CLIMATE SCIENCE, MS

Banner Code: SC-MS-CLIS

Academic Advising

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The understanding of climate science is essential to the interpretation of modern climate variations and the measurement of their impact. Climate data must be analyzed and interpreted in order to formulate useful responses and plan actions to meet specific climate challenges. The MS in Climate Science educates students to be climate professionals who can analyze and model advanced climate data. Students in the program learn to solve quantitative problems about atmospheric properties and variability, fluid dynamics, and the role of the ocean and land surface in climate. Students choose a concentration in either Climate Modeling or Climate Data to gain specific skills to understand and predict climate variations.

The program encourages applications from students with diverse backgrounds in physical science, mathematics, and engineering. Students with atmospheric science or meteorology degrees can deepen their understanding, enhance relevant computer skills, and gain insight into climate as a multi-component system. Students with physics, math, or other degrees will find that climate provides compelling applications of their mathematical and computational skills. All students will be taught by faculty of the Atmospheric, Oceanic, and Earth Sciences Department (https://catalog.gmu.edu/colleges-schools/science/atmospheric-oceanic-earth-sciences/) and the Center for Ocean-Land-Atmosphere Studies (http://cola.gmu.edu/), which includes scientists doing pioneering work in climate dynamics, climate modeling, predictability, and statistical analysis of climate data.

Admissions & Policies

Admissions

University-wide admissions policies can be found in the Graduate Admissions Policies (https://catalog.gmu.edu/admissions/graduate-policies/) section of this catalog. International students and students having earned international degrees should also refer to Admission of International Students (https://catalog.gmu.edu/admissions/international-students/) for additional requirements.

Eligibility

Applicants should possess an earned baccalaureate degree with a minimum 3.00 GPA on a 4.00 scale from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent.

Program admission decisions give preference to students with an undergraduate degree in physical science, mathematics, or engineering. Students with other undergraduate degrees should consult with the program's administration regarding the suitability of their undergraduate preparation.

Application Requirements

To apply for this program, prospective students should submit the George Mason University Admissions Application (https://www2.gmu.edu/admissions-aid/apply-now/) and its required supplemental documentation.

The GRE is not required for admission into this program.

Requirements

Degree Requirements

Total Credits: 33

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

Students must complete the Core Courses, Seminar/Reading, and Thesis or Non-thesis sections, and in addition, choose one concentration:

Core Courses

Code	Title	Credits
CLIM 511	Atmospheric Dynamics [1]	3
or CLIM 711	Introduction to Atmospheric Dynamics	
CLIM 512	Physical Oceanography [1]	3
or CLIM 712	Physical and Dynamical Oceanography	
CLIM 610	Introduction to the Physical Climate System	3
CLIM 614	Land-Climate Interactions	3
CLIM 690	Scientific Basis of Climate Change	3
Total Credits		**15**

[1] Students who wish to continue with the Climate Dynamics, PhD (https://catalog.gmu.edu/colleges-schools/science/atmospheric-oceanic-earth-sciences/climate-dynamics-phd/) should note that CLIM 711 Introduction to Atmospheric Dynamics and CLIM 712 Physical and Dynamical Oceanography are required for the PhD.

Seminar/Reading

Code	Title	Credits
CLIM 991	Climate Dynamics Seminar	1
Select 2 additional credits from the list below:		2
CLIM 796	Directed Reading and Research	
CLIM 991	Climate Dynamics Seminar	
CLIM 996	Doctoral Reading and Research	
Total Credits		**3**

Thesis or Non-thesis Options

Code	Title	Credits
Choose one of the following options:		3
Thesis Option		
CLIM 799	Master's Thesis in Climate	
Non-thesis Option		

Choose one unrestricted, graduate-level elective course [1]	
Total Credits	**3**

[1] Unrestricted, graduate-level elective courses may be chosen from the following prefixes: Climate Dynamics (CLIM) (https://catalog.gmu.edu/courses/clim/), Mathematics (MATH) (https://catalog.gmu.edu/courses/math/), Computational and Data Sciences (CDS) (https://catalog.gmu.edu/courses/cds/), Computational Science and Informatics (CSI) (https://catalog.gmu.edu/courses/csi/), Computational Social Science (CSS) (https://catalog.gmu.edu/courses/css/), Geography and Geoinformation Science (GGS) (https://catalog.gmu.edu/courses/ggs/), or chosen from the Climate-Relevant elective list (below).
Other courses can be approved by the graduate coordinator.

