ESCI 405: GLOBAL ENVIRONMENTAL CHANGE
Syllabus for Fall 2007

Professors:
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Offered by Dept. of Earth Sciences in collaboration with the University Office of Sustainability

Lectures: Nesmith 113; Tues/Thurs 9:40-11:00
One-hour recitation sections: James 35 Wed 6-7PM, 7-8PM Thurs 2-3 PM; 6-7PM, 7-8PM
Text Book: Weart, S. 2003. The Discovery of Global Warming. Harvard University Press.
Updated version of the book Available online at: http://www.aip.org/history/climate
Course information and readings posted on: blackboard.unh.edu

Student Learning Objectives:

1. Describe key **components, interactions, and concepts** that characterize the modern earth system.

2. Describe and evaluate the relative importance of various natural processes and anthropogenic (i.e., human) activities that shape the modern Earth and lead to global environmental change.

3. Analyze greenhouse gas emissions at UNH and evaluate methods to reduce them.

4. Develop an appreciation for the scientific method.

5. Read, discuss, and summarize the main points discussed in scientific papers relating to global environmental change

6. Learn data analysis tools, peer-to-peer learning, and effective communication for working in groups.

Course Content:

Part I: The Earth System Today
L1: 4 Sep – Class Overview
L2: 6 Sep – What is Global Environmental Change?
L3: 11 Sep – The Earth System: Components, Interactions, and Energy Balance
L4: 13 Sep – The Hydrosphere and the Water Cycle
L5: 18 Sep – Atmospheric and Ocean Circulation
L6: 20 Sep –The Biosphere and the Carbon Cycle; Plate Tectonics

Part II: Global Climate Change: How and Why

L7: 25 Sep – Quaternary Ice Ages and Earth's Orbital Cycles
L8: 27 Sep - Ice Cores and Rapid Climate Change
L9: 2 Oct - The Holocene and Global Warming
4 Oct - EXAM 1
L10: 9 Oct – Changing Earth's Energy Balance: solar variability, volcanoes, and aerosols
L11: 11 Oct - Changing Earth's Energy Balance: carbon cycle and fossil fuel
L12: 16 Oct – UNH Greenhouse gas emissions inventory
18 Oct – INTERVIEWS WITH ROLE MODELS
L13: 23 Oct - Ocean Changes, Climate modeling, and the IPCC

Part III: Global Environmental Change

L14: 25 Oct – CFC's and stratospheric ozone depletion
L15: 30 Oct – Air Pollution and Human Health; Nitrogen Cycle and Water Quality
L16: 1 Nov – Peak Oil
L17: 6 Nov - Dinosaurs, Meteorite Impacts, and Biodiversity
L18: 8 Nov – Humans and carrying capacity
13 Nov – NO CLASS; CLASSES FOLLOW MONDAY SCHEDULE
15 Nov - EXAM 2

Part IV: The Search for Sustainability

L19: 20 Nov - Sustainability Overview
22 Nov – THANKSGIVING – NO CLASS
L20: 27 Nov – Sustainability Continued
L21: 29 Nov - Global Governance/Policy/Kyoto Protocol
4 Dec – Negotiation (MUB)
6 Dec – Negotiation (MUB)
11 Dec – Negotiation (MUB)
13 Dec – Negotiation Debrief

Wed Dec 19 10:30-12:30 EXAM 3

Weekly Paper Reviews:

Each week you are required to write a two to three paragraph review of an assigned reading. All the scientific articles are posted on blackboard. Paper reviews are due by 5 PM on the date listed below.

Please answer the following questions when writing your review:

- What is(are) the major issue(s) raised in the paper?
- What are the key data and analysis presented in support of the authors argument?
- What are the primary conclusions? What level of certainly can be attached to these conclusions?
- What scientific questions remain?

Recitation:

James 35 Wed 6-7PM, 7-8PM Thurs 2-3 PM; 6-7PM, 7-8PM

NOTE: Attendance at Recitation periods is MANDATORY!

R1: 5-6 Sep Introduction to recitation; introduce blackboard; student photos
R2: 12-13 Sep Introduction to New England Climate Change Research Project (NECC), selection of research teams and intro to data;
R3: 19-20 Sep PowerPoint Oral presentation of NECC (5-7 minutes) plus submission of 2 page Executive Summary and related figures
R4: 26-27 Sep Tutorial for Exam 1
R5: 3-4 Oct Calculating your Individual Carbon Footprint
R6: 10-11 Oct Introduction to UNH emissions reduction negotiation and Kyoto Protocol
R7: 17-18 Oct Identification of roles and review of previous negotiations
First homework on calculating CO2 emissions
R8: 24-25 Oct UNH Greenhouse gas emissions inventory
Second homework on calculating CO2 emissions
R9: 31Oct-1Nov Research for negotiation
R10: 7-8 Nov Tutorial for Exam 2
R11: 14-15 Nov Research for negotiation/First draft of 'Briefing Paper' due
R12: 21-22 Nov NO RECITATION/THANKSGIVING
R13: 28-29 Nov Research for negotiation/Final version of 'Briefing Paper' due
R14: 5-6 Dec Research for negotiation
R15: 12-13 Dec Tutorial for Exam 3

Grading:

3 EXAMS = 50% (Exam 1- 15%; Exam 2- 15%; Exam 3 - 20 %)
Abstract Writing: 12%
Homework/Participation in class: 8%
Recitation work (MANDATORY); based primarily on negotiation = 30%
ERP project 5%
Other Recitation Exercises 5%
Briefing Paper 10%
Participation/skill in negotiation 10%

Other Books of Interest:

Alley, R.B. (2000) The Two Mile Time Machine: Ice Cores, Abrupt Climate Change, and Our Future. Princeton University Press, Princeton, NJ. 229 p.
Archer, D. (2007) Global Warming: Understanding the Forecast. Blackwell Publishing, Malden, MA. 192 p.
Dessler, A. (2007) The Science and Politics of Global Climate Change: A Guide to the Debate.
Flannery, T. 2005. The Weather Makers: How Man is Changing the Climate and What it Means for Life on Earth. Atlantic Monthly Press, New York. 357 p.
Imbrie, J. and K.P. Imbrie. 1979. Ice Ages: Solving the Mystery. Enslow Publishers, Hillside, NJ. 224 p.
Kolbert, E. (2006) Field Notes from a Catastrophe: Man, Nature, and Climate Change.

Mayewski, P.A. and F. White (2000) The Ice Chronicles: The Quest to Understand Global Climate Change. University Press of New England, Hanover, NH. 233 p.
Mooney, C. (2007) Storm World: Hurricanes, Politics, and the Battle Over Global Warming.
Philander, G.S. (1998) Is the Temperature Rising. Princeton University Press. 258 p.
Pearce, F. (2007) With Speed and Violence: Why Scientists Fear Tipping Points in Climate Change.