

# METEOROLOGY AND PHYSICAL OCEANOGRAPHY (MPO) GRADUATE HANDBOOK, 2020-2021

## 1. INTRODUCTION

This Handbook outlines the specific procedures and requirements for Ph.D. and M.S. students in the Meteorology and Physical Oceanography (MPO) program.

This Guide serves as a **supplement** to the linked [RSMAS](#) and [UM](#) Graduate Handbooks.

Students should be aware of all the requirements and procedures in these Handbooks. Students should take full responsibility to follow the procedures and meet the requirements in order to complete their degrees in due time. Any uncertainties regarding the procedures and requirements should be clarified with the MPO Program Director and the RSMAS Graduate Studies Office (GSO).

All progress should be recorded in the students' files at GSO. Information about the necessary forms is available in the RSMAS Handbook.

## 2. PROGRAM REQUIREMENTS

The applicable requirements will be those in effect during that academic year when the student first registered in the Program, unless stated otherwise in this Handbook or by the Program Director.

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

### Doctor of Philosophy

Additional MPO requirements:

- a) Comprehensive Examination: Grade of PASS or HIGH PASS
- b) Seminar: Attending the COMPASS seminar series every semester and giving at least one 15-minute presentation each year after the Comprehensive Examination and a one-hour presentation after advancing to Ph.D. candidacy, and at least 6 months before the dissertation defense.

- c) For those completing a M.S. degree first, recommendation by the M.S. thesis committee after passing the M.S. thesis defense
- d) The MPO Ph.D. degree requires a minimum of 30 course credits, of which a minimum of 9 course credits should be taken from 700 level courses. All MPO Ph.D. students are required to take, or have taken an equivalent in another program, the following courses:

MPO 603	Principles of Physical Oceanography	3 credits
MPO 611	Geophysical Fluid Dynamics I	3 credits
MPO 651	Introduction to Atmospheric Dynamics	3 credits
MPO 711	Geophysical Fluid Dynamics II	3 credits

and *one* of the following:

MPO 712	Large-Scale Ocean Circulation	3 credits
MPO 765	General Circulation of the Atmosphere	3 credits

In addition, all Ph.D. students are required to take at least one 3-credit course outside the MPO program, unless they have arrived with an M.S. degree from another institution. Courses with the ‘RSM’ designation count as an outside course.

Material from MPO 603, 611, 651, 711, and either 712 or 765 will appear on the Comprehensive Examination for Ph.D. candidates.

Students may take any other graduate courses offered by MPO, RSMAS, or UM.

A student in the Ph.D. program may request to exit the program and enter into the M.S. Program, as long as he/she does not have an M.S. degree from MPO.

The credit transfer and waiver of required courses should be done during the first year of graduate study at RSMAS with approval from the graduate advisor and the MPO Academic Committee.

*Expectations and Timeline*

Year 1. End of Spring: Comprehensive Exam.

Year 2. Fall or Spring: Form Ph.D. Committee

Years 2/3. TA (2 semesters)

Year 3. Fall or Spring: Ph.D. Qualifying Exam and Candidacy

Expectation: Research results of quality equivalent to that of at least one full journal article. Clearly written proposal and timeline.

Years 4-5. Ph.D. Dissertation Submission and Defense

Expectation: Normally the equivalent of 2-3 articles with student as first author that have been or are expected to be published (to be discussed with student’s committee)

## Master of Science

Additional MPO requirements:

- a) Comprehensive Examination: Grade of MASTERS PASS, PASS or HIGH PASS
- b) Seminar: Attending the MPO seminar series every semester and giving at least one 15-minute presentation each year after the Comprehensive Examination

All MPO M.S. students are required to take the following courses:

MPO 603	Principles of Physical Oceanography	3 credits
MPO 611	Geophysical Fluid Dynamics I	3 credits
MPO 651	Introduction to Atmospheric Dynamics	3 credits

and *one* of the following:

MPO 712	Large-Scale Ocean Circulation	3 credits
MPO 765	General Circulation of the Atmosphere	3 credits

The remaining 12 course credits can be obtained by taking other graduate courses offered by MPO, RSMAS, or UM .

