P.S. Internship Commitment Form (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) is due no later than two (2) weeks before the start of an internship and must include a one-page summary of the proposed project highlighting the timeline, goals, expectations, and objectives of the internship. Additionally, a formal proposal for the student's intended project is due no later than one (1) month after the start date of the internship. The project proposal will include an introduction to the topic (i.e., a literature review), a statement of the problem, the purpose of the project (i.e., scientific advancement of contribution to the host organization's mission), methods and materials (i.e., the proposed activities and analyses), a timeline, and plans for disseminating the information. Commitment forms, project proposal templates, and guidelines are available on the M.P.S. Forms, Guidelines, and Handbooks webpage (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/index.htmlv/>).

### Final Report

The final graduation requirements include a written report and an oral presentation. The Final Report is not a summary of involvement but rather a contributory assessment of the student's independent project, including developmental insight and a summary of any research performed. Copies of the final, approved report should be distributed as follows:

- One electronic copy to each member of the student's committee
- One copy for the representative agency, institution, or business (electronic and/or hard copy, at their request)
- One electronic copy with fully-signed title page and Report Availability Agreement (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) submitted via e-mail to the M.P.S. Office. These documents are only accepted in PDF format.

### Oral Presentation

An oral presentation is a strict graduation requirement for the completion of the M.P.S. degree. Oral presentations should be no longer than 20 minutes in length (includes time for Q&A from the committee and other attendees), should include a visual component (e.g., PowerPoint, Prezi, etc.), and may not be scheduled until all committee members have edited at least one draft of the internship report. Additionally, the PowerPoint (or equivalent) must be reviewed and edited by the Committee Chair, and all committee members must be invited to attend the presentation in person or virtually (e.g., Zoom, Microsoft Teams, etc.).

All students graduating in the spring and fall semesters are expected to participate in the M.P.S. Symposium; symposium dates will be announced each term. Spring and fall graduates who cannot participate in the symposium must give one-month advance notice (in writing) to the M.P.S. Office and are still required to host an oral presentation by the end of their graduating term for their committee. Exceptions for participating in the symposium must be approved in advance by the student's Committee Chair and the M.P.S. Program Director. Students excused from the M.P.S. Symposium must coordinate with their committee to identify a mutually agreeable time and date, and then follow the instructions and deadlines on the M.P.S. Program Checklist (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) to schedule their independent oral presentation.

There is no symposium hosted in the summer term. The M.P.S. Office will provide summer graduates instructions to reserve their oral presentation date. Students graduating in the summer have until the last day of their final semester to host an oral presentation for their committee.

### Dual-Degree J.D./M.P.S. Students

The graduation requirements for students enrolled in the joint J.D./M.P.S. program differ from students enrolled in the M.P.S. program alone. Students in the dual-degree program are only required to complete 24 "Rosenstiel graduate" credits (typically comprised of 24 lecture-based credits and 0 internship credits). To complete the required 30 credits for the M.P.S. degree, J.D./M.P.S. students must then Petition for Transfer of Credit (<https://www.grad.miami.edu/policies-and-forms/forms/>) through the Graduate School and indicate the Law School courses to be transferred from the student's Law School record to their Graduate School record. A maximum of six (6) Law credits are allowed for transfer. J.D./M.P.S. students should select courses relevant to their Rosenstiel area of concentration. If/when the Law School courses have been approved by the Graduate School, then the Law School courses will be posted to the student's graduate record. The combination of Graduate School courses and Law School courses must equal 30 total credits. 30 credits are required for a master's degree at UM.

The student's cumulative independent work in the joint program, whether related to courses, seminars, or an individual research project at the School of Law or the Rosenstiel School, must result in a substantial, written analysis (publishable quality) of marine law, policy, or related scientific issues. Students may use their required upper-class research paper or law review at the School of Law to fulfill the Final Report requirement. Thus, J.D./M.P.S. students are expected to form a committee and submit the J.D. Commitment of Committee Form, (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) take and pass four (4) Comprehensive Exams, and submit a relevant report from a legal internship or a paper published in their law journal that is vetted and approved by all committee members. J.D./M.P.S. students must include a signed title sheet (following the Final Report templates) and a Report Availability Agreement with their Final Report. J.D./M.P.S. students are exempt from submitting a project proposal and delivering an oral presentation unless a presentation is requested by the student's committee. More information is available in the M.P.S. Student Handbook and Dual-Degree J.D./M.P.S. Track Checklist. (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>)

### Conference Attendance

Though not mandatory, M.P.S. students are strongly encouraged to attend a scientific conference during their academic residency at the Rosenstiel School. Attendance must be approved by the student's Committee Chair and/or their Academic Advisor.

## Graduation

Students must be registered for at least one (1) graduate-level credit during the semester they plan to graduate. All graduating students must complete 30 total graduate-level credits with at least a 3.0 cumulative GPA. Of those 30 credits, they must complete at least 24 class credits with grades equal to or above a C-. All M.P.S. students, including joint J.D./M.P.S. students, must apply to graduate via CaneLink during the semester they intend to graduate. Application deadlines for graduation are available on the UM Academic Calendars (<https://registrar.miami.edu/dates-and-deadlines/academic-calendars/>). If a student applies to graduate and then elects to defer graduation to a future term, they must notify the M.P.S. Office via email and, if necessary, apply for graduation again.

J.D./M.P.S. students can only apply to graduate from the UM School of Law via CaneLink. J.D./M.P.S. students must then email the M.P.S. Office of their intent to graduate during the graduation application period and indicate the semester for graduation. J.D./M.P.S. students must apply to graduate from both the School of Law and the Rosenstiel School during the same semester.