Concentrations

Concentration in Climate Modeling (CM)

Code	Title	Credits
CLIM 670	Earth System Modeling	3
CLIM 715	Numerical Methods for Climate Modeling	3
CLIM 751	Predictability and Prediction of Weather and Climate	3
Choose one course from the elective lists (below)		3
Total Credits		**12**

Concentration in Climate Data (CD)

Code	Title	Credits
CLIM 680	Climate Data	3
CLIM 762	Statistical Methods in Climate Research	3
Choose two courses from the Mathematical, Computational, or Geographical elective list (below)		6
Total Credits		**12**

Electives

Code	Title	Credits
Select courses not previously taken and pay close attention to course credit values; carefully consider how the courses will work into your degree program.		
Climate Science		
CLIM 631	Urban Climate	
CLIM 680	Climate Data	
CLIM 690	Scientific Basis of Climate Change	
CLIM 713	Atmosphere-Ocean Interactions	
CLIM 750	Geophysical Fluid Dynamics	
CLIM 751	Predictability and Prediction of Weather and Climate	
CLIM 752	Ocean General Circulation	
CLIM 753	General Circulation of the Atmosphere	
CLIM 754	Elements of the Tropical Climate System	
CLIM 759	Topics in Climate Dynamics (when the topic is "Advanced Predictability" or "Convection") [2]	
GEOL 532	Paleoclimatology	
GEOL 535	Quantitative Stratigraphy	
GEOL 565	Paleoceanography	
GGS 670	Introduction to Atmosphere and Weather	
Mathematical, Computational, or Geographical		
CLIM 715	Numerical Methods for Climate Modeling	
CLIM 751	Predictability and Prediction of Weather and Climate	
CLIM 759	Topics in Climate Dynamics (when the topic is "Earth System Modeling") [2]	
CLIM 762	Statistical Methods in Climate Research	
CLIM 763	Advanced Statistical Methods in Climate Research	
GEOL 525	Modeling Earth Signals and Systems	
GEOL 553	Field Mapping Techniques	
CDS 501	Scientific Information and Data Visualization	
CSI 501	Computational Science Programming	
CSI 690	Numerical Methods	
GGS 553	Geographic Information Systems	
GGS 563	Advanced Geographic Information Systems	
GGS 650	Introduction to GIS Algorithms and Programming	
GGS 680	Earth Image Processing	
GGS 692	Web-based Geographic Information Systems	
PHYS 510	Computational Physics I	
Climate-Relevant		
GEOL 506	Soil Science	
GEOL 513	Hydrogeology	
GEOL 563	Coastal Morphology and Processes	
BIOL 650	Environment Analysis and Modeling	
CDS 502	Introduction to Scientific Data and Databases	
CSI 600	Quantitative Foundations for Computational Sciences	
EVPP 506	Science of the Environment I	
EVPP 507	Science of the Environment II	
EVPP 529	Environmental Science Communication	
EVPP 542	Urban Ecosystems Processes	
EVPP 543	Tropical Ecosystems	
EVPP 550	Waterscape Ecology and Management	
EVPP 607	Fundamentals of Ecology	
EVPP 637	Human Dimensions of Climate Change (when the topic is "Climate Change Policy & Politics" or "Climate Change, Public Administration, and Management")	
GGS 507	Geographic Approaches for Sustainable Development	
GGS 531	Land-Use Modeling Techniques and Applications	
GGS 579	Remote Sensing	
GGS 656	The Hydrosphere	
PHYS 660	Space Weather	
AIT 580	Foundations of Data Processing	
AIT 582	Metadata Analytics for Big Data	

COMM 660	Climate Change and Sustainability Communication Campaigns
CS 504	Principles of Data Management and Mining
PUBP 710	Topics in Public Policy (when the topic is "Climate Policy & Politics" or "Climate Change, Public Administration and Management")

[2] CLIM 759 Topics in Climate Dynamics is a special topics course in which different sections can address different subjects.

