New Program Proposal

Date Submitted: 04/25/18 8:58 pm

Viewing: : Climate Science, MS

Last edit: 04/25/18 8:58 pm

Changes proposed by: jbazaz

In Workflow

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Are you completing this form on someone else's behalf?

Yes

Requestor:

Name	Extension	Email
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Effective Catalog: 2019-2020

Program Level: Graduate

Program Type: Master's

Degree Type: Master of Science

Title: Climate Science, MS

Is this a retitling of an existing program?   No

Registrar/OAPI Use Only – SCHEV Status   Pending Approval

Registrar's Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter		

Concentration(s):

	Associated Concentrations	**Registrar's Office Use Only: Concentration Code**
1	Climate Modeling	
2	Climate Data	

Registrar/IRR Use Only – Concentration CIP Code		

College/School:	College of Science
Department / Academic Unit:	Atmospheric, Oceanic, & Earth Sciences
Jointly Owned Program?	No

Justification

There are currently few masters programs in Climate Science in the United States, and none with the emphasis on climate dynamics and climate data of the proposed program. Meanwhile, European nations are taking the lead in providing climate data services and analysis. Pragmatic elements in the private sector and military understand the need for reliable climate data analysis, and government agencies are supplying an ever growing volume of climate data. Although government data are often freely available, expert analysis and interpretation of those data are required to formulate responses and plan actions to meet specific challenges. However, many people currently put in positions to use and interpret climate data do not have the expertise to choose the best data sources, analysis methods, nor have adequate knowledge of the science to apply them.

Understanding of past climate data is necessary to interpret current climate variations and extremes. Furthermore, climate change means non-stationarity; everything from water resource plans and floodplain mapping to actuarial tables now require constant updates. Climate data services are relevant for everything from design standards for homes, commercial buildings and infrastructure to company structuring and financing. Climate data are essential for government officials responsible for the management of public finances, for assets such as electricity grids, government buildings and roads, and services such as emergency response and assistance. In the private sector, decision-making on input sourcing, facility siting, insurance needs, employee health and much more can be strengthened by gaining a better understanding of climate. The insurance industry is one sector that is already relatively advanced in sourcing and applying climate data in their decision-making processes. However, businesses in all fields need to prepare for climate variability and could benefit from tailored

climate information services prepared by professionals who keenly understand the complexities of climate.

The proposed MS in Climate Data responds to current needs in the Commonwealth of Virginia and the nation. The current needs include 1) a growing demand in the public, private and NGO sectors for trained professionals with expertise in climate data analysis and interpretation, 2) trained personnel to fill data management and curation roles in response to new demands from funding agencies and scientific publishers to make all research data (including voluminous climate data) archived and accessible in stable repositories, and 3) to close the growing gap between the United States and Europe in climate data literacy and applications.

George Mason University will become a pioneer in the United States and world leader in training users of climate data. This training blends understanding of the basic physics of atmospheric science and related disciplines like oceanography, hydrology, paleoclimatology and ecology with knowledge of good climate data management practices including applications of quality control, documentation, curation and data accessibility.

Total Credits Required: Total Credits: 30

Registrar's Office Use Only - Program Code:

Registrar/IRR Use Only – Program CIP Code

Admission Requirements:

Admissions

University-wide admissions policies can be found in the Graduate Admissions Policies section of this catalog. To apply for this program, please complete the George Mason University Admissions Application. Admission requirements include:

- An earned baccalaureate degree from a regionally accredited institution of higher education, or international equivalent, verified from official transcripts.
- A minimum 3.00 GPA on a 4.00 scale in baccalaureate study.
- Complete the online application and submit all required materials.

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.

Program-Specific Policies:

Degree Requirements:

Note: As of catalog publication in April, the program described below has been approved by the Board of Visitors and sent to the State Council of Higher Education in Virginia (SCHEV) for consideration as a new degree program. The university cannot accept applications or enroll students in this program until SCHEV approval has been granted. Check the school/department website for current program status.