Material from the required core courses will appear on the Comprehensive Examination for M.S. candidates (along with material from other courses from the first year).

M.S. candidates in MPO are *not* required to take a class outside MPO.

M.S. candidates should submit their thesis proposal to be approved by their thesis committee during the first Spring semester following their Comprehensive Examination. A meeting between the student and the committee to discuss the proposal is expected.

### *Expectations and Timeline for M.S. Degree*

Year 1.           End of Spring: Comprehensive Exam

Year 2.           Fall : Form M .S. Committee

                    Fall or Spring: M .S. Thesis Proposal and Candidacy

- Expectation: Preliminary results and a clear research plan and timeline.

Spring or Summer: M.S. Thesis Submission and Defense

- Expectation: Research results of quality equivalent to at least one full journal article.

### 3. EXAMINATIONS

#### *Comprehensive Examination (end of first year)*

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

The purpose of this examination is to evaluate students' understanding of materials in the courses completed up to the time of the examination and their capability of integrating these materials, and to determine whether the students are permitted to proceed to the M.S. or Ph.D. program.

The Comprehensive Examination will consist of an oral part and a written part. The written part, which lasts no longer than 8 hours, consists of closed-book questions in the courses taken in the first year by each individual student. Each student must choose to answer four questions; at least one of the questions from GFD I and II must be answered. The oral part, which lasts no longer than 2 hours for each student, may include questions from all the courses taken by the student.

The GPA comprises 20% of the Comprehensive Exam grade, and the written and oral parts of the Comprehensive Exams comprise 40% each.

A student's performance in this examination, together with his/her cumulative grade point average, will determine whether the grade of HIGH PASS, PASS, MASTERS PASS or FAIL is given by the Comprehensive Exam Committee. The examining board consists of faculty whose questions are answered by the student and any other RSMAS faculty who wish to participate.

#### **Rubric for Comprehensive Examination**

	<b><u>High Pass</u></b>	<b><u>Pass</u></b>	<b><u>Masters Pass</u></b>	<b><u>Fail</u></b>
<b><u>Score</u></b>	4	3	2	1
<b>Written</b>	All parts of Problem are answered correctly	Problem may not be answered completely correctly, but the student has shown a solid understanding of fundamental concepts	Student shows some understanding of fundamental concepts, but there are critical gaps	Student has not demonstrated an understanding of fundamental concepts
<b>Oral</b>	Shows a robust understanding of the subject matter	Shows an understanding of fundamental topics, but not a complete understanding of all subject matter	Shows some understanding of the fundamental topics, but there are critical gaps	Does not show an understanding of fundamental topics

**High Pass:** for students with no identifiable relevant weaknesses.

**Pass:** Students and advisors will receive feedback from the Comprehensive Exam committee on the strengths and weaknesses of the student, and possible recommendations of how to address those. This information can be used to help plan the next steps in the student's academic career. \*\*Note: This is a new category where a student is NOT required to defend a Masters thesis as was the case previously, but the student and advisor may of course still decide that a Masters is the appropriate next step.

**Masters Pass:** Students with this result will be required to defend a Masters thesis before considering whether to pursue a Ph.D. Students and advisors will receive feedback from the Comprehensive Exam committee on the strengths and weaknesses of the student, and possible recommendations of how to address those.

**Fail:** Students with this result will have an opportunity to re-take the exam once.

### ***Ph.D. Qualifying Examination (by end of third year)***

*These guidelines complement those given in the UM Graduate Student Handbook:  
<https://umshare.miami.edu/web/wda/grad/pdf/GraduateStudentHandbook.pdf>*

**All students are expected to take the Qualifying Exam and Proposal Defense by the end of their third year in the program. If the student needs to take the Exam in their fourth year, s/he will need to write a petition to the MPO Academic Committee with an explanation. A second extension after the end of the fourth year will not be permitted, unless there are exceptional circumstances.**

Example of a timeline for the Qualifying Exam and Dissertation Proposal:

Mon Feb 1st: Student gives Dissertation Proposal to Ph.D. Committee

Mon Feb 15th: Student takes written Qualifying Exam

Mon Feb 22nd: Oral Qualifying Exam with Ph.D. Committee

While the exact format is left to the discretion of the Ph.D. Committee, a typical Oral Qualifying Exam comprises an hour of questions from the written Qualifying Exam 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 and is not a review of previous results, which are in the written Proposal.

