

# PH.D. IN ATMOSPHERIC SCIENCES

## Overview

The Atmospheric Sciences (ATM) program is designed to prepare students with the tools, training, and education necessary to tackle critical research problems in the atmospheric sciences today. Our faculty are experts in a wide range of research areas, including tropical meteorology, climate dynamics, cloud and aerosol processes, and atmospheric chemistry. Their expertise and guidance and our world-class facilities prepare our students for successful careers in the atmospheric sciences and related fields.

## Admission Requirements

The most competitive ATM applicants have a strong foundation in the physical sciences and a bachelor's and/or master's degree in physics, mathematics, chemistry, meteorology, atmospheric science, or other related sciences. The GRE score is not required for admission. You may optionally submit your GRE score. Individual faculty members may consider GRE scores as part of a holistic evaluation of the candidates. Applicants whose first language is not English must pass the Test of English as a Foreign Language (TOEFL) with a score of at least 550. A background in scientific programming is preferred though not required. All application requirements are available here (<https://graduate.earth.miami.edu/admissions/application-information/>).

## 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 the Handbook or by the Program Director.

All Rosenstiel School courses are listed on the 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.

ATM students have a common set of required core courses. Elective courses are chosen from offerings in ATM as well as other units of the Rosenstiel School and UM.

## Curriculum Requirements

Code	Title	Credit Hours
The ATM Ph.D. degree requires 60 total credits. <sup>1</sup>		
<b>Core Courses</b>		<b>9</b>
ATM 634	Introduction to Atmospheric Chemistry	
ATM 651	Introduction to Atmospheric Dynamics	
ATM 652	Introduction to Atmospheric Physics	
<b>Electives <sup>2</sup></b>		<b>16</b>
<b>Dissertation Research</b>		<b>35</b>
ATM 830	Doctoral Dissertation	
<b>Required Examinations</b>		
Comprehensive Examination <sup>3</sup>		
Qualifying Examination <sup>4</sup>		
<b>Additional Requirements</b>		
RSM 700	Research Ethics	
COMPASS Seminars <sup>5</sup>		
ATM 770	Seminar in Atmospheric Science	
Educational Training Program (TA) <sup>6</sup>		
RSM 771	Educational Training 1	
RSM 772	Educational Training 2	
RSM 773	Educational Training 3	
<b>Total Credit Hours</b>		<b>60</b>

<sup>1</sup> Minimum of 25 course credits and 12 dissertation credits.

<sup>2</sup> The remaining course credits can be obtained by taking other graduate courses offered by ATM, Rosenstiel School, or UM.

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- Material from the required core courses will appear on the comprehensive examination (along with material from other courses from the first year).
- Grade of **Pass** or **High Pass** needed to fulfill requirement.

- For full-time students, the comprehensive examination should be taken near the end of their first year of graduate studies at the Rosenstiel School. 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 in the 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 from those submitted, with a minimum of 1 question per course (up to the maximum of 4 questions). The oral part is administered by the ATM Graduate Program Director and one or more of the course instructors (or assignees), and may include questions from all the courses taken by the student. The oral exam lasts no longer than 2 hours for each 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 their cumulative grade point average, will determine whether the grade of **High Pass, Pass, Master's 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 Rosenstiel School faculty who wish to participate.
  - **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.
  - **Master's Pass:** Students with this result will be required to defend a master's 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.

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- 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, they 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.
- 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
  - a. 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.
  - b. 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.
  - c. 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.

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- Attendance to the COMPASS seminars (Combined ATM, MPO, OCE Seminar Series) is required every semester.
- ATM Ph.D. students must give at least one 15-minute presentation each year after completing the comprehensive exam and a one-hour presentation after advancing to Ph.D. candidacy, and at least 6 months before the dissertation defense.

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

## Sample Plan of Study

<b>Year One</b>		
<b>Fall</b>		<b>Credit Hours</b>
ATM 651	Introduction to Atmospheric Dynamics	3
ATM 652	Introduction to Atmospheric Physics	3
Approved Elective		3
RSM 700	Research Ethics	0
	<b>Credit Hours</b>	<b>9</b>
<b>Spring</b>		
ATM 634	Introduction to Atmospheric Chemistry	3
ATM 765	General Circulation of the Atmosphere	3
Approved Elective		3
	<b>Credit Hours</b>	<b>9</b>
<b>Summer</b>		
ATM 830	Doctoral Dissertation	4
	<b>Credit Hours</b>	<b>4</b>
<b>Year Two</b>		
<b>Fall</b>		
ATM 830	Doctoral Dissertation	1
Approved Elective		3
	<b>Credit Hours</b>	<b>4</b>
<b>Spring</b>		
ATM 830	Doctoral Dissertation	1
Approved Elective		3
	<b>Credit Hours</b>	<b>4</b>
<b>Summer</b>		
ATM 830	Doctoral Dissertation	4
	<b>Credit Hours</b>	<b>4</b>
<b>Year Three</b>		
<b>Fall</b>		
ATM 830	Doctoral Dissertation	4
RSM 771	Educational Training 1	0
RSM 772	Educational Training 2	0
	<b>Credit Hours</b>	<b>4</b>
<b>Spring</b>		
ATM 830	Doctoral Dissertation	4
RSM 773	Educational Training 3	0
	<b>Credit Hours</b>	<b>4</b>
<b>Summer</b>		
ATM 830	Doctoral Dissertation	4
	<b>Credit Hours</b>	<b>4</b>
<b>Year Four</b>		
<b>Fall</b>		
ATM 830	Doctoral Dissertation	3
RSM 780	Directed Readings	1
	<b>Credit Hours</b>	<b>4</b>
<b>Spring</b>		
ATM 830	Doctoral Dissertation	4
	<b>Credit Hours</b>	<b>4</b>

<b>Summer</b>		
ATM 830	Doctoral Dissertation	4
<b>Credit Hours</b>		<b>4</b>
<b>Year Five</b>		
<b>Fall</b>		
ATM 830	Doctoral Dissertation	4
<b>Credit Hours</b>		<b>4</b>
<b>Spring</b>		
ATM 830	Doctoral Dissertation	4
<b>Credit Hours</b>		<b>4</b>
<b>Summer</b>		
ATM 830	Doctoral Dissertation	4
<b>Credit Hours</b>		<b>4</b>
<b>Total Credit Hours</b>		<b>70</b>

## Mission

The Department of Atmospheric Sciences (ATM), started in 2016, seeks to advance knowledge and understanding of the physical, chemical, and dynamical processes that determine our weather, our climate, and their interactions with the oceans and the continents. We train graduate students and young scientists to be leaders in the atmospheric sciences and related fields. Through our distinct strengths in climate dynamics, tropical meteorology, and cloud and aerosol processes, we strive to achieve excellence in research and education that will better inform the public and policymakers on how to prepare for hazards and changes in the weather-climate system.

## Goals

To train graduate students and young scientists to be leaders in the atmospheric sciences and related fields.

## Student Learning Outcomes

- Students will demonstrate advanced knowledge of atmospheric science and how scientific research in their topical areas relates to societal issues.
- Students will demonstrate the ability to conduct high-quality research in atmospheric sciences as evidenced by their dissertation research.
- Students will demonstrate oral and written communication skills commensurate with employment as a research scientist or equivalent professional level scientist.