

# DEPARTMENT OF ATMOSPHERIC SCIENCE

## Graduate

The department offers a Master of Science and a Doctor of Philosophy in Atmospheric Science.

## M.S. Program

Students that complete a thesis-based M.S. program acquire the knowledge and proficiency needed in the field of atmospheric science, allowing them to either continue their education at the PhD level, or seek employment in a wide range of careers (such as weather and climate forecasting and prediction, insurance, government labs, NGOs, environmental consulting). Successful students in the M.S. program demonstrate the following (as determined by their committee):

1. Broad knowledge of the fundamental areas of atmospheric science that include Climate and Atmospheric Dynamics, Weather and Weather Systems, Radiation and Remote Sensing, and Atmospheric Chemistry. This knowledge is gained through core curriculum, electives, weekly cross-disciplinary colloquia, and area-specific group meetings.
2. Understanding and practice of research ethics and broader issues related to social responsibility through a responsible conduct of research course, research projects, and weekly colloquia.
3. Completion of a high-quality original research project.
4. Proficiency in oral and written communication of research through presentations at professional conferences/meetings and preparation of manuscripts for professional journals.

## Prerequisites

- Bachelor of Science (B.S.) degree in physics, mathematics, atmospheric science, engineering, chemistry, or related field with a cumulative GPA of at least 3.0
- Calculus-based math course sequence including differential equations and vector analysis
- Calculus-based physics course sequence including kinetics, electricity and magnetism, and some modern topics

## Plan A (Thesis)

A minimum of 30 semester credits plus thesis is required. At least 19 credits must be earned in structured academic courses. 11 credits may be in special studies, graduate seminars, and research. Of the total 30 credits, 20 must have the ATS subject code.

All M.S. students must complete the following required courses (required courses account for 13 credit hours):

- ATS 601 Atmospheric Dynamics I (2 credits)
- ATS 606 Introduction to Climate (2 credits)
- ATS 620 Thermodynamics and Cloud Physics (2 credits)
- ATS 621 Atmospheric Chemistry (2 credits)
- ATS 622 Atmospheric Radiation (2 credits)
- ATS 693 Responsible Research in Atmospheric Science (1 credit)
- One of the following:

- ATS 640 Introduction to Synoptic Dynamics (2 credits)
- ATS 641 Introduction to Mesoscale Dynamics (2 credits)

All M.S. students must also complete 6 elective credit hours in structured classes. Electives may include any structured class at the 500/600-level. With written advisor approval, electives may also include structured 700-level classes and/or structured graduate courses in other departments. Audited classes do not count towards the M.S. degree.

A student may substitute an alternate course for a required class if:

1. A course similar to the required class has already been completed at the graduate level with a grade of B or higher
2. The student's advisor, the department head, and the instructor of the required course approve the substitution in writing

A student's program of study, and any deviations therein from department degree requirements, requires department head approval.

ATS 784 does not count toward the 19 structured credits. ATS 699A-O and ATS 784 are graded as S/U.

In addition to meeting the formal credit requirements for the M.S. as described above, all graduate students enrolled in the department are expected to attend the weekly department colloquium series. These colloquia are an important part of the total instructional program. Details can be found on the colloquium page (<http://www.atmos.colostate.edu/colloquia/>) on the ATS website.

## Ph.D. Program

The department offers a Ph.D. program for students who want to obtain the highest academic degree available in the field of atmospheric science. Students who earn a Ph.D. must demonstrate significant intellectual achievement, high scholarly ability, and a great breadth of knowledge. Successful students in the Ph.D. program demonstrate the following:

1. Deep knowledge in multiple areas in atmospheric science achieved through elective courses and weekly colloquia.
2. Skillful ability to formulate a science problem, review literature, propose an experiment, and analyze data at a level appropriate for academic or professional success. This ability is assessed through a three-part PhD Preliminary Examination (research prospectus, written exam related to the research/prospectus, and an oral exam by the PhD Committee).
3. Proficiency in (1) written communication through a dissertation and peer-reviewed research articles and (2) oral communication through presentations at professional conferences/meetings.
4. For students interested in gaining teaching experience, acquire basic training in teaching through teaching assistantships and other opportunities.

## Prerequisites

- Successful completion of an M.S. degree with thesis in atmospheric science, physics, math, engineering, chemistry, or related field
- Demonstration of aptitude for research

## Course Requirements

Ph.D. students must take a minimum of 42 semester credits beyond the (thesis option) master's degree (or 72 semester credits beyond the

bachelor's degree). At least 21 credits beyond the master's degree (or 37 credits beyond the bachelor's degree) must be earned in courses numbered 500 or above.

- Ph.D. students are required to take two structured courses per academic year. Students must register for the courses, and only one may be taken as an audit. The structured courses can be selected from the 500, 600, or 700 level. With written advisor approval, the courses may also include structured graduate classes from other departments. When the student is within one semester of graduation, the student and advisor may petition the Department Head, in writing, for a waiver of the "two courses per year" requirement. While ATS 784 (Supervised College Teaching) is not considered a structured academic course, it is allowed to count towards the two courses per academic year Ph.D. requirement.
- Successful completion of ATS 693 (1 cr), Responsible Conduct of Research, offered every spring semester.

In addition to meeting the formal credit requirements for the Ph.D. as described above, all graduate students enrolled in the department are expected to attend the weekly department colloquium series. These colloquia are an important part of the total instructional program. Details can be found on the colloquium page (<http://www.atmos.colostate.edu/colloquia/>) on the ATS website.

## Evaluation Mechanisms

- Successful completion of the department preliminary exam that includes background, methods, and current research that applies to the specific area(s) encompassing the candidate's proposed research topic
- Successful research topic proposal presentation
- Dissertation prepared under the mentorship of the student's advisor and graduate committee that meets the following criteria: displays original and creative scholarship, contributes new knowledge to the field of atmospheric science, and expresses good literate style.
- 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

The student's graduate committee is charged with ensuring the student gains breadth in atmospheric science during their tenure in the program. Accordingly, the graduate committee may make recommendations on coursework to be completed prior to graduation.