All M.P.S. students, regardless of track, must follow the policies, procedures, instructions, and deadlines listed in the M.P.S. Student Handbook (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) and M.P.S. Program Checklist (<https://mps.earth.miami.edu/current-students/forms-guidelines-and-handbooks/>) for successful clearance by the M.P.S. Office. Students who fail to complete all degree requirements will not be cleared for graduation. Clearance delays will postpone the release of a student's degree and diploma.

## Master of Science (M.S.) Program

The Master of Science (M.S.) degree is offered in Atmospheric Sciences, Marine Biology and Ecology, Marine Ecosystems and Society, Marine Geosciences, Meteorology and Physical Oceanography, and Ocean Sciences. The expected time to completion for the M.S. degree is two years of full-time study.

### Rosenstiel Handbook, Checklist, and Academic Plan

Each student should follow the Rosenstiel School Graduate Student Handbook (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) and Checklist for Defense and Graduation (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>), which will guide the student through all the milestones required in order to graduate from the Rosenstiel School. This begins with an Academic Plan Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) that identifies the number of courses a student must complete to be eligible for graduation, according to the Program Handbook. Part I should be reviewed and completed by the student and Program Director during the first semester; Part II must be completed at least one semester before expected graduation.

### Credit Hour Requirements

M.S. students are required to take a minimum of 30 credit hours, which consists of 24 graduate course credits (of which 18 must be taken in residence at UM) and 6 research credits, PGM 810 ("PGM" is the program abbreviation). All Rosenstiel School graduate students are required to complete the Research Ethics course (RSM 700).

M.S. students with prior graduate coursework from another accredited institution may transfer up to 6-course credits (with grades of "B" or above) with approval from the Program Director. Credit hours that pertain to or have been counted toward another degree cannot be transferred. Work taken more than six years prior to transfer will not be accepted; all work transferred is subject to examination by the program. Students must have an approved Academic Plan Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) on file prior to completing the Graduate School's Petition for Transfer of Credit (<https://grad.miami.edu/policies-and-forms/forms/>).

Any student whose cumulative Grade Point Average (GPA) falls below 3.0 will receive written notice from their Program with copies to the Graduate Studies Office (GSO) stating that they are on academic probation. Any graduate student who receives this warning letter must meet the full standards of academic progress set forth by the University by the end of the subsequent semester. Students who fail to meet the cumulative GPA requirement have failed to meet the satisfactory academic progress standards established by the university and are no longer eligible to receive any graduate assistantship, fellowship or tuition scholarship and are subject to dismissal from the school.

### Committee

The "Thesis Committee" described in the UM Graduate Student Handbook (<https://www.grad.miami.edu/policies-and-forms/>) is commonly known as the student's "Committee" at the Rosenstiel School. Specific requirements for committee formation are set by the UM Graduate School (<https://www.grad.miami.edu/policies-and-forms/>); individual programs may have additional requirements.

The thesis committee will consist of not less than three members. The committee chair must be regular faculty (<https://www.grad.miami.edu/graduate-education/graduate-faculty/>) from the student's program or department of concentration (this includes secondary appointments). In addition to the chair, one of the remaining members must also be regular faculty or have graduate faculty status (<https://www.grad.miami.edu/graduate-education/graduate-faculty/>) in the student's program or department of concentration; the third member must be an outside member

Once the Committee is formed (typically by the end of the first year), the Appointment to Student's Committee Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) should be completed, approved by all members and the Program Director, then submitted to GSO. The Committee should meet regularly to review the student's progress and prepare a short report on research directions with the student. Proposed changes to the membership of a committee must be approved by the Committee Chair and must carry

the endorsement of the Program Director. Approved changes to the Committee must be submitted to GSO using the Change to Student's Committee Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>).

### Comprehensive Examination

A comprehensive examination may be required by the end of the first year. Whether or not to host the exam, as well as the required content and format, is at the discretion of each program. The Comprehensive Exam Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) notifying GSO of the outcome must be submitted by the Committee Chair and approved by the Program Director.

### Thesis Proposal and Proposal Defense

The thesis proposal, containing the items listed below, must be defended and approved by the student's Committee. The purpose of the proposal defense is to certify the readiness of the student to conduct thesis research, as well as facilitate an open discussion regarding the objectives of the thesis and the relevant experimental approach.

1. Tentative title
2. Statement of the problem and objectives
3. Methodology, including equipment and facilities required
4. Timetable

The Thesis Proposal Form and Rubric (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) must be approved by the members of the student's Committee and Program Director. The completed form must be submitted to GSO with the approved proposal.

### Thesis Defense

Before scheduling the defense, a student must fulfill the following requirements:

- Have an approved committee on file
- Pass the comprehensive exam (if applicable)
- Submit and successfully defend the thesis proposal
- Have a minimum 3.0 GPA in all credits earned
- Remove all incomplete grades or deficiencies

The defense must occur by the "Deadline to Defend (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/defense-and-submission-deadlines/>)" during the semester a student intends to graduate. Students must be enrolled for research credits during the semester of defense. The Announcement of Defense Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) must be submitted to GSO at least 14 days prior to the defense date. The student is responsible for reserving the room and obtaining approvals from their Committee and Program Director. Each committee member must be given no less than 14 days to review material prior to approving the Announcement of Defense. Thus, the student must provide the Committee with a complete version of the thesis at least 1 month prior to the desired defense date. If a student is receiving a stipend, the Student Payroll End Date Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) should accompany the Announcement of Defense. The Committee Chair should notify GSO of the outcome of the defense via the Completion of Defense Memo (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) and Defense Rubric (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>).

