

# ATMOSPHERIC SCIENCE, PHD

Atmospheric Science faculty and graduate students engage in a wide range of atmospheric research, with specializations that include climate variability, numerical modeling, atmospheric dynamics, mesoscale and synoptic meteorology, air-pollution meteorology, and data analytics. Our program is an excellent place for graduate study because of our research excellence, close collaboration between faculty and students, friendly environment, and open-door policy for questions.

The Atmospheric Science Ph.D. program is designed to equip students with the ability to conduct independent, cutting-edge research that advances our understanding of weather and climate. Students become adept at applying existing and developing novel theory and methods to generate this knowledge. They gain broad knowledge of fundamental tenets of the atmospheric sciences and advanced knowledge within their chosen research specialization. The Ph.D. program typically requires 3-4 years to complete for students entering with an M.S. in Atmospheric Science or a related discipline. Students are typically supported as either Research or Teaching Assistantships.

Though it can be intimidating to do so, we highly encourage all prospective graduate students to reach out to the faculty members who do research in the areas of greatest interest to you. This does not have to be very formal: an e-mail that introduces yourself and lets us know that you are interested in learning more about our graduate programs is a great starting point! Reaching out helps you get more information about our program, learn more about potential research opportunities, start to determine if one of us would be a good fit for you as a mentor, and ask any questions about the application process that you might have.

## Admission Requirements

### Application Deadlines

Application deadlines vary by program, please review the application deadline chart (<http://uwm.edu/graduateschool/program-deadlines/>) for specific programs. Other important dates and deadlines can be found by using the One Stop calendars (<https://uwm.edu/onestop/dates-and-deadlines/>).

### Admission

Students seeking admission to the PhD in Atmospheric Science degree program must meet all UWM Graduate School requirements. An earned Master of Science degree is not a prerequisite for admission; however, it is expected that most applicants will have an earned master of science degree in atmospheric science or a closely-related discipline.

Entering students without an earned master of science degree should have a general background in both physics and mathematics, including calculus and ordinary differential equations. Students who lack this background may be admitted if the deficiencies amount to no more than two courses, and deficiencies must be made up within three enrolled semesters of graduate study.

Applicants are required to submit a Reason Statement. Statements are used to determine the appropriateness of your educational and professional goals and serves as an example of your ability to express yourself in writing. Your reason statement should include:

1. your reasons for pursuing graduate study
2. your specific background interests and background in the field
3. any relevant skills or training you've acquired

4. any academic awards or honors you have received
5. the name(s) of faculty members with whom your research interests most closely align

### Optional

Submission of scores on the Graduate Record Examination (GRE) (<http://uwm.edu/graduateschool/admission/#gre>).

## Credits and Courses

Students enrolled in the PhD in Atmospheric Science program must complete a total of fifty-four (54) graduate credits beyond the bachelor's degree with at least twenty-one (21) earned in residence at UWM. Students receiving financial support from the School of Freshwater Sciences must enroll in a minimum of fifteen (15) credits offered by the School during each academic year. As part of their 54 credits, students admitted directly to the PhD program without an earned Master of Science in Atmospheric Science must complete the following twenty-one (21) credits:

| Code  | Title  | Credits   |
|---|--|-----------|
| Select 9 credits at or above the ATM SCI or FRSHWTR 700-level |  | 9         |
| Select 6 credits in approved graduate elective courses        |  | 6         |
| Select one of the following:                                  |  | 6         |
| MATH 703<br>& MATH 704  | Advanced Engineering Mathematics I and Advanced Engineering Mathematics II                                       |           |
| ATM SCI 500<br>& ATM SCI 700                                  | Statistical Methods in Atmospheric Sciences and Statistical Methods in Atmospheric Sciences II: Signal Detection |           |
| <b>Total Credits</b>  |  | <b>21</b> |

Students admitted to the PhD program with an earned Master of Science in Atmospheric Science from UWM or elsewhere have fulfilled these requirements. In consultation with their major professor, students are expected to identify additional graduate courses that benefit their research or professional development. It is expected that most students will elect to supplement their formal Atmospheric Science coursework with formal coursework from other curricular areas. With the approval of the student's major professor, any graduate-level course at UWM may fulfill degree requirements. Assuming an earned MS degree, a typical PhD student's curriculum will consist of twelve credits of formal graduate coursework, at least half of which will be completed at the 700-level or above; three credits of ATM SCI 999; and nine to twelve credits of ATM SCI 998.

