AOS/NIES 171 Global Change: Atmospheric Issues and Problems
Spring 2025 3 credits Comm-B
University of Wisconsin - Madison
T R 11:00 - 12:15, Room 811 AOSS Building, 1225 W. Dayton St.

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Course textbook: *Global Change: Humans in the Earth System*
On our course website, login "book", with password "globalchange".
Course website: http://www.aos.wisc.edu/~aos171/ Contains all course materials.
Canvas website: https://canvas.wisc.edu/courses/439517 For uploading written assignments.
Recommended Reading: *Earth's Climate: Past and Future*, William F. Ruddiman, 2007, W. H. Freeman and Co., New York

Course Description:
This in-person course has no prerequisites. We will investigate a variety of global change issues. During the first part of the course we will study fundamental scientific knowledge about how the climate system works. In the middle part we will explore current issues and human impact on the environment. In the third part, we will focus on human issues which are related to global change. Some questions that we will address include:

- What are the main features of our present climate system and how are they changing?
- Are there more severe storms than there used to be?
- What causes the stratospheric ozone hole and what do we expect for the future?
- How is acid rain related to regional cooling?
- How is fossil fuel burning related to reduced sea ice?
- How can cutting down or planting forests change the global climate?
- Why are coral reefs important and why are scientists concerned about them?
- How can climate change affect human disease, food, and water supply?
- What is the relationship among energy consumption, the environment, and international conflict?
- What is geoengineering? Could it have begun as early as 6000 years ago?

In this course we will study the primary aspects of natural climate variability, including the El Nino Southern Oscillation (ENSO) phenomenon, the Atlantic Meridional Overturning Circulation (AMOC), the Quasibiennial Oscillation (QBO), volcanic eruptions, and solar variability. By studying past climates we will gain insight into how the earth system works and how it might respond to human influences. We will investigate climate model forecasts for the future. The cycling of water and carbon will be explored, as they highlight the interdependence of life and the earth system. Topics will include biodiversity, food crops, genetic engineering, and alternative energy sources. Human psychological aspects help guide which strategies might be best for society.

Grading: Your grade for the course will be determined by your total score out of 160 points for the semester. Half of your grade will be based on two 40-point mid-term exams. The exam material will be from my lectures and will focus on concepts and physical processes. We will have an in-class review before each exam.

This is a Communication Part B course, where half of the grading is based on writing and oral presentations. Please read the accompanying document "Criteria for Courses Satisfying Part B of the General Education Requirement". Students should submit at least 20 pages of writing, with the opportunity to receive feedback and re-write at least two assignments. At least two assignments should provide the opportunity for presenting in modes other than writing.

- For each of the two short written assignments, you will write a 4-5 page response paper to assigned readings. You will receive detailed feedback and an initial grade, and then revise your text for submitting a final draft. Each of these two assignments will be worth 10 pts.
- The term paper provides an opportunity for in-depth exploration of a topic of interest to you and should be about 10 pages long. You will have the opportunity to meet to develop a term paper topic. The term paper is worth 40 pts.
- Oral assignments will involve short presentations. Oral assignment one will be to describe a figure as part of a team (5 pts). Oral assignment two will be to describe your term paper idea (5 pts). Oral assignment three will involve participation in debates on global change issues during the last week of class (10 pts).

12.5% - 20 points - 2 Short Written Assignment (10 points each)
12.5% - 20 points - 3 Oral Assignments (5, 5, and 10 points each)
25% - 40 points - First Midterm
25% - 40 points - Second Midterm
25% - 40 points - Term Paper
100% = 160 points

Credit Value and Expected Outcome: You will receive 3 credits for this group lecture course which is based on two 75 minute lectures per week in the Traditional Carnegie definition. This course satisfies the L&S requirements for a Communication Part B course. This course counts as a Physical Science credit toward the Natural Sciences requirement in L&S at the Elementary level. Course learning outcomes will include being able to

- describe the primary processes which govern our climate system,
- summarize current issues regarding climate change, air quality and stratospheric ozone,
- integrate skills in critical reading, logical thinking, and use of evidence,
- identify and use relevant, reliable, and high-quality research sources,
- make productive use of the writing process, including brainstorming, outlining, drafting, and incorporating, and
- demonstrate enhanced skills in written and oral communication.

L&S Policy and Resources: Please see the link to these documents on our course website. Use of AI is not acceptable in original writing.