### Thesis Submission

All graduating students must adhere to the ETD guidelines (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/>) provided by the Graduate School. In addition to submitting an electronic copy of their manuscript to the UM Scholarly Repository, students must complete the following forms by the deadlines specified in the Academic Calendar (<http://www.miami.edu/index.php/registrar/calendar/>).

1. Certificate of Defense Approval: (<https://grad.miami.edu/policies-and-forms/forms/>) This form is the student's proof of successful defense. Students must have each committee member electronically sign the form after the successful defense
2. ETD Final Content Approval Form: (<https://grad.miami.edu/policies-and-forms/forms/>) This form replaces the signed hard copy of the signature page to formally document the Committee's approval of the content in the final manuscript. Students must complete this form prior to uploading the final manuscript to the Scholarly Repository.
3. ETD Availability Agreement Form: (<https://grad.miami.edu/policies-and-forms/forms/>) This form informs the Graduate School of the availability option for the final manuscript in the UM Scholarly Repository.

### Graduation Clearance and Submission Deadlines

A student must apply for graduation during the semester in which they intend to graduate. Applications must be submitted online through CaneLink by the deadline specified on the Academic Calendar (<http://registrar.miami.edu/dates-and-deadlines/academic-calendars/>). If a student applies for graduation and does not meet the Deadline for Completion (<http://grad.miami.edu/electronic-thesis-and-dissertation/defense-and-submission-deadlines/>), they must reapply for graduation for the following semester.

The defense and submission deadlines (<http://grad.miami.edu/electronic-thesis-and-dissertation/defense-and-submission-deadlines/>) are set by the Graduate School. In order to be cleared for graduation, the student must satisfy the minimum degree requirements set by the Program and Graduate School, fulfill all milestones noted on the Checklist for Defense and Graduation (<https://graduate.earth.miami.edu/students/>

forms-guidelines-and-handbooks/), and complete the Graduate School's ETD Process (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/etd-process/>) by the identified deadlines. The Clearance Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) must be completed by the student and returned to GSO prior to the last day of the semester.

## Doctor of Philosophy (Ph.D.) Program

The Doctor of Philosophy (Ph.D.) degree is offered in Atmospheric Sciences, Environmental Science and Policy, Marine Biology and Ecology, Marine Geosciences, Meteorology and Physical Oceanography, and Ocean Sciences. The expected time to completion for a Ph.D. degree is five years. A student in residence in the program beyond 8 years requires approval by the Program Director and Associate Dean.

### Rosenstiel Handbook, Checklist, and Academic Plan

Each student should follow the Rosenstiel School Graduate Student Handbook (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) and Checklist for Defense and Graduation (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>), which will guide the student through all the milestones required in order to graduate from the Rosenstiel School. This begins with an Academic Plan Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) that identifies the number of courses a student must complete to be eligible for graduation, according to the Program Handbook. Part I should be reviewed and completed by the student and Program Director during the first semester; Part II must be completed at least one semester before expected graduation.

### Credit Hour Requirements

Each program sets its own requirements with regard to the course and research credits, PGM 830 (where "PGM" is the program abbreviation), as stated in the Program Handbook, as long as a minimum of 60 total credits are taken. The Graduate School requires at least 24 credit hours in residence at UM, which includes a minimum of 12 dissertation credit hours. It is up to each program to determine, upon admission whether a student requires more course credits to fulfill the Ph.D. requirements. Ph.D. students entering with a master's degree from another accredited university may apply up to 30 credits toward their Ph.D. degree at the discretion of the Graduate Program Director. Individual programs may require more course credits to remove deficiencies. Of the remaining credits needed for the Ph.D. degree, a minimum of 12 must be taken as research credits (PGM 830). All Rosenstiel School graduate students are required to complete the Research Ethics course (RSM 700).

Ph.D. students with prior graduate coursework from another accredited institution and have not earned a graduate degree may transfer up to 9-course credits (with grades of "B" or above) with approval from the Program Director. Students must have an approved Academic Plan Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) on file prior to completing the Graduate School's Petition for Transfer of Credit (<https://grad.miami.edu/policies-and-forms/forms/>). Credit hour transferred is subject to the same recency rules as all other credit hours counted toward the degree, and is also subject to examination by the program.

Any student whose cumulative Grade Point Average (GPA) falls below 3.0 will receive written notice from their Program with copies to GSO stating that they are on academic probation. Any graduate student who receives this warning letter must meet the full standards of academic progress set forth by the University by the end of the subsequent semester. Students who fail to meet the cumulative GPA requirement have failed to meet the satisfactory academic progress standards established by the university and are no longer eligible to receive any graduate assistantship, fellowship or tuition scholarship and are subject to dismissal from the school.

### Committee

The "Supervisory Committee" and "Dissertation Committee" described in the UM Graduate Student Handbook (<https://www.grad.miami.edu/policies-and-forms/>) are commonly known as the student's "Committee" at the Rosenstiel School, and are normally the same committee. Specific requirements for committee formation are set by the UM Graduate School (<https://www.grad.miami.edu/policies-and-forms/>); individual programs may have additional requirements.

