

CLIM 690 Scientific Basis of Climate Change

Course Syllabus, Fall 2024

Instructor: Dr. Barry A. Klinger,

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Lectures: W 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

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.

Recommended

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

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:

Carlson, G. L., 2022: *Human Health and the Climate Crisis*, Jones & Bartlett

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*, 2nd edition, Columbia University Press.

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

Class Assignments

Percentage of Total Grade	Assignment
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.

Separate documents will give more details about class reports and 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 2024

Electronic Communications

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

Disability Accommodations & Other Academic Assistance

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. If you have a disability or other condition that may affect academic performance you should: 1) contact **Office of Disability Services** to determine and document the accommodations you need; and 2) talk with me to discuss your accommodation needs. Please do this at the beginning of the term.

Office of Disability Services: <https://ds.gmu.edu/>

Office of Learning Services:

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

Academic Integrity

Mason has an **Honor Code**: Student Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work. See link below for full description of the Honor Code and its enforcement.

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. If you have any doubts about what constitutes plagiarism, please see me.

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.

Office of Academic Integrity: <http://oai.gmu.edu/>

Honor Code: <https://oai.gmu.edu/full-honor-code-document/>

Mason Diversity and Non-Discrimination

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

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.

George Mason University is committed to providing equal opportunity and an educational and work environment free from any discrimination on the basis of race, color, religion, national origin, sex, disability, military status (including veteran status), sexual orientation, gender identity, gender expression, age, marital status, pregnancy status or genetic information.

George Mason University is committed to a campus that is free of sexual misconduct and other acts of interpersonal violence. We encourage students and employees who believe that they have been sexually harassed, sexually assaulted or subjected to sexual or interpersonal misconduct to seek assistance and support.

Faculty members are designated as “Non-Confidential Employees,” and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason’s Title IX Coordinator. If you wish to speak with someone confidentially, resources include Student Support and Advocacy Center (<https://ssac.gmu.edu/>), and Counseling and Psychological Services (<https://caps.gmu.edu/>). You may also seek assistance from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

Office of Diversity, Equity, and Inclusion:

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

[Mason Diversity Statement](#).

[Non-Discrimination Policy](#)

[Policy on Sexual Misconduct & Interpersonal Violence](#)