PH.D. IN ATMOSPHERIC SCIENCE

The Ph.D. in Atmospheric Science trains the next generation of scientists in atmospheric science, a critical field for understanding weather and climate issues that significantly impact all life on Earth. Graduates acquire the knowledge and skills necessary to pursue an academic career or to enter diverse careers, including weather and climate forecasting, insurance, government laboratories, NGOs, and environmental consulting. Under the tutelage of renowned atmospheric science faculty, Ph.D. students dig deep into the discipline, produce important contributions, and drive future advancements through original research. Going a step further than the master's program, Ph.D. students will create fundamentally new content that adds to the body of knowledge in their field.

Please visit the Requirements tab above for a full list of the Ph.D. requirements.

Learning Objectives

Upon successful completion, students will be able to:

1. Formulate a science problem, review literature, propose an experiment, and analyze data at a level appropriate for academic or professional success.
2. Produce important contributions and add to the body of knowledge through peer-reviewed, high-impact publications.
3. Demonstrate proficiency in oral and written communication of research through presentations at professional conferences/ meetings and preparation of manuscripts for professional journals.
4. Demonstrate professional behavior and understand the ethical, economic, environmental, and societal impacts of their work.

Requirements Effective Fall 2025

The Ph.D. requires 72 graduate course credit hours for students without an applicable master's degree and 42 graduate course credit hours for students with an applicable master's degree. Ph.D. students are required to take two regular courses per academic year. One of those courses may be audited, but will not count towards the total graduate course credit hours or towards a student's GPA.

Regular courses selected for the Ph.D. are intended to support research and provide depth of study in a particular area of interest. Selection of courses must be approved by faculty advisor who is supervising the dissertation to ensure courses taken complement the dissertation.

Colloquium participation

All graduate students enrolled in the department are expected to attend the weekly department colloquium series. Colloquia are normally held once per week when classes are in session during the Fall and Spring Semesters.

Competency exams

Students pursuing a Ph.D. must demonstrate significant intellectual achievement, high scholarly ability, and a great breadth of knowledge.

Students are required to complete a **Preliminary Examination** within 18 months of admission to the Ph.D. program or within 12 months after completing an M.S. degree within our program.

The **Preliminary Examination** consists of three parts, all weighted equally: 1) Research Prospectus, 2) Written Examination, and 3) Oral Examination. Each component is graded as *Satisfactory* or *Unsatisfactory* by their Ph.D. graduate committee.

1) Research Prospectus:

The purpose of Research Prospectus is to evaluate the student's ability to independently formulate and propose a research project. It consists of the following elements: (max 10 pages, 11-pt font minimum):

- A statement of the problem and its broader significance, supported by a review of the existing literature which points to gaps in the current knowledge that motivate the proposed research.
- Research questions and hypotheses.
- A description of the proposed methods that is well-organized, appropriate for answering the research questions, and incorporates mechanisms to assess success. The proposed methods should thoroughly describe all tools and assumptions about their use. The approach should also include an explanation of how each research step is linked to the scientific questions and/or hypotheses.
- A work plan that demonstrates a realistic understanding of the extent of the work required.
- A summary detailing the expected benefits that will result from the research.
- A financial budget or statement of resources is not necessary.

The prospectus should not exceed 10 pages, with text in at least 11-point font. The title page and references are not included in the page count, but all other content, including text and figures, must fit within the 10-page limit. References should be listed separately at the end of the prospectus.

The subject of the prospectus may be shared with the adviser prior to writing the prospectus, but the subject is at the discretion of the student.

While interactions with the adviser or other committee members are not forbidden during the writing process, it is incumbent upon the student to ensure the main objective of the prospectus, the demonstration of independent capabilities, is not compromised by these interactions. For example, having the adviser or other students read the prospectus and comment upon the content prior to submission is in clear contradiction of the objectives. Interactions with the CSU Writing Center (intended to aid non-native English speakers) are permissible as long as they do not impact the scientific content of the prospectus.

Advisors can assist students in planning their time to appropriately manage the prospectus writing process among other competing responsibilities.

Students are allowed access to a set of examples of successful prospectuses to guide their preparation.

2) Written Examination:

The primary purpose of the Written Questions is to assess the student's ability to use their understanding of topics pertaining to their field of research to synthesize and process complex information by critically analyzing the research literature through the use of written arguments, appropriate equations and current theory.

The graduate committee will meet to develop three questions. The external committee member is not required to attend this meeting. At least one question must be based on one or more journal articles relevant to the general research area(s) of the student. In the context of the journal article(s), the questions may require the student to, among other things, critically review the article(s), place the article(s) in the broader context of the field, perform back-of-the-envelope calculations, defend a statement from first principles, discuss how to apply ideas in the article(s) to a different situation, etc.

The student may use any reference materials required to answer the questions but may not consult with other persons. The student has 48 hours to prepare and submit their written responses. History has shown that working for the entire 48 hours is not beneficial.

If the student has circumstances that make it difficult to complete the written questions in a single 48 hour period, they may consult with the Associate Department Head about potential accommodations.

Should the student discovers any errors in their submitted responses, they may correct these errors without consulting others and present the revised responses during the oral examination (see below).