The dissertation committee is composed of at least four members; this includes the committee chair (i.e. the primary research mentor/advisor), who may or may not be from the student's program, department or school (this includes secondary appointments), and must be a permanent member of the graduate faculty. Of the remaining members, it is also required that two shall be members of the program or department of concentration, as well as permanent members of the graduate faculty, and one from outside the program or department of concentration. A program may require additional members.

Once the Committee is formed (typically in the second year), the Appointment to Student's Committee Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) should be completed, approved by all members and the Program Director, then submitted to GSO. The Committee should meet regularly to review the student's progress and prepare a short report on progress and research directions with the student. Proposed changes to the membership of a committee must be approved by the Committee Chair and must carry the endorsement of the Program Director. Approved changes to the Committee must be submitted to GSO using the Change to Student's Committee Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>).

### Comprehensive Examination

A comprehensive examination may be required by the end of the first year. Whether or not to host the exam, as well as the required content and format, is at the discretion of each program. The Comprehensive Exam Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) notifying GSO of the outcome must be submitted by the Committee Chair and approved by the Program Director. In the event of a failure, a student may be re-examined once, upon the advice of the student's advisor and/or Committee, and at the discretion of the Program

Academic Committee with advice from the Comprehensive Exam Committee. If granted, the re-examination must be given before the end of the following semester.

### Dissertation Proposal and Proposal Defense

The dissertation proposal, containing the items listed below, must be defended and approved by the student's Committee. The purpose of the proposal defense is to certify the readiness of the student to conduct dissertation research, as well as facilitate an open discussion regarding the objectives of the dissertation and the relevant experimental approach.

1. Tentative title
2. Statement of the problem and objectives
3. Methodology, including equipment and facilities required
4. Timetable

The Dissertation Proposal Form and Rubric (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) must be approved by the members of the student's Committee and Program Director. The completed form must be submitted to GSO with the approved proposal.

### Qualifying Examination

The written qualifying examination is normally administered around the time of the proposal defense. In addition, an oral qualifying examination may be required by the program or the student's Committee. The Committee will prepare and administer the written examination (and oral examination, if required) within the program guidelines. The Qualifying Exam Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) notifying GSO of the outcome must be submitted by the Committee Chair and approved by the Program Director.

### Admission to Candidacy

Before being admitted to candidacy, a student must fulfill the following requirements:

- Have an approved committee on file
- Pass the comprehensive exam (if applicable)
- Submit and successfully defend the dissertation proposal
- Pass the qualifying exam
- Have a minimum 3.0 GPA in all credits earned
- Remove all incomplete grades or deficiencies

The Application for Admission to Candidacy (<https://grad.miami.edu/policies-and-forms/forms/>) must be completed and approved by the Graduate School at least one semester prior to the expected semester of graduation. No student may receive the degree in the same semester or summer session in which they are admitted to candidacy. The student must be admitted to candidacy before the defense dissertation is scheduled. If there are any changes to the student's Committee after this form is approved by the Graduate School, the student must submit a Committee Composition Change Request Form (<https://grad.miami.edu/policies-and-forms/forms/>) to the Graduate School and the Change to Student's Committee Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) to GSO.

### Dissertation Defense

The defense must occur by the "Deadline to Defend (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/defense-and-submission-deadlines/>)" during the semester a student intends to graduate. Students must be enrolled for research credits during the semester of defense. The Announcement of Defense Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) must be submitted to GSO at least 14 days prior to the defense date. The student is responsible for reserving the room and obtaining approvals from all Committee members and Program Director. Each committee member must be given no less than 14 days to review material prior to approving the Announcement of Defense. Thus, the student must provide the Committee with a complete version of the dissertation at least 1 month prior to the desired defense date. If a student is receiving a stipend, the Student Payroll End Date Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) should accompany the Announcement of Defense. The Committee Chair should notify GSO of the outcome of the defense via the Completion of Defense Memo (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) and Defense Rubric (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>).

### Dissertation Submission

All graduating students must adhere to the ETD guidelines (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/>) provided by the Graduate School. In addition to submitting an electronic copy of their manuscript to the UM Scholarly Repository, students must complete the following forms by the deadlines specified in the Academic Calendar (<http://www.miami.edu/index.php/registrar/calendar/>). Additional requirements for Ph.D. students are listed in the UM Graduate Student Handbook (<https://www.grad.miami.edu/policies-and-forms/>) and ETD guidelines (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/>).

1. Certificate of Defense Approval: (<https://grad.miami.edu/policies-and-forms/forms/>) This form is the student's proof of successful defense. Students must have each committee member electronically sign the form after the successful defense
2. ETD Final Content Approval Form: (<https://grad.miami.edu/policies-and-forms/forms/>) This form replaces the signed hard copy of the signature page to formally document the Committee's approval of the content in the final manuscript. Students must complete this form prior to uploading the final manuscript to the Scholarly Repository.

- ETD Availability Agreement Form: (<https://grad.miami.edu/policies-and-forms/forms/>) This form informs the Graduate School of the availability option for the final manuscript in the UM Scholarly Repository.

### Graduation Clearance and Submission Deadlines

A student must apply for graduation during the semester in which they intend to graduate. Applications must be submitted online through CaneLink by the deadline specified on the Academic Calendar (<http://registrar.miami.edu/dates-and-deadlines/academic-calendars/>). If a student applies for graduation and does not meet the Deadline for Completion (<http://grad.miami.edu/electronic-thesis-and-dissertation/defense-and-submission-deadlines/>), they must reapply for graduation for the following semester.

