

**AOS/IES 171 Lec 1 Spring 2012 3 credits Comm-B**  
**GLOBAL CHANGE: ATMOSPHERIC ISSUES AND PROBLEMS**

T R 11:00 - 12:15 811 AOSS Building

Professor Matt Hitchman 262-4653 1303 AO&SS Building (1225 W. Dayton St.)  
email: matt@aos.wisc.edu  
Office Hours: T R 12:30-1:30, and by appointment

Teaching Assistant Shellie Rowe 262-0781 1317 AO&SS Building  
email: rowe1@wisc.edu  
Office Hours: T R 12:30-1:30, and by appointment

The primary material for this course is my lecture notes:

<http://www.aos.wisc.edu/~aos171/>

The login for the on-line textbook is “book”; the password is “globalchange” (one word).

The following are recommended for specific interests:

*Earth in the Balance - Ecology and the Human Spirit*, Al Gore, 1993, Penguin, New York (an interesting earlier book on the topic).

*Whole Earth Discipline*, Stewart Brand, 2009, Penguin, New York (controversial practicality for the future).

*Earth's Climate: Past and Future*, William F. Ruddiman, 2007, W. H. Freeman and Co., New York (an excellent text emphasizing paleoclimate and future climate).

In this course we will investigate a variety of global change issues. During the first part of the course we will study 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 underlying human issues which drive global change. Some sample questions that we will address include:

- How is fossil fuel burning related to reduced glaciers and sea ice?
- 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 can cutting down 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, environmental degradation and international conflict?
- What is the effect of the strength of the economy on the health of the earth's ecosystems?
- What is “geoengineering” and did it begin as early as 6000 years ago?
- Should we embrace nuclear power, transgenic crops, and geoengineering to avoid too much global warming?

By studying past climates we will gain insight into how the earth system works and how it might respond to anthropogenic influences. We will also gain insight into natural variability and how well climate models represent climate change. The cycling of water, carbon, and other nutrients will be explored, as they highlight the interdependence of life and the earth system. Other topics include biodiversity, food crops, and genetic engineering; energy, water, and land; and alternative energy sources. Human psychological, social, and industrial factors are inextricably intertwined with global

change issues. These factors guide which strategies might be best for society. Early in the semester we will have a sample debate, perhaps about nuclear power. During the last week we will have in-class debates on global change issues that you choose, and talk about what we can do to help humankind and our planet.

Your grade for the course will be determined by your score out of 160 points for the semester, with an appropriate “curve”. Half of the grading will be based on writing. The other half will be based on the 6th and 12th week exams. The exam material will be from my lectures and will focus on concepts and physical processes. We will have an in-class review session before each exam.

25% - Four short assignments, 10 points each, 40 points total.

25% - Term Paper, 40 points.

25% - First Midterm, 40 points.

25% - Second Midterm, 40 points.

For a Comm-B course one should write approximately 35 pages of material, including revisions. For the first three short assignments you will write ~3-5 page response papers to special assigned readings. For each of these assignments you will receive detailed written comments from the Writing Fellows, with an opportunity for revising your text.

The fourth short assignment will involve participation in The Great Debates in the last week of class, and submitting a summary of your contribution.

The term paper provides an opportunity for more in-depth exploration of a topic of interest to you and should be about 10 pages long. Near the middle of the semester you will have the opportunity to meet with us to develop a term paper topic, if you wish. You might find the course Webography to be useful for thinking about possible term paper topics: <http://www.wisc.edu/wendt/aos171/>.

<u>Week</u>	<u>Topics</u>
1	The Earth System and Global Change
2	Evolution and Composition of the Earth System
3	Electromagnetic Radiation and the Greenhouse Effect
4	The General Circulation
5	The Oceans and ENSO
6	**1st Mid-Term Exam R March 1 **
7	Paleoclimate and Climate Dynamics
8	Stratospheric Ozone; Volcanoes and Climate
9	Anthropogenic Greenhouse Effect; Tropospheric Pollution
10	Coral Bleaching; Desertification
	Spring Break March 31 - April 8
11	Carbon Cycle; Vegetation Changes
12	Biodiversity, Land, Food and Energy
	**2nd Mid-Term Exam R April 19 **
13	Prediction Models and Future Scenarios
14	Value Systems and Strategies; Environmental Engineering
14	Alternative Energy Sources **Term Paper Due R May 4 **
15	The “Great Debates”
	No Final Exam