

ATMOSPHERIC SCIENCES, BS

Banner Code: SC-BS-AOES

Dr. Cristiana Stan, Undergraduate Coordinator and Associate Professor

267 Research Hall
Fairfax Campus

Phone: 703-993-5391

Email: cstan@gmu.edu

Website: cos.gmu.edu/aoes/academics/atmos-sci/

The undergraduate program in atmospheric sciences gives students a strong quantitative undergraduate education in atmospheric, climate, and related sciences to understand the basic principles behind current and emerging issues in weather, climate variability, and climate change. Students completing the atmospheric sciences degree will be prepared for a full range of career paths including forecast and analysis, operations and research support in meteorology, atmospheric sciences, and climate. The curriculum meets the American Meteorological Society's (<https://www.ametsoc.org/ams>) recommendations for a bachelor's degree in atmospheric sciences.

Admissions & Policies

Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies section of this catalog.

To apply for this program, please complete the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now>).

Policies

Students must fulfill all Requirements for Bachelor's Degrees, including the Mason Core.

The university's writing intensive requirement for the major will be met upon successful completion of CLIM 408 Senior Research.

For policies governing all undergraduate degrees, see AP.5 Undergraduate Policies.

Requirements

Degree Requirements

Total credits: minimum 120

Students should refer to the Admissions & Policies tab for specific policies related to this program.

A GPA of at least 2.00 is required for all core courses, with an overall GPA of at least 2.50.

Atmospheric Sciences Core

| Code | Title | Credits |
|----------|--|---------|
| CLIM 102 | Introduction to Global Climate Change Science (Mason Core) | 4 |

| | | |
|----------------------|--|-----------|
| CLIM 111 | Introduction to the Fundamentals of Atmospheric Science (Mason Core) | 3 |
| CLIM 112 | Introduction to the Fundamentals of Atmospheric Science Lab (Mason Core) | 1 |
| CLIM 301 | Weather Analysis and Prediction | 4 |
| CLIM 408 | Senior Research ¹ | 3 |
| CLIM 411 | Atmospheric Dynamics | 3 |
| CLIM 429 | Atmospheric Thermodynamics | 3 |
| PHYS 475 | Atmospheric Physics | 3 |
| Total Credits | | 24 |

¹ Fulfills the writing intensive requirement.

Chemistry

| Code | Title | Credits |
|----------------------|---|----------|
| CHEM 211 | General Chemistry I (Mason Core) | 3 |
| CHEM 213 | General Chemistry Laboratory I (Mason Core) | 1 |
| Total Credits | | 4 |

Computer Science

| Code | Title | Credits |
|------------------------------|--|------------|
| Select one of the following: | | 3-4 |
| CDS 130 | Computing for Scientists (Mason Core) | |
| CS 112 | Introduction to Computer Programming (Mason Core) ¹ | |
| Total Credits | | 3-4 |

¹ Students selecting CS 112 Introduction to Computer Programming (Mason Core) must take an additional information technology ethics course in order to completely fulfill the Mason Core Information Technology requirement. Recommended courses include either CDS 151 Data Ethics in an Information Society (Mason Core) or CS 105 Computer Ethics and Society (Mason Core).

Mathematics

| Code | Title | Credits |
|----------------------|---|-----------|
| MATH 113 | Analytic Geometry and Calculus I (Mason Core) | 4 |
| MATH 114 | Analytic Geometry and Calculus II | 4 |
| MATH 213 | Analytic Geometry and Calculus III | 3 |
| Total Credits | | 11 |

Statistics

| Code | Title | Credits |
|----------------------|--|----------|
| STAT 250 | Introductory Statistics I (Mason Core) | 3 |
| Total Credits | | 3 |

Physics

| Code | Title | Credits |
|----------|--|---------|
| PHYS 160 | University Physics I (Mason Core) | 3 |
| PHYS 161 | University Physics I Laboratory (Mason Core) | 1 |

| | | |
|---------------|---|---|
| PHYS 260 | University Physics II (Mason Core) | 3 |
| PHYS 261 | University Physics II Laboratory (Mason Core) | 1 |
| Total Credits | | 8 |

Options

Students in the atmospheric sciences major will select one of the following options in addition to the required courses above. These options reflect faculty expertise and provide two areas of research emphasis. The options will help in creating educated professionals who have the requisite training to support future weather and climate research, enabling the graduate's potential for providing substantial societal benefits.