The defense and submission deadlines (<http://grad.miami.edu/electronic-thesis-and-dissertation/defense-and-submission-deadlines/>) are set by the Graduate School. In order to be cleared for graduation, the student must satisfy the minimum degree requirements set by the Program and Graduate School, fulfill all milestones noted on the Checklist for Defense and Graduation (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>), and complete the Graduate School's ETD Process (<https://www.grad.miami.edu/electronic-thesis-and-dissertation/etd-process/>) by the identified deadlines. The Clearance Form (<https://graduate.earth.miami.edu/students/forms-guidelines-and-handbooks/>) must be completed by the student and returned to GSO prior to the last day of the semester.

### Educational Training Program (Teaching Assistants)

All Rosenstiel School Ph.D. students are expected to be a Teaching Assistant (TA) for two courses while pursuing their degree. A training session and two teaching opportunities are offered as courses in educational training (RSM 771, RSM 772, RSM 773). The mandatory TA program will include training of new TAs, evaluation of their performance, and recognition of excellence. Faculty nominations for the Rosenstiel School TA Excellence Awards are solicited each semester and will be given at the end of the academic year. The goal of the TA program goal is to make the experience as valuable as possible for the TA, the faculty, and the students taking our courses. Rosenstiel School TAs must comply with the following requirements:

- Register for and complete the Rosenstiel TA training workshop, RSM 771
- Review the TA Resources posted on Blackboard
- Register for the Educational Training courses: RSM 772 and RSM 773
- Refer to the guidelines and course documentation provided with the TA appointment letters

## Master of Professional Science (M.P.S.) Programs

The M.P.S. degree prepares students for science careers in industry, government, and non-profit organizations, where employment demands are growing. M.P.S. degrees were developed and implemented nationally in response to employer demands for well-rounded, highly trained employees with a breadth of knowledge and practical skills to address emerging environmental issues and improve the management of natural and cultural resources. The curriculum is structured to allow students to complete their degree in as little as 12 months (for select tracks), with the training and real-world experience necessary to prepare them for careers in today's professional science job market.

- M.P.S. in Atmospheric Sciences (ATM) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/atmospheric-sciences/atmospheric-sciences-mps/>)
- M.P.S. in Marine Biology and Ecology (MBE) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-biology-ecology/marine-biology-ecology-mps/>)
- M.P.S. in Marine Ecosystems and Society (MES) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-ecosystems-and-society/marine-ecosystems-society-mps/>)
- M.P.S. in Marine Geosciences (MGS) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-geology-geophysics/marine-geosciences-mps/>)
- M.P.S. in Ocean Sciences (OCE) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/ocean-sciences/ocean-sciences-mps/>)
- B.A./M.P.S. in Marine Ecosystems and Society (MES) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-ecosystems-and-society/marine-ecosystems-society-ba-mps/>)
- J.D./M.P.S. in Marine Ecosystems and Society (MES) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-ecosystems-and-society/marine-ecosystems-society-jd-mps/>)

## Master of Science (M.S.) Programs

- M.S. in Atmospheric Sciences (ATM) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/atmospheric-sciences/atmospheric-sciences-ms-phd/>)
- M.S. in Marine Biology and Ecology (MBE) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-biology-ecology/marine-biology-ecology-ms/>)
- M.S. in Marine Ecosystems and Society (MES) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-ecosystems-and-society/marine-ecosystems-society-ms/>)



- M.S. in Marine Geosciences (MGS) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-geology-geophysics/marine-geology-geophysics-ms/>)
- M.S. in Meteorology and Physical Oceanography (MPO) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/meteorology-physical-oceanography/meteorology-physical-oceanography-ms/>)
- M.S. in Ocean Sciences (OCE) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/ocean-sciences/ocean-sciences-ms/>)
- M.S. in Ocean Engineering (<http://bulletin.miami.edu/graduate-academic-programs/engineering/ocean-engineering/>)
  - The College of Engineering and the Rosenstiel School offers a joint program that leads to a non-thesis M.S. degree in Ocean Engineering. Full details are available here (<https://mae.coe.miami.edu/programs/ms-programs/ms-in-ocean-engineering/>).
- M.S. in Data Science (MSDS) - Marine and Atmospheric Sciences track (<http://bulletin.miami.edu/graduate-academic-programs/arts-sciences/data-science/data-science-ms/>)
  - The Rosenstiel School coordinates the track in Marine and Atmospheric Sciences for the Master of Science in Data Science, an interdisciplinary degree offered in collaboration with the College of Arts & Sciences. Full details are available here (<https://msdatascience.as.miami.edu/>).
- M.S. in Climate and Health (MSCH) (<http://bulletin.miami.edu/graduate-academic-programs/medicine/public-health/ms-climate-health/>)
  - The Master of Science in Climate and Health degree is offered in partnership with the Department of Public Health Sciences (Miller School of Medicine) and the Department of Atmospheric Sciences (Rosenstiel School of Marine, Atmospheric, and Earth Science). Full details are available here (<https://graduatestudies.publichealth.med.miami.edu/academic-programs/masters-degrees/ms-climate-and-health-program-plan/>).

