

Syllabus: Global Warming
Professor Kerry H. Cook
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Class: TTh 11-12:15 GDC 1.304

Office hours: TBA in JGB 5.220F

Teaching Assistant: Naresh Neupane

Texts:

- (1) Climate Dynamics, K. H. Cook
- (2) Reports from the Intergovernmental Panel on Climate Change, available online at <http://www.ipcc.ch/>

Evaluation:

- Three in-class tests. 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

I. Introduction

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

II. The Science of Global Warming

- A. Background on Radiative Processes
- B. Radiation: Fueling the Climate System
 1. Incoming solar radiation
 2. Outgoing terrestrial radiation
 3. Greenhouse effect
 4. Clouds and Radiation
- C. The Flow of Energy Through the Climate System
 1. Top of atmosphere
 2. Surface
 3. Overview
- D. Atmospheric Circulation Systems
 1. The Hadley Circulation
 2. Monsoons
 3. Walker Circulations
 4. Mid-latitude Circulation
- E. Ocean Circulation Systems
 1. The Wind-Driven Circulation: Surface currents
 2. The Thermohaline Circulation
- F. Climate Change Processes
 1. Radiative Forcing
 2. The Changing Chemical Composition of the Atmosphere

3. Climate Feedbacks

III. Observations of Global Warming

- A. Temperature (means and extremes)
- B. Precipitation (means and extremes)
- C. Sea level
- D. Circulation (atmosphere and oceans)
- E. High latitude ice
 - 1. Artic
 - 2. Greenland
 - 3. Antarctic
- F. Modes of natural climate variability on interannual and decadal time scales

IV. Predictions of Global Warming

- A. Climate Models
 - 1. Simple climate models
 - 2. Description of global models
 - 3. Description of regional models
 - 4. Simulation design
- B. Global Warming Prediction
 - 1. Emissions scenarios
 - 2. Projections
 - a. Global
 - b. High latitudes
 - c. Sea level rise
 - d. Central Texas
- C. Evaluating confidence in predictions

VI. Impacts and Implications of Global Warming: Guest lectures and student projects