

# ATMOSPHERIC AND OCEANIC SCIENCE MAJOR

**Program Director:** A. Jones, Ph.D.

Fundamental concepts from mathematics, chemistry, physics, and computer science are applied to understand the basic principles that control our weather and climate, from extreme events like tornadoes to the millennial changes of ice ages and the results of human modification of our environment. Coursework in the first two years emphasizes mastery of these fundamentals. Coursework in the last two years provides a comprehensive survey of atmospheric and oceanic science, while specialty courses and guided research allow the student to develop expertise in an area of concentration. The Department has particular strengths in computer modeling and remote sensing of the atmosphere and ocean, atmospheric chemistry, and climate studies. In addition to the Department, nearby research laboratories such as the NOAA National Centers for Environmental Prediction and NASA Goddard Space Flight Center offer the student many research opportunities. Courses offered by this department may be found under the following acronyms: AOSC

## Admission to the Major

The major in Atmospheric and Oceanic Science is not a limited enrollment program (LEP), so there are no formal requirements for entry into the major. Successful students generally have a solid background, earning good grades in mathematics, physics and chemistry.

## Program Objectives

The Atmospheric and Oceanic Science B.S. program seeks to educate majors in the basic principles that control our weather and the interactions between atmosphere and ocean that regulate Earth's climate. Students will be provided with practical experience as researchers and creators of knowledge, and equipped with the requirements for a full range of careers in Atmospheric and Oceanic Science, as well as for related areas in secondary education, graduate school, industry, and public service.

## Program Learning Outcomes

1. Design and Execution of Research: Upon completion of the program students will be able to create, synthesize, or apply knowledge to relevant scientific problems in atmospheric and oceanic science using critical and analytical thinking and employ diagnostic, prognostic, and technological tools to evaluate physical processes across a multitude of scales.
2. Professional Communication: Upon completion of the program students will be able to effectively and professionally communicate scientific information in oral and written form at an appropriate level for the particular audience. This will be accomplished through written manuscripts, oral presentations, and poster presentations.
3. Deep Knowledge: Upon completion of the program students will be able to summarize scientific literature and nuanced concepts, demonstrating in-depth knowledge in a specific subfield of their choice, corresponding to upper level electives, in atmospheric and oceanic sciences
4. Broad Knowledge: Upon completion of the program students will be able to solve problems and explain fundamental physics governing the atmosphere, ocean, and coupled climate system. This is accomplished through the core required courses and electives.

5. Diversity, Equity, and Inclusion: Upon completion of the program students will be able to identify implicit bias within themselves as it relates to working with diverse peers and resolve interpersonal challenges across diverse student teams to successfully complete team based assignments and projects with a high degree of integrity, ethics, and in keeping with professional codes of conduct.

## REQUIREMENTS

Course	Title	Credits
<b>Requirements for the Major</b>		
AOSC200	Weather and Climate <sup>1</sup>	3
AOSC201	Weather and Climate Laboratory	1
AOSC431	Atmospheric Thermodynamics	3
AOSC432	Dynamics of the Atmosphere and Ocean	3
AOSC494	Atmospheric and Oceanic Science Seminar	1
AOSC493	Senior Research Project I	3
AOSC498	Senior Research Project II	3
AOSC358	Special Topics in Atmospheric and Oceanic Science (AOSC358L-Computing and Data Analysis: Deciphering Climate Change Clues)	3
AOSC4XX	Upper Level Major Electives <sup>2</sup>	6
Select four of the following:		12
AOSC400	Physical Meteorology	
AOSC401	Climate Dynamics and Earth System Science	
AOSC424	Remote Sensing of the Atmosphere and Ocean	
AOSC433	Atmospheric Chemistry and Climate	
AOSC470	Synoptic Meteorology	
CHEM135	General Chemistry for Engineers	3
CHEM136	General Chemistry Laboratory for Engineers	1
MATH140	Calculus I	4
MATH141	Calculus II	4
MATH241	Calculus III <sup>3</sup>	4
MATH246	Differential Equations for Scientists and Engineers <sup>3</sup>	3
PHYS161	General Physics: Mechanics and Particle Dynamics <sup>4</sup>	3
PHYS174	Physics Laboratory Introduction <sup>4</sup>	1
PHYS260	General Physics: Vibration, Waves, Heat, Electricity and Magnetism <sup>4</sup>	3
PHYS261	General Physics: Mechanics, Vibrations, Waves, Heat (Laboratory) <sup>4</sup>	1
PHYS270	General Physics: Electrodynamics, Light, Relativity and Modern Physics <sup>4</sup>	3
PHYS271	General Physics: Electrodynamics, Light, Relativity and Modern Physics (Laboratory) <sup>4</sup>	1
<b>Total Credits</b>		<b>69</b>

<sup>1</sup> Or another AOSC course at the 200-level

<sup>2</sup> For a detailed list, see our website for AOSC majors

<sup>3</sup> The sequence for math majors may also be used: MATH340, MATH341

<sup>4</sup> The sequence for physics majors may also be used: PHYS171, PHYS174, PHYS272, PHYS275, PHYS273

The program requires that a grade of "C-" or better be obtained in all courses required for the major. Beginning with students matriculating in

Fall 2012, to be awarded a baccalaureate degree, students must have a minimum C (2.0) cumulative grade point average across all courses used to satisfy major degree requirements.

Detailed information on the major can be obtained by consulting our major website and making an appointment with an AOSC advisor.

## **FOUR-YEAR PLAN**

Click here (<https://cmns.umd.edu/undergraduate/advising-academic-planning/academic-planning/four-year-plans/four-year-plans-gened/>) for roadmaps for four-year plans in the College of Computer, Mathematical, and Natural Sciences.

Additional information on developing a four-year academic plan can be found on the following pages:

- <http://4yearplans.umd.edu>
- the Student Academic Success-Degree Completion Policy (<https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/#success>) section of this catalog