Course Change Request

New Course Proposal

Date Submitted: 01/03/24 1:36 pm

Viewing: CLIM 636 : Atmospheric Aerosols

Last edit: 03/06/24 1:54 pm

Changes proposed by: qtong

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

In Workflow

- 1. AOES Curriculum Committee
- 2. AOES Chair
- 3. SC Curriculum Committee
- 4. SC Assistant Dean
- 5. Assoc Provost-Graduate
- 6. Registrar-Courses
- 7. Banner

Approval Path

- 02/28/24 10:48 pm Barry Klinger (bklinger): Approved for AOES Curriculum Committee
- 2. 02/29/24 7:24 am Mark Uhen (muhen): Approved for AOES Chair

636

Course Number:

No

Effective Term: Fall 2024

Subject Code: CLIM - Climate Dynamics

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Atmospheric Aerosols

Banner Title: Atmospheric Aerosols

3/6/24, 1:56 PM		CLIM 636: Atmospheric	Aerosols
Will section titles vary by semester?	No		
Credits:	3		
Schedule Type:	Lecture		
Hours of Lecture or S week:	Seminar per	2.5	
Repeatable:	May be only take attempts (N3)	en once for credit, limited to 3	Max Allowable Credits: 9
Default Grade Mode:	Graduate Regula	r	
Recommended Prerequisite(s): At least one course	in chemistry, physic	cs, environmental science, atmo	ospheric or climate science.
Recommended Corequisite(s):			
Required Prerequisite(s) / Corequisite(s)			

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(Course/Test Code	Min Grade/Score	Academic Level)	Concurrency?

Registration Restrictions (Updates only):

(Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study: Class(es): Level(s): Degree(s): School(s):

Catalog Description:

Aerosols are small particles in the atmosphere which play an important role in cloud formation, the Earth's radiative balance, and human health. Societal aerosol emissions are a major driver of climate change. Course covers physical and chemical properties of atmospheric aerosols and their impacts on climate and health. Topics include sources, size distribution, thermodynamics, effects on radiation, and interactions with clouds, and the importance of aerosols in health risks, biogeochemical effects, and proposed climate engineering.

Justification:

What: creating a new graduate level course on Aerosols.

Why: This aerosol course provides students with the fundamentals of atmospheric aerosols and their roles in climate. It is designed to prepare students to conduct research in a suite of Earth science fields, including climate science, air quality, and GeoHealth science.

The aerosols and trace gases are important modulators of the climate system. The course will extend existing courses in climate science by focusing on interactions of aerosols, clouds, and radiation.

The course has been offered twice as a special topic (CLIM 759-002) since Spring 2021. We now propose to establish it as a formal course under the Climate Dynamics program. Four students enrolled in the course each time, with 50% from AOES, 37% from Engineering School and 13% from GGS.

Does this course cover material which No crosses into another department?

Learning Outcomes:

Will this course be scheduled as a crosslevel cross listed section?

Attach Syllabus Syllabus-Aerosols v2.pdf

Additional Attachments

Staffing:

Daniel Tong Zafer Boybeyi

Relationship to

Existing Programs:

Will be elective for Climate Dynamics PhD and elective for Climate Science MS. Based on enrollment from the special topics version already offered, it will also be a good elective for graduate programs in Engineering, GGS, and other departments.

Relationship to Existing Courses:

There is no Aerosols course available at graduate level at Mason.

Additional Comments:

Reviewer Comments

CLIM-635 Syllabus

Atmospheric Aerosols

Spring or Fall Semester, 2024 Tuesdays - Thursdays, 9:00 - 10:15am EST Online Synchronous Lectures

Instructor: Daniel Tong

Office Hours: 2:00-4:00pm, Tuesday 264 Research Hall or Virtual (by appointment)

Catalog Description:

Aerosols are small particles in the atmosphere which play an important role in cloud formation, the Earth's radiative balance, and human health. Anthropogenic aerosol emissions are a major driver of climate change. Course covers physical and chemical properties of atmospheric aerosols and their impacts on climate and health. Topics include sources, size distribution, thermodynamics, effects on radiation, and interactions with clouds, and the importance of aerosols in health risks, biogeochemical effects, and proposed climate engineering.

This course is listed under the Department of Atmospheric, Oceanic & Earth Sciences (AOES) as CLIM 635.

