

ATMOSPHERIC AND OCEANIC SCIENCES - DOCTOR OF PHILOSOPHY (PHD)

The Department of Atmospheric and Oceanic Sciences (ATOC) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical and chemical processes in the atmosphere, ocean and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing and modeling climate and global change.

ATOC attracts many of the most outstanding graduate students in the field. Our students receive a significant number of fellowships and nationally recognized awards each year, provide excellent instruction to CU Boulder's undergraduates as teaching assistants, and make scientific advances while conducting innovative research. Our graduates go on to successful careers in academia, national research institutes and private industry.

Graduate students, research staff and faculty work together on a wide range of research themes:

- atmospheric & oceanic dynamics
- atmospheric chemistry & physics
- chemical & physical oceanography
- clouds & aerosols
- planetary atmospheres
- radiative transfer & remote sensing
- regional, boundary layer & wind energy meteorology

For more information about programs and application procedures, contact the ATOC office.

Requirements

Admission Requirements

Academic Preparation

An undergraduate degree in mathematics, physics, engineering, chemistry or another natural science is recommended. The general prerequisites expected of incoming graduate students include undergraduate courses in calculus, linear algebra, differential equations and computer programming, as well as one-year sequences of undergraduate calculus-based physics and chemistry. Upper-division undergraduate courses in physics, chemistry, engineering and mathematics are strongly recommended. Undergraduate courses in atmospheric and oceanic sciences are useful, but not expected, as part of the undergraduate background.

Program Requirements

Academic Standards

A student is required to maintain a 3.00 (B) average in all work attempted while enrolled in the Graduate School. For the PhD, a course grade of C+ or below is unsatisfactory and will not be counted toward fulfilling requirements for the degree.

Course Requirements

A total of 36 credit hours of coursework are required, including 18 credit hours in ATOC core courses, as well as a graduate-level course in applied or computational mathematics. In addition, 30 dissertation hours are

required. Other specific course requirements are covered in the *ATOC Graduate Handbook*.

Code	Title	Credit Hours
Core Courses		
All PhD students are required to take the following four ATOC core courses or their equivalent.		
ATOC 5050	Atmospheric Thermodynamics and Dynamics	3
ATOC 5051	Introduction to Physical Oceanography	3
ATOC 5060	Dynamics of the Atmosphere and Oceans	3
ATOC 5235	Introduction to Atmospheric Radiative Transfer and Remote Sensing	3
All PhD students are required to take two courses from the following list of courses or their equivalent.		
ATOC 5061	Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms	
ATOC 5151	Atmospheric Chemistry	
ATOC 5200	Biogeochemical Oceanography	
ATOC 5600	Physics and Chemistry of Clouds and Aerosols	
ATOC 5500	Special Topics in Atmospheric and Oceanic Sciences (Boundary Layer Meteorology)	
ATOC 5890	Synoptic Dynamic Meteorology	
Total Credit Hours		18

Examinations

The PhD Comprehensive Examination is conducted in two parts, referred to as "Comps 1" and "Comps 2." The goal of Comps 1 is to demonstrate mastery of foundational ATOC concepts. This can be achieved either by passing the 4 common required core classes (ATOC 5050, ATOC 5051, ATOC 5060 and ATOC 5235) with a defined minimum combination of grades or by taking an exam with a written and oral component to show mastery to reach the minimum grade requirement. Comps 2 is an oral exam based upon a written report of original student research. Successful completion of the Comprehensive Examination is required before a student is admitted into PhD candidacy.

Learning Outcomes

By the completion of our program, students will be able to:

- Demonstrate an advanced understanding of core ATOC topics.
- Demonstrate expert level knowledge in one specific area of Atmospheric and Oceanic Sciences.
- Design and independently conduct ATOC related original research.
- Effectively disseminate scientific results through oral presentations.
- Effectively disseminate scientific results through scientific writing.