## Doctor of Philosophy (Ph.D.) Programs

- Ph.D. in Atmospheric Sciences (ATM) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/atmospheric-sciences/atmospheric-sciences-phd/>)
- Ph.D. in Environmental Science and Policy (EVR) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-ecosystems-and-society/environmental-science-policy-phd/>)
- Ph.D. in Marine Biology and Ecology (MBE) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-biology-ecology/marine-biology-ecology-phd/>)
- Ph.D. in Marine Geosciences (MGS) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/marine-geology-geophysics/marine-geology-geophysics-phd/>)
- Ph.D. in Meteorology and Physical Oceanography (MPO) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/meteorology-physical-oceanography/meteorology-physical-oceanography-phd/>)
- Ph.D. in Ocean Sciences (OCE) (<http://bulletin.miami.edu/graduate-academic-programs/marine-atmospheric-science/ocean-sciences/ocean-sciences-phd/>)

### RSM 600. Introduction to Research Diving Techniques. 3 Credit Hours.

This course introduces students to the practices and policies of scientific diving. The goal is to prepare students to use SCUBA as a research tool for the marine sciences and acquire the skillset that will allow them to be competent and efficient scientific divers when conducting underwater data collection. Topics covered include physics, physiology, dive tables, dive planning, accident management and rescues, project planning, etc. Skillsets covered include buoyancy control/stability/trim, line reels, surface marker buoy deployment, rigging and lift bag usage, full face mask communications, diver propulsion vehicles, low visibility training, and federal competency skills tests. The course content may qualify students as scientific divers under the auspices of the UM/RSMAS Scientific Diving Program and will meet the standards set by the American Academy of Underwater Sciences (AAUS). These standards include 100 hours of course training and a minimum of 12 dives during the scientific diving course. Students that qualify will be approved UM scientific divers. Students who enroll in the course must be certified as a recreational diver with a major recreational certification agency, pass a swim test, and complete a diving physical exam. Certain medical conditions may disqualify a student from scientific diving. Conditions include, for example, asthma, seizures, spontaneous pneumothorax, etc. Please reference the NOAA Diving Medical Standards for additional details and other potential disqualifications. Before enrollment, please contact the UM Diving Safety Office for questions relating to these potential disqualifying medical conditions.

**Components:** LEC.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 601. Scientific Freediving. 4 Credit Hours.**

This course is designed to provide students who have an interest in conducting underwater research with the skills and competencies to be certified as a University of Miami Scientific Freediver in accordance with the Standards for Scientific Freediving. This course will discuss and evaluate topics related to the history and evolution of freediving and the common techniques; marine mammals and human physiology in relation to freediving activities and adaptations; safety and problem management in the aquatic realm; the practical application of underwater research skills, techniques, and methodologies. Prerequisites and Course Safety Enrollment Requirements: Medical certification of fitness; General water skills test; Have a high degree of comfort being in and under the water – both in confined water (pool) and open water (ocean); Obtain personal equipment for freediving activities. Contact the instructor if you have any questions about the enrollment requirements.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 611. Principles of Mass Spectrometry and Applications to Marine, Atmospheric, and Environmental Science. 3 Credit Hours.**

This course goes in depth into the principles and uses of mass spectrometry. It is intended for graduate students who use mass spectrometry to conduct their research. Concepts taught will include the components of mass spectrometers (vacuum systems, ionization methods, mass analyzers, detectors), different types of mass spectrometers and their uses, and coupling chromatography to mass spectrometry. Each student will be required to give presentations on new advances in mass spectrometry and an in-depth presentation on a mass spectrometer that they use and new findings in the literature relevant to their technique and personal research.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 612. Statistics for Marine Scientists. 3 Credit Hours.**

This course is intended for students in the life sciences and environmental sciences who are interested in learning how to use and apply statistics. The course will cover basic concepts of probability and statistics, as well as a number of useful statistical methodologies that are used in biology and environmental science, such as regression, analysis of variance, and univariate non-parametric statistics. The course will include homework assignments, which the students will conduct using both Excel and the free statistics package R (<http://cran.r-project.org/>), so that they will get hands-on experience with the methodology.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall.

**RSM 613. Statistical Modeling of Extreme and Rare Events. 3 Credit Hours.**

The course will focus on rare events and extreme values observed in nature. In particular, students will learn: advanced statistical methods of data analysis, as well as concepts of probability and predictability; statistical modeling of rare and extreme events; and applications of these advanced techniques to real atmospheric and oceanic data.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 615. Marine Tourism and Conservation. 3 Credit Hours.**

This course introduces students to critical concepts in the practice and management of marine tourism, and explores the potential of tourism to contribute to marine conservation across different geographical locations and taxa. Discussion, readings, and lectures encourage students to draw connections between the biology and ecology of organisms and ecosystems and existing human-environment relationships. We also consider the social context in which tourism is occurring, and how this may shape the success or failure of tourism operators in contributing to conservation. This course will also explore questions about “consumptive” and “non-consumptive” uses of marine resources. Discussion will evaluate both the potential and the limitations of marine tourism as a tool for environmental protection.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 616. Florida Topics in Environmental Law & Policy. 3 Credit Hours.**

This course will provide an overview of environmental policy at the state and local level in Florida. The course will include an analysis of relevant law, policy, and emerging issues for Florida-specific environments, focusing on environmental themes that are of particular importance to marine professionals, such as: Everglades restoration, coral reef protection, fish and wildlife management, watershed and land management, invasive and listed species, waste management, energy, and climate change policies.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 617. Instrument Design and Quick Prototyping for Marine Science. 2 Credit Hours.**

Introduction to the principles and applications 3D printing, scanning and digital manufacturing for non-engineers. It will cover the basic principles and practice of: (1) computer aided design and drafting (CAD); (2) digital manufacturing techniques, including 3D printing and CNC machining (milling and laser cutting); and (3) performance assessment of student-manufactured prototypes. This will be achieved through lectures and hands-on training in the RSMAS Makers Lab, whereby each student will be required to design, construct, and field-test a new piece of hardware that is relevant to their field and/or individual research.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Summer.

