

# Course Syllabus

## ATM 656 Climate and Climate Change (3 Credits)

### Atmospheric Science Program, CNSM

### University of Alaska Fairbanks

### Fall 2005 (Sept.-Dec. 2005)

**Instructor:** U. Bhatt (474-2662, [bhatt@gi.alaska.edu](mailto:bhatt@gi.alaska.edu)), IARC 307

**When:** T-Th 2:00-3:30PM, IARC Room 407

**Office Hours:** T-Th – 4:00-5:00PM and by appointment (send email)

**Course Web page:** [www.gi.alaska.edu/~bhatt/Teaching/ATM656/atm656.fall05.html](http://www.gi.alaska.edu/~bhatt/Teaching/ATM656/atm656.fall05.html)

**Registration information:** ATM656 CRN: 78819

**Course Pre-requisite:** ATM 401/601 taken or currently taking or permission of the instructor.

#### Course Description:

This course covers the basic concepts of climate variability and change. We will cover the topics from Chapters 1-12 of Hartmann and supplement these topics with chapters from the IPCC reports and various advanced climate texts. A detailed schedule of topics is available on the course web page under 'Course Calendar' and will likely evolve during the course of the semester.

#### Materials Needed:

**Required Text:** Global Physical Climatology (The International Geophysics Series, Vol 56) by Dennis Hartmann, Academic Press, 1994, ISBN: 012328530-5. List Price: \$83.95. Available at the UAF bookstore.

#### Other Tools:

- IPCC Report: Climate Change 2001: The Scientific Basis, downloadable free,
- Books on reserve in Mather Library (see below)

#### Course Goals:

Students will gain a fundamental knowledge of key processes in the Climate System (Climate Dynamics).

#### Student Learning Outcomes:

Students who take this class, participate, do the homework, and attend regularly are expected to have the following skills:

- Understand basic concepts in climate such as: Global energy balance, Surface energy balance, Hydrological cycle, Atmospheric and Oceanic general circulation as related to climate, Past climate, climate feedbacks, and Natural and Anthropogenic climate variability/change
- Be able to read climate papers in the mainstream climate research literature

- Be able to critically discuss current climate change issues
- Apply concepts from this class to their research

Pass the Climate and Climate Change Comprehensive Exam (if applicable).

**Instructional methods:** This course is based on lectures, which will cover the major topics, emphasizing and discussing the important points. They are not sessions to regurgitate material already written in the text (though they sometimes may be!). Your personal participation is important, and it will help you learn more efficiently to read the assigned material before lecture. There will be some homework assigned, a midterm exam to cover the lectures and a final project.

### Course Policies:

**Homework:** There will be a few homework sets early in the semester to reinforce the basic building blocks discussed in class.

**Late problem sets will have grade lowered by 10% per day late.**

**Exams:** Midterm exam will cover class lecture material.

**Complaints and Concerns:** You are always welcome to talk to me to express complaints and concerns about the class. I will listen, though I do not guarantee that I will change the way I am doing things.

**Plagiarism etc:** Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks, which will be followed in this class. (Taken from the UAF plagiarism web site, which has many links with good information about this topic).

**Evaluation:** The course grade will consist of the following components. Final letter grades will be based on a standard scale:  $A \geq 90\%$ ,  $90\% < B \leq 80\%$ ,  $80\% < C \leq 70\%$ ,  $70\% < D \leq 60\%$  and  $F \leq 50\%$ . Note that tests will be graded on a curve.

	ATM656
Attendance/Participation	10%
Homework	15%
Midterm Exam	25%
Final Project	50%

### Additional References:

**(We are working to get these books reserve in Mather Library)**

#### Basic Climate Texts (Overviews)

Peixoto, J. P. and A. H. Oort, 1992: "Physics of Climate", AIP Press, 520 pp.

Ruddiman, W. F., 2001, "Earth's Climate: Past and Future", Freeman Press, 465 pp.

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### **Specific Climate Texts (& Special Topics)**

Barry, R. and A.M Carleton, 2001, "Synoptic and Dynamic Climatology", Routledge Press, 620 pp.

Bigg, G., 1996, "The Oceans and Climate", Cambridge Press, 266 pp.

Grotjahn, R. 1993, "Global Atmospheric Circulations: Observations and Theories", Academic Press, 430 pp.

Hastenrath, S., 1991: "Climate Dynamics of the Tropics", Kluwer Academic Publishers, 488 pp.

McGuffie K. and A. Henderson-Sellers, 1997, "A Climate Modeling Primer", 253 pp.

National Research Council Publications:

"Abrupt Climate Change: Inevitable Surprises"

"Natural Climate Variability on Decade-to-Century Time Scales"

### **Presentation References**

Dr. Jim Callen's Preparation of Effective Scientific Talks (Univ. of Wisconsin)

### **General Advice:**

Understanding Climate and Climate Change requires that you pull together all your knowledge in different areas. Climate 'Dynamics' begins the description of a certain phenomena and then works towards understanding the processes are responsible for this variability. Here are some suggestions for how to study climate.

1. Read the material prior to lecture, to familiarize yourself.
2. Listen carefully to the lecture and take notes, ask questions and participate. This is 10% of your grade and could mean the difference between a letter grade in the end. Also, this is a good opportunity for you to practice how science is done.
3. There is a two step process in learning this material well. First you must to some extent memorize climate maps and phenomena and be able to describe them verbally. Then the second step is to understand the physical and chemical basis for why they occur. Some of you may not need to memorize the phenomena because understanding why they occur will help you remember the description of the phenomena.
4. The bulk of your grade will be a class project, which will entail doing 'research' on a topic that you and I have agreed upon. This means finding key papers on the topic and *synthesizing* the results into a coherent story that is presented orally to the class and written up in the form of a short term paper (less than 10 pages).

### **Disabilities Services:**

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.