3) Oral Exam

The Oral Examination provides the graduate committee an opportunity to ask questions about the student's prospectus, their responses to the written questions, and related topics in their area(s) of research.

The examination will begin with a 15-minute presentation of the prospectus by the student, during which committee members may only ask brief clarifying questions. Following the presentation, the committee will spend up to 45 minutes asking questions related to the prospectus. The total time for presenting and discussing the prospectus will not exceed 1 hour. Next, the committee will ask questions about the responses to the written questions and other questions in the student's area(s) of research for 45 minutes. After the questioning period, the student will be asked to leave the examination room while the committee decides on the outcome of the exam. The total length of the oral examination will not exceed 2 hours.

The student is responsible for arranging a time and place for the oral exam after consulting their graduate committee.

Scheduling of the Preliminary Examination:

The preliminary examination shall be administered at least two terms before the student's PhD defense.

The prospectus should be submitted to the student's graduate committee at least three weeks prior to the scheduled written portion of the exam (see below). The student should notify the committee in advance of the expected submission date for the prospectus. The three-week window can be shortened upon a written request by the student, provided all committee members agree that there is sufficient time to prepare the written questions.

The student must notify the graduate adviser at least three weeks before the oral examination The date, time and location of the oral examination will be announced to all Atmospheric Science academic faculty members one week prior to the examination. It is the candidate's responsibility to comply with these notifications.

The student is expected to make every effort to comply with departmental timelines for admission and for passing the preliminary examination. However, in cases of extenuating circumstances that require modification of these timelines or the exam format itself, the student and adviser may submit a written petition to the graduate committee. This petition should outline the reasons for the request and the proposed modified timetable and/or exam format. The Department Head will approve or deny the request.

Violation of departmental requirements and failure to meet established time lines will be considered grounds for dismissal from the program.

Outcome of the Preliminary Examination:

Outcomes of the full exam may be:

- PASS: Satisfactory on all three components
- PARTIAL PASS: Two satisfactory, one unsatisfactory
- FAIL: One or zero satisfactory ratings

A PARTIAL PASS requires the completion of follow-up work within 6 months, as specified by the graduate committee. This follow-up work will be documented in a department memo. Although the result will be considered a pass by the Graduate School (as specified in the GS16 form), any follow-up requested by the committee must be completed within the timeline specified in the memo), which will be within 6 months or less following the oral examination.

A FAIL can be followed by one re-examination, subject to committee endorsement and to be completed within six months of the first attempt. Conditions to be met before re-examination are documented on the GS16 form.

Internship or Practicum Experiences:

No internships or practicum experiences are required.

Dissertation requirements:

The dissertation must be prepared under the mentorship of the student's adviser and graduate committee. It should meet the following criteria: displays original and creative scholarship, contributes new knowledge to the field of atmospheric science, and demonstrate a high standard of scholarly writing.

Successful defense of a dissertation before the student's graduate committee and any other members of the academic and scientific communities who desire to attend.

Oral presentations:

A public oral defense of the dissertation is required. Dissertation defenses are open to all members of the University community and the public at large. The presentation and following question period are expected to last about one hour.

Following the public oral defense of the dissertation, the student meets privately with their Ph.D. committee. The private meeting typically lasts less than one hour. The committee asks questions primarily about the dissertation, but additional subject matter may also be covered. The question-and-answer session typically lasts less than one hour. Then the student leaves the room and the committee discusses the dissertation, the oral presentation, and the student's answers to the oral questions in the private meeting.

Passing criteria include the scientific quality of the work, the clarity of the oral presentation, and the quality of the student's answers in the committee meeting. If there are issues with the student's performance, the committee may ask the student to do some additional work. The nature of this work is determined by the committee, on a case-by-case basis. The additional work is submitted to the committee at a time specified by the committee. The committee may or may not request an additional meeting with the student.

Teamwork expectations

Students are expected to work collaboratively on co-authored publications as appropriate for their research topic.

Code	Title	Credits
Required Coursework:		
ATS 693	Responsible Research in Atmospheric Science	1
Regular Coursework: [1,2,3]		**Variable**
Select two regular courses each academic year from ATS 5XX -7XX [4]		
M.S. Degree		**0-30**
Research/Dissertation (ATS 799) Credits [5]		**Variable**
Program Total [6]		**72**

A minimum of 72 credits are required to complete this program.

1. Courses not accepted as regular include all courses ending in the range -82 through -99, with the exception of ATS 784.
2. With written adviser approval, the courses may also include regular graduate classes from other departments.
3. When within one semester of graduation, students and advisers may petition the department head, in writing, for a waiver of the two regular courses per year requirement.
4. One of these regular courses may be audited, but will not count towards the total required graduate course credits.
5. Students will select their advisor's section of ATS 799.
6. Students are expected to enroll in 15 credits each semester and will therefore earn more than 72 credits.

Requirements for All Graduate Degrees Effective Fall 2025

The Ph.D. requires 72 graduate course credit hours for students without an applicable master's degree and 42 graduate course credit hours for students with an applicable master's degree. Ph.D. students are required to take two regular courses per academic year. One of those courses may be audited, but will not count towards the total graduate course credit hours or towards a student's GPA.

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