

# **ATMOSPHERIC SCIENCES (ATM) GRADUATE HANDBOOK** **2020-2021 - ( Revision: July, 2020)**

## **1. INTRODUCTION**

This Handbook outlines the specific procedures and requirements for Ph.D. and M.S. students in the Atmospheric Sciences (ATM) program.

This Guide serves as a **supplement** to the RSMAS and UM Graduate Handbooks which are available in the GSO Student Center on Blackboard.

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 ATM 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. With advisor's consent, students accepted earlier than 2020 may petition the Program Director to modify requirements to those in the current handbook.

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 ATM Program Director regarding their choices of courses. Deviations from the requirements must be approved by the advisor and the ATM Program Director.

### **Doctor of Philosophy**

Additional ATM requirements:

- (a) Comprehensive Examination: Grade of PASS or HIGH PASS
- (b) Seminar: Attending the ATM 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 that the student may enter into the PhD program.
- (d) The ATM Ph.D. degree requires a minimum of **25** course credits. The RSM 771-

773 'Educational Training' courses are non-credit courses.

(e) All ATM Ph.D. students are required to take, or have taken an equivalent in another program, the following courses:

ATM 651	Introduction to Atmospheric Dynamics	3 credits
ATM 652	Introduction to Atmospheric Physics	3 credits
ATM 634	Introduction to Atmospheric Chemistry	3 credits
ATM 765	General Circulation of the Atmosphere	3 credits

Material from all required courses, and all other courses taken in the first year may appear on the Comprehensive Examination for Ph.D. candidates. A waiver from taking any of the required courses needs approval by the student's advisor and the Graduate Program Director.

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

PhD candidates in ATM are not required to take a class outside ATM.

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 ATM.

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 ATM Program Director.

#### *Expectations and Approximate 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 ATM requirements:

- (a) Comprehensive Examination: Grade of MASTERS PASS, PASS or HIGH PASS
- (b) Seminar: Attending the ATM seminar series every semester and giving at least one 15-

minute presentation each year after the Comprehensive Examination

ATM M.S. students are required to complete at least **24** course credits. The required courses for ATM M.S. students are identical to those for ATM Ph.D. students. The remaining course credits can be obtained by taking other graduate courses offered by ATM, RSMAS, or UM.

Material from all required courses, and all other courses taken in the first year may appear on the Comprehensive Examination for M.S. candidates. A waiver from taking any of the required courses needs approval by the student's advisor and the Graduate Program Director.

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

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

- 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 taken before or immediately after the end of their first year of graduate studies at RSMAS. This examination will be arranged by a Comprehensive Examination Committee which comprises the ATM Graduate Program Director and the instructors (or 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 questions from four courses (no more, no less). For a given course, you need to answer all the questions (if there are more than one) unless explicitly stated otherwise. The oral part is administered by the ATM Graduate Program Director and course instructors (or assignees) and may include questions from all the courses taken by the student (and for PhD students the exam includes a 15 minute critical review of a short-format peer-reviewed journal article that is assigned by the Program Director in consultation with the student's advisor). The oral exam is scheduled to last one hour.

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><u>Written</u></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><u>Oral</u></b>	Shows a robust understanding of the subject matter	Shows an understanding of fundamental topics, but not a complete understanding of all the 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.

**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 may have an opportunity, based on recommendation of the faculty judging the exam, to re-take the exam once.

### ***Ph.D. Qualifying Examination***

*These guidelines complement those given in the UM Graduate Student Handbook.*

**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 ATM Faculty 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 of a 30 minute presentation by the student on their proposed research and recent results, questioning from the committee on the proposed research, and then follow-up questions from the committee on the student's written answers. It is recommended that the presentation emphasizes future work and is not a review of previous results, which may be 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 their 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 it is not required to retake the entire exam or have a full committee meeting.

**4. ATM COURSES** (3 credits, unless otherwise stated. Several of these courses will be cross-listed with other programs, especially OCE and MPO). Courses in Bold Type are required for all ATM students.

#### **600-level courses**

*ATM 611* Geophysical Fluid Dynamics I

*ATM 614* Introduction to Weather and Climate \*\* this class should not be taken by ATM MS/PhD students

*ATM 624* Applied Data Analysis

*ATM 632* Broadcast Meteorology

*ATM 633* Atmospheric Boundary Layer

***ATM 634* Introduction to Atmospheric Chemistry**

*ATM 636* Hurricanes

*ATM 637* Natural Hazards: Atmosphere and Ocean

***ATM 651* Introduction to Atmospheric Dynamics**

***ATM 652* Introduction to Atmospheric Physics**

*ATM660* Tropospheric Chemistry I

*ATM 653* Climate Change

*ATM 654* Climate Variability

*ATM 662* Advanced Weather Forecasting

*ATM 663* Mesoscale Meteorology and Severe Storms

#### **700-level courses**

*ATM 711* Geophysical Fluid Dynamics II

*ATM 713* Predictability

*ATM 731* Air-Sea Interaction

*ATM 732* Climate Dynamics

*ATM 750* Reaction Kinetics and Molecular Dynamics

*ATM 752* Vortex Dynamics

*ATM 761* Atmospheric Chemistry II

*ATM 762* Computer Models of Fluid Dynamics

*ATM 764* Atmospheric and Oceanic Turbulence

***ATM 765* General Circulation of the Atmosphere**

*ATM 767* Spectral and Finite Element Methods in Computational Fluid Dynamics

*ATM 768* ENSO Dynamics, Prediction and Predictability

### **Directed Readings**

*RSM 781* Directed Readings in topics including Cloud Physics, Climate Dynamics, Our Moist Convecting Atmosphere, Special Topics in Atmospheric Chemistry (all 1 credit)

## **5. TRANSFER OF STUDENTS INTO ATM**

A Graduate Program Transfer Form must be completed and placed on file in the RSMAS Graduate Studies Office. It requires signatures from the student, advisor, directors of the original and new programs, and the RSMAS Associate Dean. The Form can be obtained from the ATM Program Director and the Graduate Studies Office.