Degree Requirements

Students must complete the Core Climate Courses, Seminar Course, and Thesis and Elective Courses sections, and in addition, choose one concentration:

Course List		
Code	Title	Credits
Core Climate Courses		**15**
CLIM 511	**Course CLIM 511 Not Found** [1]	
or CLIM 711	**Introduction to Atmospheric Dynamics**	
CLIM 512	**Physical Oceanography** [1]	
or CLIM 712	**Physical and Dynamical Oceanography**	
CLIM 610	**Course CLIM 610 Not Found**	
CLIM 614	**Course CLIM 614 Not Found**	
CLIM 690	**Scientific Basis of Climate Change**	

[1]**Students who wish to continue with the Climate Dynamics PhD should note that these courses are required for the PhD.**

Course List		
Code	Title	Credits
Seminar Course		**3**
CLIM 991	**Climate Dynamics Seminar (1 credit, repeated 3 times)**	

Course List		
Code	Title	Credits
Thesis and Elective Courses		**6**
Choose the Thesis Option or the Non-thesis Option:		
Thesis Option		
CLIM 799	**Master's Thesis in Climate**	
Choose 1 unrestricted elective course [2]		
Non-thesis Option		
Choose 2 unrestricted electives [2]		

[2]**Unrestricted electives may be chosen from any of the elective lists below: Climate Science; Mathematics, Computational Science, and Geographic Information Systems; and Climate-Relevant Topics. Courses not on the list can count toward elective credit if approved by the graduate coordinator.**

Course List		
Code	Title	Credits
Concentrations		**6**

Code	Title	Credits

Choose one concentration:

Climate Modeling

CLIM 759   **Topics in Climate Dynamics**

Choose 1 Climate Science elective

Climate Data

CLIM 680   **Climate Data**

Choose 1 Mathematics, Computational, and GIS elective

Course List

Code	Title	Credits

Electives: Climate Science

Code	Title
CLIM 000	**Course CLIM 000 Not Found** (Urban Microclimates)
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** 3
GEOL 532	**Paleoclimatology**
GEOL 535	**Quantitative Stratigraphy**
GEOL 565	**Paleoceanography**

Electives: Mathematics, Computational Science, and Geographic Information Systems

Code	Title
CLIM 715	**Numerical Methods for Climate Modeling**
CLIM 759	**Topics in Climate Dynamics** 3
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	**Introduction to Scientific Programming**
CSI 690	**Numerical Methods**
GGS 553	**Geographic Information Systems**
GGS 563	**Advanced Geographic Information Systems**
GGS 650	**Introduction to GIS Algorithms and Programming**
PHYS 510	**Computational Physics I**

Electives: Climate-Relevant Topics

Code	Title
GEOL 506	**Soil Science**

Code	Title	Credits
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	
CSI 662	Introduction to Space Weather	
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	
GGS 507	Sustainable Development	
GGS 531	Land-Use Modeling Techniques and Applications	
GGS 550	Geospatial Science Fundamentals	
GGS 579	Remote Sensing	
GGS 656	The Hydrosphere	
AIT 580	Analytics: Big Data to Information	
AIT 582	Applications of Metadata in Complex Big Data Problems	
COMM 660	Climate Change and Sustainability Communication Campaigns	
CS 504	Principles of Data Management and Mining	
PUBP 710	Topics in Public Policy [4]	

[3] A special topics course in which different sections can address different subjects.

[4] When the topic is either Climate Change Policy and Politics or Climate Change, Public Administration and Management.

Plan of Study:

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

Courses offered via distance (if applicable):

What is the primary delivery format for the program?	Face-to-Face Only

Does any portion of this program occur off-campus?

No

Are you working with a vendor / other collaborators to offer your program?

No

**Related
Departments**

**Could this program prepare students for any type of professional licensure, in
Virginia or elsewhere?**

No

Are you adding or removing a licensure component?

No

Does this program cover material which crosses into another department?

No

**Additional
Attachments**

SCHEV Proposal

**Executive
Summary**

The Master of Science (MS) in Climate Science will be offered by the Department of Atmospheric, Oceanic, and Earth Sciences (AOES) to be implemented in the Fall 2019 Semester. The MS will complement the existing B.S. in Atmospheric Science and Ph.D. in Climate Dynamics offered by the department. It will educate students who can conduct climate modeling experiments and diagnostic analyses at national centers; advise governments, corporations, and nongovernmental organizations on climate issues; and continue to doctoral studies in climate, atmospheric research, and related fields.

The degree requires 30 credits of course work and will have two concentrations, Climate Modeling and Climate Data. All students will take a 12 credit core of climate science classes, 6 credits of unrestricted electives, and 3 credits of seminar. Students can choose a thesis option (3 credits), or a non-thesis option in which an elective is substituted for thesis. The remaining 6 credit requirement is fulfilled in a different way by the two concentrations. Each will require a course specific to the concentration as well as an elective from a list specific to the concentration. The required courses and most electives have already been taught by AOES (including as special topics courses).

**Reviewer
Comments**

**Additional
Comments**

New courses to be approved:

CLIM 610 Introduction to the Physical Climate System

CLIM 614 Land-Climate Interactions

CLIM 511 Atmospheric Dynamics

CLIM ??? Urban Microclimates

Key: 720