

## CLIM 759 Atmospheric Convection Spring 2024

**Location:** Innovation Hall, Room 338

**Time:** 10:30am – 11:45pm TR, 01/16/2024 – 05/08/2024

**Instructor:** Dr. Cristiana Stan  
267 Research Hall  
[cstan@gmu.edu](mailto:cstan@gmu.edu)

**Course Website:** Blackboard

**Course Credits:** 3

**Prerequisites:** None

### **Aims of the course**

To provide a deep understanding of the structure and theory of atmospheric moist convection, particularly as it relates to the structure and sensitivity of climate system.

### **Course Outline**

Part I: How do individual clouds work

1. Review and basic concepts
  - 1.1 Moist thermodynamic processes
  - 1.2 Thermodynamic Diagrams
2. Characteristics of nonprecipitating clouds
3. Characteristic of precipitating clouds

Part II: How do large collections of clouds interact with the large-scale circulation

1. Stevens, B., 2005: Atmospheric moist convection. *Annual Review of Earth and Planetary Sciences*, 33, 605-643.
2. Houze, R. A., 2018: 100 Years of research on mesoscale convective systems. *Meteorological Monographs*, 59, 17.1-17.54.
3. Wood, R., 2012: Review stratocumulus clouds. *Monthly Weather Review*, 140, 2373-2432.

PART III: Clouds Effects on the Earth Radiation Budget

1. Slingo A. and J. M. Slingo, 1988: The response of a general circulation model to cloud longwave radiative forcing. I: Introduction and initial experiments. *Quarterly Journal of the Royal Meteorological Society*, 114, 1027-1062
2. Slingo J. M. and A. Slingo, 1991: The response of a general circulation model to cloud radiative forcing. II: Further studies. *Quarterly Journal of the Royal Meteorological Society*, 117, 333-364.
3. Okert-Bell and D. Hartmann, 1992: The effect of cloud type on the earth's energy balance: results from selected regions, *Journal of Climate*, 5, 1157-1171.

The methods of conducting the class will be divided into two general approaches:

1. The lecture-question method in which the instructor delivers the lecture for some phase of the general subject. When the class meets the next time it is opened with

- a question period during which the lecturer quizzes the students on the subject matter of the previous week's lecture and reading in connection with it. This approach will be used mostly for the series of introductory and review lectures.
2. Discussing the text in the class in which students will receive reading assignments and will be asked to explain/present it in their own words. If the student fails to bring out the meaning clearly or give the right interpretation the question will be directed to other students. This approach will be used for close reading and discussion of primary articles from literature.

### **Assessments**

There will be no formal exams. Your grade will be determined by your performance on the quizzes, in-class participation in discussions about articles and presentations.

### **University Requirements**

#### *Campus Closure or Emergency Class Cancellation*

If the campus closes, or if a class meeting needs to be canceled or adjusted due to weather or other concern, classes will be held on Blackboard Collaborate Ultra

#### *Course Recordings*

If for any reasons classes are recorded, recordings will be stored on Blackboard and will only be accessible to students taking this course during this semester.

#### *Academic Integrity*

GMU is an Honor Code university; please see the [Office for Academic Integrity](#) for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

### **Disability Accommodations**

- Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <http://ds.gmu.edu/> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: [ods@gmu.edu](mailto:ods@gmu.edu) | Phone: (703) 993-2474

- **Covid-19 Note:** Students who have a Covid-related disability should contact the Disability Services office; DS will contact faculty using standard protocols about any students who require accommodations. Faculty are not expected to create accommodations for students outside of the Disability Services official guidelines.

## **Diversity and Inclusion**

AOES seeks to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age and ability. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

**Notice of mandatory reporting of sexual or interpersonal misconduct:** As a faculty member, I am designated as a “Non-Confidential Employee,” and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason’s Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing [titleix@gmu.edu](mailto:titleix@gmu.edu).

## **Privacy**

Students must use their Mason email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.