

## Syllabus

### Course overview

Human-induced climate change - popularly known as "global warming" - is emerging as one of the great challenges facing society in the 21st century. If we ignore the problem, by the end of this century the climate changes due to increased greenhouse gases will be large enough to have significant consequences on the environment and on civilization. To avoid these changes will require either (i) a wholesale change in the sources of energy used by humans, (ii) yet to be developed (economical) methods to sequester carbon on an unprecedented scale, or intentional human modification of the earth's energy budget to partially cancel the warming that will result from the increased greenhouse gases due to human activity (so-called geoengineering solutions to global warming). At stake are deeply felt values as well as entrenched economic interests. When these are combined with scientific uncertainty, it is not surprising that global warming has sparked a raging, often passionate debate.

The primary goal of this course is to understand the basic science of global warming and its consequences to date. We will then examine how the climate is projected to change over the present century due to further human activity, and some of impacts these changes will have on ecosystems and people, especially on the global water and food supplies. The lectures will provide a critical analysis of the scientific consensus on global warming, and highlight the major sources of uncertainty in the projections of future climate. We will also examine stronger claims made by advocates on both sides - "skeptics" and "alarmists," as they are sometimes called. The term paper will examine the portrayal of these issues by the media.

### Class Webpage:

<http://www.atmos.washington.edu/2009Q4/111/>

### Online homework (also linked from class webpage):

<http://www.atmos.washington.edu/moodle/course/view.php?id=3>

### Meeting times and locations

Lectures: MTWTh, 12:30-1:20, 220 [KNE](#)

#### Quiz Sections:

##### Section AA

Fri, 9:30-10:20, 026 [JHN](#), Jack

##### Section AB

Fri, 10:30-11:20, 302 [BLM](#), Jack

##### Section AC

Fri, 12:30-1:20, 026 [JHN](#), Jack

##### Section AD

Thurs, 1:30-2:20, 125 [EEB](#), Jack

##### Section AE

Fri, 11:30-12:20, 125 [EEB](#), Pu

##### Section AF

Fri, 9:30-10:20, 154 [BAG](#), Pu

Section AG

Fri, 12:30-1:20, 003 [EEB](#), Pu

Section AH

Thurs, 1:30-2:20, 105 [EEB](#), Pu

**Midterm Exam:** Monday, November 9 during lecture

**Final Exam:** Thursday, December 17, 8:30-10:20am, location TBD

**Instructor:** Prof. David Battisti

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Office Hours: TBD or by appointment

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TW from 3:30-4:30 in ATG 420

**Text:** The Rough Guide to Climate Change 2<sup>nd</sup> edition, by Rob Henson, Rough Guides, 2008.

This short, nontechnical book summarizes the current scientific consensus.

**Other resources:** The class webpage will contain:

- key facts and figures from the lectures
- links to additional readings (many of which will be required)
- links to useful information sources

**Prerequisites**

None. Open to all undergraduates. A working knowledge of high-school algebra and physical sciences will be useful; however, the basic tools used by scientists will be reviewed and practiced as they arise during the course. Students desiring a course with more attention to the physical processes governing Earth's climate (and less focus on the specific issue of global warming) may want to consider ATM 211 "Climate and Climate Change", which also has no prerequisites.

**Learning Goals and Objectives of the course**

Students will explore both the basic science behind the theory of global warming and the role of scientific knowledge in formulating effective societal responses. Grappling with this challenge will require intelligent, long-range decision making which, in turn, requires an informed citizenry. The ultimate learning objective of this course is to foster citizens who can think critically and act effectively in regard to this enormous and complex challenge.

**Academic Credit**

This course provides 5 credits toward the Natural World requirement.

## Grading Policy

➤ Opening survey	1%
➤ Current event briefs	4%
➤ Homework assignments	35%
➤ Midterm	30%
➤ Final	30%

Homework will be online at [www.atmos.washington.edu/moodle](http://www.atmos.washington.edu/moodle) (see above) and will be distributed on Thursday and due the following Thursday. Late homework will receive a 0. The mid-term will be on Wednesday, November 9th.

## Current event briefs

You will also briefly report on four different news articles (of your choice) on global warming or climate change over the course of the quarter. Each report will be a one-paragraph summary plus one-paragraph of your opinion. These will be due approximately once per month.

## *Tentative Schedule.*

- Overview of Class (introductions, goals, logistics, etc)
- History of the Science, 21<sup>st</sup> Century Projections, Uncertainties
- The Greenhouse Effect and theory of human-induced planetary warming
- the greenhouse effect and planetary temperature (notes, but no ppt)
- Tools: Blackbody radiation; terrestrial and solar radiation
- Energy Balance Model and the Natural Greenhouse Effect
- The History of Climate on Earth
- Context: a brief history of planet earth (deep time; notes but no ppt)
- Paleoclimate
- Ice ages and role of the orbital and carbon dioxide
- Tools: oxygen isotopes in sediments and land ice
- Climate Trends During the 20th Century
- The 20th century record of climate: global, regional, local
- Climate Variability and Climate Change
- Natural variability: El Nino, etc
- Natural forced changes: solar and volcanoes
- Human forced changes: greenhouse gases and aerosols
- Climate trends during the 20th Century: Human or Natural?
- Climate Models
- Climate Sensitivity and Feedbacks
- Attribution: Climate of the 20th Century and the Human Impact
- Projections of the Future Climate
- Emission scenarios: human forcing: greenhouse gases and aerosols
- Midterm
- Climate of 2100: global impacts
- Climate of 2100: regional impacts (by continent, following IPCC)
- Uncertainty in the projections (emissions and climate models)
- Serious (worthwhile) concerns of the science by scientists
- Impacts of Climate Change
- Climate change and world food security: global issues

- Climate change and world food security: case study of Indonesia
- The Shrill Nonscientific “Debate”
- Who are the Extremists (so-called climate skeptics)
  - What are their tactics?
  - What motivates them (and who pays for their efforts)
  - Sources of reliable information: IPCC, NAS, realclimate.org, etc
  - Sources of uneven information
  - Reliable sources for DISinformation and lies: “think tanks” (eg., Cato Inst, CEI, Marshall Inst), WSJ (OpEd pages), Fox “News”, etc
- Impacts of Climate Change (more)
- Climate change and marine ecology
  - Climate change and terrestrial ecology
  - Climate change and the impacts on the Pacific Northwest
- Role of the Scientist/Drivers of Energy
- The role of the scientist
  - Drivers of world energy in the 21<sup>st</sup> Century
- Impacts of Climate Change, Alternative Energy and Ethics
- What Puget Sound is doing
  - Biofuels
  - Ethics of Global Warming
- Avoiding the Climate Changes Projected for this Century
- Embracing the challenge: stabilization wedges
  - Embracing the challenge: stabilization wedges
  - The easier and incredibly risky response: climate engineering
  - Wrap up