| Code   | Title | Credits   |
|--|-------|-----------|
| Master's degree/pre-doctoral coursework  |       | 30        |
| Formal graduate coursework, at least half of which will be completed at the 700-level or above |       | 12        |
| Additional approved courses, including 9-12 credits of ATM SCI 998                             |       | 12        |
| <b>Total Credits</b>   |       | <b>54</b> |

Courses in Atmospheric Science that may be taken for graduate credit are listed below.

| Code        | Title                      | Credits |
|-------------|----------------------------|---------|
| ATM SCI 330 | Air-Pollution Meteorology  | 3       |
| ATM SCI 350 | Atmospheric Thermodynamics | 3       |

|             |  |      |
|-------------|--|------|
| ATM SCI 351 | Dynamic Meteorology I  | 3    |
| ATM SCI 352 | Dynamic Meteorology II   | 3    |
| ATM SCI 360 | Synoptic Meteorology I   | 4    |
| ATM SCI 361 | Synoptic Meteorology II  | 4    |
| ATM SCI 460 | Mesoscale Circulations   | 3    |
| ATM SCI 464 | Physical Meteorology: Cloud Physics                              | 3    |
| ATM SCI 470 | Tropical Meteorology   | 3    |
| ATM SCI 480 | The General Circulation and Climate Dynamics                     | 3    |
| ATM SCI 497 | Study Abroad: (subtitled)  | 3    |
| ATM SCI 500 | Statistical Methods in Atmospheric Sciences                      | 3    |
| ATM SCI 505 | Micrometeorology   | 3    |
| ATM SCI 511 | Seminar in Atmospheric Radiation and Remote Sensing              | 3    |
| ATM SCI 600 | Data Analytics   | 3    |
| ATM SCI 690 | Seminar in Atmospheric Sciences:                                 | 3    |
| ATM SCI 700 | Statistical Methods in Atmospheric Sciences II: Signal Detection | 3    |
| ATM SCI 705 | Air Pollution Modeling   | 3    |
| ATM SCI 711 | Cloud Dynamics   | 3    |
| ATM SCI 730 | Numerical Weather Prediction                                     | 3    |
| ATM SCI 750 | Nonlinear Time Series Analysis                                   | 3    |
| ATM SCI 761 | Advanced Synoptic/Mesoscale Meteorology                          | 3    |
| ATM SCI 950 | Seminar on Topics in Atmospheric Sciences:                       | 3    |
| ATM SCI 990 | Master's Thesis  | 1-8  |
| ATM SCI 997 | Doctoral Externship  | 1-12 |
| ATM SCI 998 | Doctoral Dissertation  | 1-12 |
| ATM SCI 999 | Advanced Independent Reading                                     | 1-4  |

## Additional Requirements

### Major Professor as Advisor

The student must have a major professor to advise and supervise the student's studies as specified in Graduate School regulations.

### Preliminary Examination

To qualify for dissertator status, students must successfully pass a preliminary examination in Atmospheric Science, focusing on three sub-disciplines of the field, and complete a dissertation proposal hearing. With approval of their major professor, students may elect to substitute an area of mathematics for one of the three Atmospheric Science sub-disciplines on the preliminary examination. The preliminary examination must be attempted prior to the start of the third year of study, and students who fail the examination are permitted one retake. The preliminary examination and dissertation proposal hearing must both be completed no later than the end of the fourth year of study.

### Dissertation

To receive the degree, students, under the direction of a major professor and supervision of a five-member evaluation committee, must complete and successfully defend a dissertation representing an original contribution to the field of sufficient caliber for publication in a peer-reviewed journal. The evaluation committee is to be comprised of four

Atmospheric Science graduate faculty members and one member external to the program.

### Time Limit

Entering full-time students with an earned Master of Science degree are expected to complete all degree requirements within three to four years of first enrollment. Entering full-time students without an earned Master of Science degree are expected to complete all degree requirements within five to six years of first enrollment. All degree requirements must be completed within ten years of first enrollment, consistent with UWM's campus-wide policy.

## Atmospheric Science PhD Learning Outcomes

Students graduating from the Atmospheric Science PhD program will be able to:

- **Conduct** independent, cutting-edge research that, through the application of existing and development of novel theory and methods, results in one or more original contributions to understanding in the atmospheric sciences. This requires critical thinking, creativity, and a mastery of appropriate analysis, interpretation, and synthesis techniques.
- **Communicate** fundamental tenets of the atmospheric sciences and specialized research findings clearly and effectively to diverse audiences, including students, professionals, and the public.

### Contact Information

School of Freshwater Sciences  
600 E Greenfield Avenue  
Milwaukee, WI 53204

[uwm.edu/freshwater](http://uwm.edu/freshwater/) (<http://uwm.edu/freshwater/>)