

Syllabus: GEO 371C (27630) Global Warming  
Professor Kerry H. Cook  
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Class: TTh 11-12:15 JGB 3.116

Office hours: TBD, and by appointment

Text: Pre-publication chapters from Climate Dynamics, K. H. Cook (provided in class)

Most recent IPCC report (available online)

Overview: The purpose of the class is to study the science of global warming, including the physics of the greenhouse effect and climate feedback systems. Students conduct independent research into an aspect of the global warming issue that interests them, such as additional aspects of the science, impacts on natural and/or human systems, communication challenges, and policy implications. There are no prerequisites other than upper-level standing.

Academic Goals: Students will understand the science of global warming, and learn methodology for obtaining accurate and trustworthy information about the subject. They will address the implications of global warming for their future careers and lives.

Class website: Access through the university's Blackboard site.

Evaluation:

- Three in-class tests, following Chapters II, III, and IV. 45% of the total grade (15% each test)
- Report on impacts/implications of global warming. 25% of the total grade
- Final exam. 30% of the total grade

Plus and minus grades will be used for final course grades.

Detail of course content:

I. Introduction

- A. Overview of the Climate System
- B. The Intergovernmental Panel on Climate Change

II. The Science of Global Warming

- A. Radiation: Fueling the Climate System
  1. Incoming solar radiation
  2. Outgoing terrestrial radiation
  3. Greenhouse effect
- B. The Flow of Energy Through the Climate System
- C. Atmospheric Circulation Systems
  1. The Hadley Circulation
  2. Monsoons
  3. Walker Circulations
  4. Mid-latitude Circulation
- D. Ocean Circulation Systems

1. The Wind-Driven Circulation: Surface currents
  2. The Thermohaline Circulation
- III. Observations of Climate Change
- A. Changes in the Atmosphere's Chemical Composition
    1. CO<sub>2</sub>
      - a. Observed changes
      - b. Associations with human activity (attribution)
      - c. Carbon cycle
    2. CH<sub>4</sub>
      - a. Observed changes
      - b. Methane budget
    3. N<sub>2</sub>O
      - a. Observed changes
      - b. Nitrogen budget
    4. CFCs
      - a. Observed changes
      - b. Manufactured chemicals for cooling and cleaning
      - c. The Ozone Hole
- IV. Predictions of Global Warming
- A. Climate Models
    1. Description of global models
    2. Description of regional models
    3. Simulation design
  - B. Global Warming Prediction
    1. Emissions scenarios
    2. Projections
      - a. Global
      - b. High latitudes: The Polar Amplification
      - c. Sea level rise
      - d. Central Texas
  - C. Evaluating confidence in predictions
- V. Impacts and Implications of Global Warming: Student-driven Inquiry

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>

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According to UT Austin policy, you must notify the professor of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an

examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.