Prerequisites: Recommended courses: One course on Atmospheric/Climate Sciences or Environmental Science, Air Pollution, or Physical Chemistry

Course credits: 3

General Course Goals:

- The overarching goal of this course is to provide students with the fundamentals of atmospheric aerosols and their roles in climate and public health.
- This course is designed to prepare students to conduct research in a suite of Earth science fields, including climate science, air quality and health science.

Learning Outcomes:

Upon completion of this course, students will be able to:

- Understand the sources and physical and chemical properties of atmospheric aerosols.
- Be familiar with the concepts and basics of aerosol sciences.

• Apply the knowledge to conduct research in related fields.

Instructor and Contact Information:

Prof. Daniel Tong Research Hall, Room 264 Mail Stop 6A2 Email: qtong@gmu.edu Office Hours: Tuesdays, 2:00-4:00pm EST; Additional hours by appointment.

Electronic Communications

Students must use their MasonLive email account to receive important University information, including communications related to this class.

Course Website:

GMU Blackboard: https://gmu.blackboard.com/

- Class notes will be posted on GMU Blackboard;
- In order to comply with student privacy laws, faculty and students need to use their GMU email accounts when corresponding with each other.

Textbook:

Seinfeld, J.H., and S. N. Pandis, *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change*, Wiley-Interscience, 2006.

Boucher, Olivier, Atmospheric Aerosols: Properties and Climate Impacts, Springer, 2015.

Week	Content
1	Introduction to Atmospheric Aerosols
2	Emission Sources of Aerosols and Aerosol Precursors
3	Aerosol Size Distribution and Chemical Composition
4	Thermodynamics of Aerosols
5	Aerosol Optical Properties
6	Direct and Semi-Direct Effects of Aerosols on Climate
7	Indirect Effects of Aerosols on Climate
	Spring Break
8	Midterm Exam; Stratospheric Aerosols
9	Climate Responses to Aerosol Forcing
10	Aerosol Observations: Ground and Remote Sensing
11	Aerosols Models and CMIP6 Aerosol Climatology
12	Biogeochemical Effects of Aerosols

Tentative Course Schedule:

13	Health Effects of Aerosols
14	Aerosol-Based Climate Engineering
15	Final Exam.

Course Format:

1) Lectures

- 2) Bi-Weekly homework assignments
- 3) Midterm exam
- 4) Final exam

Important Notes:

- Attendance Policy: Students **must attend** all classes.
- If you arrive more than 20 minutes late for an exam, or after anyone has finished the exam and left, you may not take it.
- Anyone caught cheating on an exam will be referred to the George Mason University Honor Council.
- The exams are closed book, closed to notes and all outside materials. Use of outside materials are not allowed.
- If you have a schedule conflict and cannot take an exam on the scheduled day, let me know ahead of time and I will try to arrange an alternative test date.

Makeup Policy:

• Late exams will be permitted if the instructor is provided with an acceptable explanation and if performed within one week of the original exam. Make-up exams must be scheduled in **advance** with instructor permission.

Course Grading Policy:

Homework	25%
Class Participation	25%
Midterm Exam	20%
Final Exam	30%

Numerical Grade Ranges:

A	94-100%
A-	90-93%
B+	87-89%
В	83-86%
B-	80-82%
C+	77-79%

С	73-76%
C	70 720/

- C- 70-72%
- D 60-69%
- F Below 60%

Religious Holidays and Observations:

http://ulife.gmu.edu/calendar/religious-holiday-calendar/ is available to help minimize difficulties for students of different faiths. It is the student's responsibility to speak to the instructor in advance should their religious observances impact their participation in class activities and assignments.

Students with Disabilities:

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with **Office of Disability Services** to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Office of Disability Services: http://ods.gmu.edu

Academic Integrity

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that:

- 1) all work submitted be your own;
- 2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and
- 3) if you are uncertain about the ground rules on a particular assignment, ask for clarification.

Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

Office of Academic Integrity: <u>http://oai.gmu.edu/</u> Honor Code: <u>https://oai.gmu.edu/mason-honor-code/full-honor-code-document/</u>

Mason Diversity Statement

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs,

policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

https://diversity.gmu.edu/

Counseling and Psychological Services

If are in crisis or need information or services for psychological stress, violence, or other issues that require counseling: <u>https://caps.gmu.edu/</u>.