## **Expectations of the Qualifying Exam**

*Written Exam* – written answers judged by each Committee member to demonstrate that the student has the ability to understand and investigate the concept asked in the question. The questions are usually related to the research described in the dissertation proposal.

*Oral Exam* – demonstration of oral communication skills in responding satisfactorily to questions raised by the Committee in relation to the written questions, and any other questions asked by the Committee members.

*Dissertation Proposal* – written by the student in clear English befitting the standard of writing in a peer-reviewed journal. The proposal should demonstrate the capability of the student to produce and present research that is of the quality suitable for a journal Article. Emphasis needs to be placed on the proposed research: the questions and hypotheses to be tested, the data and methodology used to test the hypotheses, and some anticipated results (which may or may not be realized). A student is encouraged to discuss the proposal with the advisor, but the writing must be his/her own.

## **Expectations leading up to the Qualifying Exam**

- Communicating with Advisor at least once per month to give research updates.
- Formal establishment of Dissertation Committee, and an initial Committee meeting at least 3 months prior to the Qualifying Exam.

## **Rubric**

Written Exam	Meets expectations	Unsatisfactory
Oral Exam	Meets expectations	Unsatisfactory
Dissertation Proposal	Meets expectations	Unsatisfactory

## **Decision by Committee**

PASS: Meets expectations in all

FAIL: Unsatisfactory in at least one of the written/oral/proposal.

In some cases, the committee may require revisions to a proposal or question, or a retake of the oral exam, but there is no need to retake the entire exam or have a full committee meeting.

## **4. COURSES** (3 credits, unless otherwise stated)

### **Required Courses**

MPO 651 Introduction to Atmospheric Dynamics

MPO 603 Principles of Physical Oceanography

MPO 611 Geophysical Fluid Dynamics I

MPO 711 Geophysical Fluid Dynamics II

MPO 712 Large-Scale Ocean Circulation\*

MPO 765 General Circulation of the Atmosphere\* (one of two \* courses is required)

### **600-level courses**

MPO 602 Oceanography I (Physical) (2 cr)

MPO 618 Remote Sensing of the Atmosphere MPO 621 Estuarine and Coastal Processes

MPO 624 Applied Data Analysis

MPO 632 Broadcast Meteorology

MPO 642 Physics of Remote Sensing

MPO 652 Introduction to Atmospheric Physics

MPO 653 Climate Change

MPO 654 Climate Variability

MPO 663 Mesoscale Meteorology

MPO 681 Climate Change

MPO 682 Scientific Programming in the Physical Sciences

MPO 683 Ocean Monitoring Systems and Implementation Strategies

MPO 685 Advanced Weather Forecasting

### **700-level courses**

MPO 715 Numerical Weather Prediction MPO 721 Waves and Tides

MPO 723 Statistical Analysis of Geophysical Data

MPO 724 Statistical Modeling of Geophysical Fields

MPO 731 Air-Sea Interaction

MPO 732 Climate Dynamics

MPO 733 Marine Atmospheric Boundary Layer

MPO 750 Coastal Oceanography

MPO 752 Vortex Dynamics

MPO 762 Computer Models of Fluid Dynamics

MPO 764 Atmospheric and Oceanic Turbulence

MPO 768 ENSO Dynamics, Prediction and Predictability

MPO 772 Spectral and Finite Element Methods in Computational Fluid Dynamics

MPO 774 Predictability

MPO 775 Mesoscale Oceanography

### **Directed Reading**

MPO 683 Topics in Climate Dynamics (1 cr)

MPO/RSM 781 Directed Readings: Cloud Physics Reading Group (1 cr)