**RSM 618. Setting a Course for Success: Professional Development for STEM Students. 1 Credit Hour.**

The scientific job market has always been a highly competitive space, and it seems to get more so every year. This course is intended to help students explore their aptitude, focus their intentions, and set goals to achieve success in the academic, government, or industrial job market. Through identifying core motivations, matching intentions with career paths, and collaborative exercises, students will construct the application materials needed for upcoming internship and job applications as well as practice interview skills.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**RSM 620. Climate and Society. 3 Credit Hours.**

This course is designed to provide students from different disciplinary backgrounds with an overview of physical processes, general concepts and policy debates surrounding climate issues.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 622. Data Management for Scientists. 2 Credit Hours.**

This course will cover techniques used in data profiling, filtering, and archiving. online tools will be used for elaborating data management plans and well-established database techniques for manipulating data. Participants will develop data management plans and introduce techniques for data manipulation, such as database design and implementation concepts, query coding, and data cleaning/importing/exporting. Course participants will be exposed to theoretical concepts and engage in hands-on activities throughout the semester. Participants are encouraged to bring their own data for processing or asked to select a dataset from the many online data repositories.

**Components:** LEC.

**Grading:** SUS.

**Typically Offered:** Fall.

**RSM 630. Elasmobranch Field Research Skills. 3 Credit Hours.**

This field course introduces students to essential principles of responsible fieldwork with elasmobranchs (sharks and rays). Through a combination of readings, structured discussions of primary literature, guest lectures, opportunities to learn about and contribute to gear construction, practice with the administrative requirements for working with animals, including IACUC and state and federal permitting processes, and hands-on experience with elasmobranchs, students will leave with a strong understanding of the technical, administrative, and practical aspects of best practices for conducting field research with sharks and rays.

**Components:** FLD.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**RSM 631. Teleost Field Research Skills. 1 Credit Hour.**

This short course introduces students to essential skills and knowledge for performing fieldwork with teleost fish. This intensive workshop includes an introduction to fish of South Florida, especially targeting essential characteristics for identification, and provides base knowledge about fish morphology, anatomy, habitat, and life history. After a half-day of classroom lectures and activities, students will spend two weekend days in the field learning techniques to sample for and identify a variety of teleost fishes. This course is not recommended for students taking MBE 621.

**Components:** FLD.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 632. Research Vessel Operations. 1 Credit Hour.**

This short course introduces students to essential skills for serving as crew or research staff aboard medium-sized research vessels. The intensive workshop includes on-vessel experience with research vessel operations of US Coast Guard certificated vessels. Over two and a half days, students will build experience with essentials of acting as crew on research vessels, including vessel operations, docking, chart-reading, anchoring and mooring, responding to on-board emergencies, and vessel logistics and research cruise planning.

**Components:** FLD.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 633. Survey of Telemetry for Animal Movement Research. 1 Credit Hour.**

This two-day workshop is designed to give students an introduction to the breadth of technologies available for telemetry studies. Tracking animals for the purpose of addressing questions regarding movement and behavior has been an increasingly employed research methodology over the past three decades. Technological advances have rapidly transformed our ability to collect more data over longer periods of time, and the use of telemetry techniques has become ubiquitous across many taxa and disciplines.

**Components:** FLD.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 640. DEIA in Marine Science Broader Impacts: Theory & Reflection. 1 Credit Hour.**

This unique course will focus on various concepts related to the theory of equity, diversity, inclusion, and accessibility, as well as practical examples and helpful strategies to ensure DEIA in broader impacts and everyday lives. We will emphasize meaningful conversations about DEIA and strategies to both address inequities as individuals and educators and ensure effective science communication and inclusion.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 641. Broadening Participation in Marine Science. 3 Credit Hours.**

This unique course will focus on various concepts related to broadening participation of underrepresented minorities in marine science and conservation. During the course, students will learn how to effectively implement the fundamental principles, goals, and practice of integrative informal STEM education and broader impacts by developing, coordinating, and hosting an outreach event for K-12 students in under-served schools.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 645. Science Communication: Professional Writing. 1 Credit Hour.**

This course introduces students interested in scientific research to various techniques for processing and presenting research data and information. Students will learn techniques to effectively present research to the general public and to the scientific community in written form, such as research papers, grant proposals, conference presentations and fact pages.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 646. Presentation Boot Camp. 1 Credit Hour.**

This course focuses on presenting scientific concepts and research findings more effectively to both technical audiences and the general public.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall.

**RSM 647. Methods for Marine and Atmospheric Education. 3 Credit Hours.**

This course focuses on curriculum and instructional methods for teaching marine and atmospheric content in formal and informal settings. The course will introduce students to recent national science and engineering, climate, and ocean education standards and best curricula and instructional approaches for teaching and learning science. The course will also focus on identifying and analyzing research on marine and atmospheric education and effectively communicating scientific topics to different audiences.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall.

