

# CLIM 690 Scientific Basis of Climate Change

Course Syllabus, Spring 2023

**Instructor:** Dr. Barry A. Klinger,

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**Lectures:** Wed 4:30-7:10, Research Hall 121

**Office Hours:** by appointment

## ***Catalog Description***

A rigorous treatment of global warming, especially with regard to anthropogenic causes, based on the IPCC 4th Assessment Report "The Physical Science Basis". Topics include 1) Overview of observed climate, 2) Variability of climate, 3) Modeling of climate response to greenhouse gas forcing, 4) Greenhouse gases, chemistry, and aerosols, and 5) Projections of climate change and its societal impact. **3 credits.**

**Recommended prerequisites:** BS or MS in a natural science or engineering, or instructor permission.

## ***Reading***

### **Required Reading**

Dessler, A. E., 2012: *Introduction to Modern Climate Change*, Cambridge University Press.

Klinger, B. A., et al., 2021: *How Bad? An Inquiry Into Climate Change Consequences*, in preparation.

**Important summaries of climate change issues** available online:

Assessment Reports, Intergovernmental Panel on Climate Change (IPCC, <https://www.ipcc.ch>), particularly AR5, AR6, and recent Special Reports, of

- Working Group I, Physical Science Basis
  - Working Group II, Consequences of Climate Change and Options for Adaptation
- National Climate Assessments, particularly Fourth National Assessment, Volume II (impacts), 2018 (<https://nca2018.globalchange.gov/>)

**Other reading** that may be useful:

Hartmann, D. L., 1994: *Global Physical Climatology*, Academic Press.

Houghton, J., 2009: *Global Warming, The Complete Briefing*, Cambridge University Press.

Peixoto, J. P., and A. H. Oort, 1992: *Physics of Climate*, American Institute of Physics.

Mathez, E. A., and J. E. Smerdon, 2018: *Climate Change, The Science of Global Warming and our Energy Future*, 2<sup>nd</sup> edition, Columbia University Press.

Trenberth, K. E. (ed.), 1992: *Climate System Modeling*, Cambridge University Press.

Tziperman, E., 2022: *Global Warming Science: A Quantitative Introduction to Climate Change and Its Consequences*, Princeton University Press.

## ***Class Assignments***

<b>Percentage of Total Grade</b>	<b>Assignment</b>
20%	Class reports
10%	Problem sets
25%	Term project
20%	Midterm exam
25%	Final Exam

A few classes present quantitative analysis of climate, for which a total of two homework problem sets will give students practice performing the analysis.

A separate document will give more details about the term project.

## ***Class Lecture and Assignment Schedule***

See separate document.

## ***Learning Objectives***

1. Understand evidence for global warming.
2. Understand physical relationship between changing atmospheric composition and climate parameters such as temperature and rainfall.
3. Understand projections of possible climate futures and the evidence supporting them.
4. Evaluate and explain claims about risks and benefits climate change that are relevant to humans.

## **Some Important Mason Policies**

Updated Fall 2020

### ***Electronic Communications***

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

### ***Disability Accommodations***

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. No grade is important enough to justify academic misconduct. 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: <http://oai.gmu.edu/>  
Honor Code: <http://oai.gmu.edu/the-mason-honor-code-2/>

## ***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.

Office of Compliance, Diversity, and Ethics:

<https://diversity.gmu.edu/>

Anti-Racism Task Force:

<https://www2.gmu.edu/news/587381>