

Ohio State

Senior
OSU Integrated
Earth Systems

GEOGRAPHY 597.02: INTEGRATED EARTH SYSTEMS

SYLLABUS: SPRING, 1995 (Lecture: UH 82: 8:30 am - 10:00 am: Monday & Wednesday)

Instructor:

Dr. Ellen Mosley-Thompson Office: Derby Hall 1140; Telephone: 292-2580 or 292-6662
Office Hours: Mon. and Wed. 10:15 to noon or by appointment

Teaching Assistant:

Mr. Bryan Mark, Dept. of Geography; Office: 1145 Derby Hall; Telephone (292-6127)
Office Hours will be provided during the first week of classes

Textbooks (required):

- (1) *Living in the Environment*, G.T. Miller, Jr. Wadsworth Publishers, 1994 (required).
- (2) *Workbook*: All four exercises are in the Workbook which must be purchased from Cop-EZ in the basement of Bricker Hall for \$4.88. You are required to purchase this - copies will not be provided by the TA or the instructor.

Additional publications on reserve in Orton Hall Geology Library include:

under Geography 597.02:

- (1) *Climate Change: The IPCC Scientific Assessment*. 1990. Edited by J.T. Houghton, G.J. Jenkins and J.J. Ephraums, published by Cambridge University Press and sponsored by the Intergovernmental Panel of Climate Change (IPCC) of the WMO/UNEP;
- (2) The IPCC report update: 1992: more specific but less comprehensive;
- (3) D.E. Abrahamson, 1989, *Meeting the Challenge of Global Warming*, Island Press, Washington, D.C., an older, general text;
- (4) *Managing Planet Earth*, 1991 which appeared as a special issue in the September, 1989 issue of *Scientific American*; this bound volume of *Scientific American* is on reserve.

under Geology 203:

- (5) *Earth in the Balance: Ecology and the Human Spirit*. Al Gore, Penguin Books (interesting and informative reading);

in the new Science and Engineering Library on permanent reserve

- (6) *Energy for Planet Earth*. A selection of papers from a special issue (1990) of *Scientific American* and reproduced in paperback by Freeman Press.

Throughout the quarter recent publications and news articles will be put on reserve in the Orton Library in a red three-ring binder labelled Geography 597.02.

***** NOTE: THIS SYLLABUS IS TENTATIVE AND LIKELY TO CHANGE AS INVITED SPEAKERS ARE ARRANGED**

LECTURE SESSIONS

Week 1: Theme: Global Change - What are the issues?

Assigned Reading: Text: Preface (iii-vi); Chapter 1 (p. 4-27); Chapter 11 (p. 290-310)

Enrichment reading: Chapter by Clark (p. 47-54) in *Managing Planet Earth*

March 27: Class organization; global change quiz; Introduction to global environmental change issues and the global system concepts

March 29: Fingerprints of global climatic and environmental change

Week 2: Theme: Earth's radiation balance, the greenhouse effect and climate system basics

Assigned reading: Text: Chapter 3: (46-73) and Chapter 5: (p. 112-145)

Enrichment reading: Chapter by Crutzen and Graedel (p. 58-68) in *Managing Planet Earth*

April 3: How the Earth system is powered: foci: radiation and fossil fuels

April 5: How does the Earth's climate system work (an overview)

Week 3: Theme: The Earth as a system; ecosystems and global carbon cycle

Assigned reading: Text: Chapter 4: (74-111); Chapter 6: (146-171); article by Post in the 1990 volume of *Scientific American* which is on reserve in Orton under Geog. 597.02

Enrichment reading: article by Moore (a xerox) in the red class binder (on reserve)

April 10: How ecosystems work; Why they provide good system models

April 12: Global carbon cycle

Week 4: Theme: How do we know that global change is occurring? Let's examine the records!

What are some signs of these changes (Biodiversity loss, Deforestation)?

Assigned reading: Text: Chapter 10 (p. 260-289); Chapter 16: (p. 416-439)

Enrichment reading: Chapter by Wilson (p. 108-117) in *Managing Planet Earth*

April 17: Earth's climate history in perspective

April 19 : Biodiversity and deforestation as examples of global change

Week 5: Theme: Monitoring changes on the Earth

Assigned reading: Review for Mid-term Exam; Article on reserve (remote sensing)

April 24: Review for the exam and guest speaker: Remote sensing of the Earth

(guest speaker: Dr. Carolyn Merry, Dept. Civil Engineering) 9:15

April 26: Mid-term examination (bring exam book, pencil, eraser, calculator)

Week 6: Population dynamics, population regulation, resource allocation and use

Assigned reading: Text: Chapter 8: (p. 202-227); Chapter 9: (p. 228-258); Chapter 2: (28-44)

Enrichment reading: Chapter by Keyfitz (p. 118-127) in *Managing Planet Earth*

May 1: Human population and population regulation

May 3: Population and resource allocation and use

LECTURE SESSIONS (continued)

Week 7: Energy for Planet Earth and its inhabitants

Assigned reading: Text: Chapter 17: (p. 446-475); Chapter 18: (p. 476-503)

Enrichment reading: Chapter by Gibbons *et al.* (p. 136-143) in *Managing Planet Earth*;

Chapter 1 by Davis in *Energy for Planet Earth* on reserve in Science and Eng. Library

May 8: Nonrenewable energy resources

May 10: Renewable energy resources

Week 8: Resources and resource use: water and soil

Assigned reading: Text: Chapter 12: (p. 312-333); Chapter 13: (p.334-357);

Enrichment reading: Chapter by Crosson and Rosenberg (p. 128-135) in *Managing Planet Earth*

May 15: Hydrological cycle and water resources

May 17: Soil resources and erosion

Week 9: Air pollution and air quality

Sustainable development and industrial metabolism

Assigned reading: Text Chapter Chapter 22: (p.568-591); Chapter 25 (p. 636-657)

Enrichment reading: Chapters by Frosch and Gallopoulos (p. 144-153) and by MacNeill (p. 154-154)
both in *Managing Planet Earth*

May 22: Air pollution and air quality

May 24: Sustainable development and industrial metabolism (Mr. Bryan Mark will lecture)

Week 10: Review and work on final paper/project

Reading for the week: none assigned: review for final examination

May 29: Memorial Day (no class)

May 31: Review for final / final projects and papers/projects are due on **Friday, June 2 by 5 pm**
Graduating senior deadlines will be set separately

Finals week: Final examination (Monday, June 5th from 7:30 to 9:18 am)

Grading: class participation will be considered when your final grade is borderline

Mid-term exam: 20%

Recitation/modeling exercises (4): 30%

Final exam: 20%

Essays: paper 1 (10%) and paper 2/project (20%)

Two papers are required: The first is a brief review of a controversial issue of your choice. The paper will include a discussion of the topic you research and your opinion and justification for that opinion (5 to 7 pages typed, double spaced text, no more than 5 references). The second paper may be either (1) a more extensive research paper (maximum 10 pages typed, 10 references, double spaced) on a second environmental issue of your choice or (2) development of a Stella-based model project (a system you try to model) with an accompanying paper of 5-7 pages and 4-8 references. We will discuss these papers and topics and help you with details. Papers will be graded 75% for content and 25% for writing (style, grammar, spelling).

You might expect a few "pop quizzes" and special lectures to attend for "extra credit".