**RSM 648. Management and Leadership in Marine and Atmospheric Science. 3 Credit Hours.**

The goal of this course is to become an effective leader/manager while leveraging the individual strengths of a team in the marine and atmospheric field. The course will use leadership theories and case studies to understand how decisions affect outcomes. Students will develop the ability to manage teams effectively amidst a changing world. Students discuss literature and case studies to explore the foundations of effective leadership and support task triage, decision-making, shared mental models, and appropriate executive styles. The course will introduce students to recent national science and engineering, climate, and ocean standards and best approaches when it comes to managing a staff in the marine and atmospheric sciences. The course will also focus on identifying and analyzing marine and atmospheric leadership and effectively communicating scientific topics to different audiences.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 649. Advanced Presentation Boot Camp. 1 Credit Hour.**

This follow-up course builds upon the topics and approaches covered in the basic training session and focuses on advanced techniques for designing and delivering effective scientific presentations to both technical audiences and the general public. The course provides opportunities for students to expand and practice their critique language and hone their presentation evaluation and design skills.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.

**RSM 650. Data Management in the Research Environment. 2 Credit Hours.**

This course covers theoretical and practical approaches to research data management in academic contexts. Theoretical aspects include overviews of information science, data policy and data governance. The practical approaches include skills and best practices in research data management, and basic command line computing for data analysis and visualization (python and R). The purpose of the course is to increase research productivity, to enable data stewardship, and to help the student exceed data management expectations/requirements in the research environment. This is a practical methods course with tangible products; students produce a data management plan for their specific research endeavor, or prepare and deposit data into a discipline specific repository (other projects subject to instructor approval will be considered). The class is open to all graduate students in all disciplines. There are no prerequisites and while the course is designed for the first or second year of a graduate program, students who are further along will benefit as well.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**RSM 664. Scientific Small Boating. 2 Credit Hours.**

The scientific small boating course provides entry-level training for persons interested in becoming small boat operators or crewmembers for marine science research and/or fieldwork purposes. The course is designed to give students broad academic knowledge and practical training in the safe operation of vessels 36 feet length overall. Course content focuses heavily on navigation, rules of the road, local area knowledge, legal requirements, and emergency procedures. In addition to meeting US Department of the Interior MOCC certification requirements (see RSM 667 course description), students are taught project-specific techniques and technical skill-sets that scientific small boat operators must be proficient in. Students must possess a valid US or international driver's license with a clean driving record (no at-fault accidents within the last three years and no more than 3 points on Motor Vehicle Record), and complete a boating physical exam to be eligible for this course.

**Components:** FLD.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 665. Fish Ecology and Oceanography. 3 Credit Hours.**

This course is intended to introduce students to key biological, ecological, oceanographic, and climatic processes of direct relevance to fishery species, with a view toward development of an ecosystem perspective.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**RSM 666. Polar Science. 3 Credit Hours.**

The course covers the physical, chemical and biological components of the polar oceans, atmosphere and coastal regions. The interactions between ocean, ice, atmosphere and land are discussed in detail not only in terms of local relationships, with links to the climate system.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**RSM 667. Motorboat Operator Certification Course. 1 Credit Hour.**

The MOCC course is intended to give students basic academic knowledge and training in operating Class A and Class I vessels (<26 feet length overall). In addition to learning relevant theory, students gain hands-on experience in slow and high speed maneuvering, trailering, launching and loading at boat ramps, marlinspike (knot tying), and in-water emergency procedures, including the use of flares and pyrotechnics. Federal agencies such as the US Department of the Interior and the US Fish & Wildlife Service require MOCC certification. This course meets minimum small boat training standards recognized by many other government, non-profit, and private research organizations as well. Students must possess a valid US or international driver's license with a clean driving record (no at-fault accidents within the last three years and no more than 3 points on Motor Vehicle Record), and complete a boating physical exam to be eligible for this course.

**Components:** FLD.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 668. Techniques in Respirometry, Swim Performance and Behavior of Aquatic Organisms. 2 Credit Hours.**

The objectives of this course is to give participants an understanding and overview of methods and hands-on with modern equipment. The emphasis of the course will be on marine fish, but the techniques can be used for freshwater fish and aquatic invertebrates as well. The course is based on lectures, lab exercises and plenary discussions. The final part of the course constitutes a written project based on data collected during the week.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**RSM 671. Special Topics. 1-4 Credit Hours.**

Lectures and research projects in special topics related to Marine and Atmospheric Science.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.

**RSM 672. Special Topics. 1-4 Credit Hours.**

Lectures and research projects in special topics related to Marine and Atmospheric Science.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.

**RSM 673. Special Topics. 1-3 Credit Hours.**

Lectures and research projects in special topics related to Marine and Atmospheric Science.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.

**RSM 700. Research Ethics. 0 Credit Hours.**

Online research ethics training, required for all graduate students.

**Components:** DIL.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 710. The Physical Environment of Marine Organisms. 3 Credit Hours.**

The fluid environment of the sea influences the growth, distribution, and survival of marine organisms. The physical processes that affect organisms occur in space and time, ranging from the molecular properties of water to basin-wide linkages between oceanic regime and climate shifts are discussed. Course emphasis is placed on how physical processes affect the life of plankton to nekton, Students are required to present reviews based on the literature.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**RSM 771. Educational Training 1. 0 Credit Hours.**

Educational training workshop and presentations.

**Components:** WKS.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 772. Educational Training 2. 0 Credit Hours.**

First semester of educational training.

**Components:** WKS.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 773. Educational Training 3. 0 Credit Hours.**

Second semester of educational training.

**Components:** WKS.

**Grading:** SUS.

**Typically Offered:** Fall & Spring.

**RSM 780. Directed Readings. 1 Credit Hour.**

The goal of this directed readings course is to cover a wide range of current marine and atmospheric science topics, and to give students experience independently reading about recent advances in research. The course will also give the students an opportunity to practice presentation and communication skills. Students will be assessed based on their presentations and participation.

**Components:** DIS.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.