

SYLLABUS

EAS 6500 Climate & Global Change Fall 2026

Course Description: The course will explore the scientific fundamentals underpinning our understanding of how increased atmospheric carbon dioxide will lead to global climate change. It will also explore how changes in radiative forcing from other causes and natural climate variability impact climate, feedbacks in the climate system, impacts of climate change on the global environment, and the basics of the global carbon cycle and the fate of anthropogenic carbon.

Objectives: By the end of the course, the student should have an understanding of the fundamental science behind the greenhouse effect, the concepts of radiative forcing and feedbacks, and the lifetimes of various atmospheric constituents. Students will gain a sense of what we know about the current and future changes in global climate with confidence, what is less certain, and be able to make well-informed assessments of the current literature. Students will gain a broad context in which to place their research as it relates to Climate and Global Change.

Audience/Pre-requisites: This class is appropriate for all graduate students regardless of area but is targeted for those whose area of research touches on issues of climate and global change. There are no specific pre-requisites, although understanding of basic physical science concepts is helpful.

Format: Lectures will on Mondays. On Wednesday will discuss papers. The class sessions will be in-person unless a remote learning day is called by institute operations or the instructor.

Required Texts:

IPCC AR6 Working Group 1 Report (excerpts)
Other Book Chapters and Review Papers as assigned

All readings will be supplied as pdf on Canvas, no textbook purchase required.

Journal articles will be assigned each week for discussion.

Recommended Texts:

Henson, R. *The Thinking Person's Guide to Climate Change Second Edition*, American Meteorological Society, 2019.

Grading:

(50%) Exam scores

(30%) Homework is graded on a 10 point scale. 2 point grade penalty for each day late.

(20%) Discussion preparation: 1 = questions submitted on time and ready to discuss, 0 = not submitted on time or not present. Lowest two grades will be dropped.

Attendance: See catalog for institute policies for excused absences and make-up work: <http://www.catalog.gatech.edu/rules/4/>.

Health: Please do not attend class if you feel poorly.

Student-Faculty Expectations Agreement: Georgia Tech strives for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectations for both students and faculty.

Academic Integrity: Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Collaboration, Group Work, and AI Tools: No books, notes, or collaboration are allowed on exams. While collaboration is allowed on the homework, each student must submit their own write-up in their own words. Students must write their own responses to the study questions that will be used in lieu of exams. Large language models and other AI tools are considered the same as human collaborators. Use them if they are helpful, beware of their limitations, understand that we will grade based on your grasp of the material that is covered in class, and your responses must be written in your own words.

Accommodations for Students with Disabilities: If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Statement of Intent for Inclusivity: As a member of the Georgia Tech community, I am committed to creating a learning environment in which all of my students feel safe and included. Because we are individuals with varying needs, I am reliant on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the

things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community.

Topic List:

Introduction

Global Climate Overview and Climate Change Overview

Unit 1: Radiation and Climate

Radiation, Greenhouse Gasses and Layer models
Radiative Forcing: Solar Variability, Aerosols, Greenhouse Gasses

Unit 2: Convection, Moisture and Clouds

Radiative-Convective Equilibrium, Climate Models
Global Climate Model Projections and Evaluation
Water vapor and Lapse Rate Feedbacks
Clouds and Cloud Feedbacks

Unit 3: Carbon Sources and Sinks

Global Carbon Cycle
Ocean Carbon Uptake, Ocean Acidification
Land Carbon Sources, Sinks and Feedbacks

Unit 4: Global Change

Observations of Climate Change, Climate Variability and Climate Change
Heat waves, droughts, floods and storms
Ice Sheets and Sea Level
Sea Ice, Atlantic Ocean Circulation
Mitigating Climate Change