Meteorology Option

This option is designed for students who are primarily interested in weather and weather forecasting. The required classes in this option emphasize atmospheric phenomena, especially those that have the greatest impact on society.

| Code | Title | Credits |
|------------------------|----------------------------|---------|
| CLIM 312 or GGS 312 | Physical Climatology | 3 |
| CLIM 314 or GGS 314 | Severe and Extreme Weather | 3 |
| CLIM 319 or GGS 319 | Air Pollution | 3 |
| Total Credits | | 9 |

Computational Atmospheric Sciences Option

The computational atmospheric sciences option gives students preparation in computational science, mathematics, and elements of numerical modeling in order to undertake quantitative research or operational work in a professional or graduate setting.

| Code | Title | Credits |
|--------------------------------|---|---------|
| CLIM 440 or CLIM 470 | Climate Dynamics | 3 |
| MATH 214 | Elementary Differential Equations | 3 |
| Select one from the following: | | 3 |
| CDS 251 | Introduction to Scientific Programming | |
| CDS 301 | Scientific Information and Data Visualization | |
| CDS 302 | Scientific Data and Databases | |
| CDS 303 | Scientific Data Mining | |
| Total Credits | | 9 |

Required Electives

The required electives must be chosen from this list and be independent of courses taken in the selected option (Meteorology or Computational Atmospheric Sciences):

| Code | Title | Credits |
|--------------------------------------|----------------------------|---------|
| Select 9 credits from the following: | | |
| CLIM 312 or GGS 312 | Physical Climatology | |
| CLIM 314 or GGS 314 | Severe and Extreme Weather | |

| | | |
|------------------------|--|---|
| CLIM 319 or GGS 319 | Air Pollution | |
| CLIM 409 | Research Internship | |
| CLIM 412 | Physical Oceanography | |
| CLIM 429 | Atmospheric Thermodynamics | |
| CLIM 438 | Atmospheric Chemistry | |
| CLIM 440 | Climate Dynamics | |
| CLIM 456 or GGS 456 | Introduction to Atmospheric Radiation | |
| CLIM 470 | Numerical Weather Prediction | |
| GEOL 420 | Earth Science and Policy (Mason Core) | |
| CDS 251 | Introduction to Scientific Programming | |
| CDS 301 | Scientific Information and Data Visualization | |
| GGS 354 | Data Analysis and Global Change Detection Techniques | |
| MATH 214 | Elementary Differential Equations | |
| Total Credits | | 9 |

Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires an additional 48-49 credits (dependent upon the course chosen for the Computer Science requirement), which may be applied toward any remaining Mason Core requirements (outlined below), Requirements for Bachelor's Degrees, and electives. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

Mason Core

Some Mason Core requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core requirements.

| Code | Title | Credits |
|---------------------------------|--------------------------------------|---------|
| Foundation Requirements | | |
| | Written Communication (ENGH 101) | 3 |
| | Oral Communication | 3 |
| | Quantitative Reasoning | 3 |
| | Information Technology and Computing | 3 |
| Exploration Requirements | | |
| | Arts | 3 |
| | Global Understanding | 3 |
| | Literature | 3 |
| | Natural Science | 7 |
| | Social and Behavioral Sciences | 3 |
| | Western Civilization/World History | 3 |
| Integration Requirements | | |
| | Written Communications (ENGH 302) | 3 |
| | Writing-Intensive ¹ | 3 |
| | Synthesis/Capstone ² | 3 |
| Total Credits | | 40 |

- ¹ Most programs include the writing-intensive course designated for the major as part of the major requirements; this course is therefore not counted towards the total required for Mason Core.
- ² Minimum 3 credits required.