

Survey  
UAZ Intro to G.I

**INTRODUCTION TO GLOBAL CHANGE  
GEOS 107A / HWR 107A**

(4 units)

Lecture 9:30 - 10:45 am Tues & Thur in Space Sci 308

Labs on Thur: 12:30-3:20, 3:30-6:20, or 6:30-9:20 pm in Harshbarger (Old Geol) 203

*Global Change encompasses the many ways the global environmental system is changing both naturally and through the influence of human beings. Understanding how the earth's climate changes in relationship to other earth system processes is a unifying theme in Global Change studies. This course puts global environmental change problems -- such as climatic change, global warming, ozone depletion, deforestation & desertification -- into a scientific context by examining the essential components of the earth system (atmosphere, biosphere, and geosphere) and the feedbacks that link these components. This scientific context provides the basis for a critical discussion of the social, economic and political implications of global change.*

**Course Objectives:** *This course will introduce you to the language and methods used by scientists from a variety of fields (such as Geosciences, Ecology, Atmospheric Sciences, and Geography) to study the nature of change in this complex and dynamic system that we call the Earth. We will introduce you to various hypotheses as to how and why change occurs in this system and to the logic underlying the development of theories about the nature of Global Change.*

**Instructor:** **Katherine K. Hirschboeck** (Laboratory of Tree-Ring Research) a hydroclimatologist whose research links local extreme events (e.g., floods, droughts) to large-scale atmospheric circulation patterns. Office: 208 West Stadium; tel. 621-6466. e-mail: [hirschbo@ccit.arizona.edu](mailto:hirschbo@ccit.arizona.edu)

**Textbooks and Readings:**

- "Climate and weather: A Spatial Perspective," by Marlyn L Shelton, 1988. Kendall/Hunt Publishing Co.
  - "Global Warming Debate," special issue of *Research & Exploration*, National Geographic Society, v. 9, n. 2, Spring 1993 (available at ASUA Bookstore)
  - "On Being a Scientist," by National Academy of Sciences, 1989. National Academy Press.
- Plus a packet of supplementary articles and course manual to be purchased (details announced in class).

**Grading and Exams:**

Labs	25%
Paper	15%
Exam I	20%
Exam II	20%
Exam III	20%

The exams will be a combination of multiple choice, short answer and essay questions. The paper will consist of a 10 page critical review of five scientific papers on a specific environmental problem. You should choose the paper topic in consultation with your TA. Details of the paper assignment will be handed out in lab.

**COURSE POLICIES**

*(guidelines for a happy and successful semester)*

**Office Hours:** Students are encouraged to take advantage of the fact that both the professor and TAs hold regularly scheduled office hours during which they patiently wait for someone to come talk with them about Global Change. Office hours will be announced in class. Please take advantage of office hours to obtain extra help understanding the material or to discuss questions that may arise from the lecture or reading material.

**Attendance:** Attendance is expected at every lecture and lab period. Regular attendance is extremely important for this course in order to keep up with the material; furthermore exam questions will be drawn directly from lecture notes. Random attendance checks in lecture and lab will be taken periodically during the semester (*with bonus point opportunities!*). A poor record on attendance checks will have a negative effect on your grade if you are borderline at final grade time.

**Lab Exercises:** are due on the date announced in lab. One point per day will be taken off for late papers. *No exercises will be accepted for credit later than 1 week after the scheduled due date.*

**Make-up Exams:** A make-up exam will be arranged only if we are notified in person or by phone *prior* to the time of the scheduled exam *and* are given a legitimate excuse (with validation). If you do not show up for an exam and do not contact us prior to that exam, no make-up or credit will be allowed and your exam score will be zero points.

**Final Exam (Exam III):** All students must take the Final Exam during its regularly scheduled time -- no early final exams will be given. (See p. 16 of the Fall 1994 Schedule of Classes for official University policy on this.)

**Probation? Special needs?:** If you are in academic trouble or involved in any special academic program (e.g., SALT), please let us know *within the first three weeks of the semester*. If you are willing to work, we will try to do everything we can to help you achieve your goals for this course. (Do not wait until the end of the semester to inform us of your situation because by then it is too late to help you.)

**Dropping:** (*We hope not!*) The last day to drop the course without it appearing on your record is **September 21**. The last day to drop with a "W" is **November 2**. *To receive a W, you must have a passing grade at the time you drop the course.* (Your passing status will be determined by the % of the total possible points you have earned at the time you drop.)

#### LECTURE OUTLINE (Fall 1994 Semester)

- 8/25 Introduction -- On Being a Scientist
- 8/30 Week 1 Basic Principles of Matter and Energy  
9/1 Basic Introduction to Our Laboratory: The Earth  
9/1 Lab 1: The Scientist's First Tool: Observation (Gila Computer Lab)
- 9/6 Week 2 Energy from the Sun  
9/8 Earth-Sun Relationships  
9/8 Lab 2: Hypotheses, Observations and Analog Models
- 9/13 Week 3 Atmospheric Structure and Composition  
9/15 Radiation Balance and Fluxes  
9/15 Lab 3: Symbolic Representation in Scientific Analysis (Gila Computer Lab)
- 9/20 Week 4 Net Radiation  
9/22 Temperature  
9/22 Lab: Class synthesis and discussion period
- 9/27 Week 5 EXAM 1  
9/29 Atmospheric moisture  
9/29 Lab 4: The Interdisciplinary Field Experiment
- 10/4 Week 6 Global Moisture Fluxes  
10/6 Local Radiation Balance  
10/6 Lab 5: The Importance of Scale
- 10/11 Week 7 The Biosphere and Geosphere at the Boundary Layer  
10/13 Deforestation  
10/13 Lab 6: Forcing, Feedbacks, and Sensitivity

LECTURE OUTLINE (cont.)

- 10/18 Week 8 Desertification  
10/20 Global Atmospheric Circulation  
10/20 Lab 7: Model-building and Scientific Discovery (Gila Computer Lab)
- 10/25 Week 9 Ocean Circulation  
10/27 Regional Climate Variations  
10/27 Lab: Class synthesis and discussion period
- 11/1 Week 10 EXAM 2  
11/3 Internal and External Forcing of Climate Change  
11/3 Lab 8: Teleconnections and Statistical Associations
- 11/8 Week 11 General Circulation Models  
11/10 The Global Warming Debate  
11/10 Lab 9: Modelling as Hypothesis Testing
- 11/15 Week 12 Population and Environment  
11/17 Natural Resource Consumption  
11/17 Lab 10: The Human Variable
- 11/22 Week 13 Vulnerability of Natural Resources to Climatic Change  
11/24 Thanksgiving Recess
- 11/29 Week 14 Policy and Decision-making  
12/1 Preparing for an Uncertain Climate  
12/1 Lab 11: Probabilistic Models: Assessing Risk (Gila Computer Lab)
- 12/6 Week 15 Issues in Global Change: Greenhouse Warming  
12/8 Issues in Global Change: Water Supply  
12/8 Lab: Class synthesis and discussion period
- 12/13 Week 16 Issues in Global Change: Ecosystems

**Final Exam: THURSDAY December 15th 8 a.m. - 10 a.m.**