Accelerated Master's

Atmospheric Sciences, BS/Climate Science, Accelerated MS

Overview

This bachelor's/accelerated master's degree program allows academically strong undergraduates with a commitment to advance their education to obtain both the Atmospheric Sciences, BS (https://catalog.gmu.edu/colleges-schools/science/atmospheric-oceanic-earth-sciences/atmospheric-sciences-bs/) and the Climate Science, MS degrees within an accelerated timeframe. Upon completion of this 141 credit accelerated program, students will be exceptionally well prepared for entry into their careers or into a doctoral program in the field or in a related discipline.

Students are eligible to apply for this accelerated program once they have earned at least 60 undergraduate credits and can enroll in up to 18 credits of graduate coursework after successfully completing 75 undergraduate credits. This flexibility makes it possible for students to complete a bachelor's and a master's in five years.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/). For more information on undergraduates enrolling in graduate courses, see AP.1.4.4 Graduate Course Enrollment by Undergraduates (https://catalog.gmu.edu/policies/academic/registration-attendance/#text).

Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies (https://catalog.gmu.edu/admissions/graduate-policies/) section of this catalog.

Important application information and processes for this accelerated master's program can be found here (https://www2.gmu.edu/admissions-aid/how-apply/accelerated-masters/).

Students should seek out the graduate program's advisor who will aid in choosing the appropriate graduate courses and help prepare the student for graduate studies.

Three letters of recommendation, including one from a prospective thesis or project advisor, are required.

GRE scores are not required for students in this accelerated program.

Successful applicants will have an overall undergraduate GPA of at least 3.00.

Accelerated Option Requirements

After the completion of 75 undergraduate credits, students may complete 3 to 12 credits of graduate coursework that can apply to both the undergraduate and graduate degrees.

In addition to applying to graduate from the undergraduate program, students in the accelerated program must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (https://registrar.gmu.edu/forms/)) to the College of Science's Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us/) by the last day to add classes of their final undergraduate semester. Students should enroll for courses in the master's program in the fall or spring semester immediately following conferral of the bachelor's degree, but should contact an advisor if they would like to defer up to one semester.

Students must maintain an overall GPA of 3.00 or higher in all graduate coursework and should consult with their faculty advisor to coordinate their academic goals.

Reserve Graduate Credit

Accelerated master's students may also take up to 6 graduate credits as reserve graduate credits. These credits do not apply to the undergraduate degree, but will reduce the master's degree by up to 6 credits. With 12 graduate credits counted toward the undergraduate and graduate degrees plus the maximum 6 reserve graduate credits, the credits necessary for the graduate degree can be reduced by up to 18.

Graduate Course Suggestions

The following list of suggested courses is provided for general reference. To ensure an efficient route to graduation and post-graduation readiness, students are strongly encouraged to meet with an advisor before registering for graduate-level courses.

Code	Title	Credits
CLIM 511	Atmospheric Dynamics [1]	3
CLIM 512	Physical Oceanography [1]	3
CLIM 601	Midlatitude Synoptic Meteorology [1]	3
CLIM 610	Introduction to the Physical Climate System	3
CLIM 614	Land-Climate Interactions	3
CLIM 631	Urban Climate	3
CLIM 670	Earth System Modeling	3
CLIM 680	Climate Data	3
CLIM 690	Scientific Basis of Climate Change	3

[1] An undergraduate version of this course exists. Students in this accelerated master's program who wish to take a cross-listed graduate/undergraduate course as part of the MS program should take the graduate version of the course.