

GEOG 520, CLIMATOLOGY
Spring Quarter 2008, 5 credits, call number: 10196
M-W-F 10:30 AM - 11:48 AM, Derby Hall, Rm. 1080

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Textbook: "Understanding Weather and Climate" (4th ed.) by E. Aguado and J. Burt (published by Prentice Hall).

(has been ordered in the Central Classroom Building bookstore)

Course Objectives:

This course is designed to provide a broad introduction to *climatology*, the study of the average state of weather on planet Earth. Emphasis is made of planetary energy budgets, regional climates, climate change, and past and future climates. Energy budgets include the solar energy receipt, infrared radiation loss, turbulent heat fluxes, and the redistribution in the earth-atmosphere system as well as the role of atmospheric moisture, its global spatial distribution, and its importance in energy exchange, and cloud and precipitation formation. Course lectures will describe the causes, and the spatial distribution, of climates of the world as well as the physical mechanisms of some observed weather phenomena. The physical causes of and spatial variations in small- and large-scale motions of the atmosphere will be described. The distribution and causes of 21st century climate will be explained and the distributions of past climates, methods for reconstructing them, and the potential explanations for them will be discussed. The course will also consider how humankind has both intentionally and unintentionally become a factor in the physical processes of weather and climate. Many students will find the basic concepts and ideas discussed in the course will have applications in their fields of interest as well as applications to their daily lives.

Upon successful completion of this course, students should (1) be able to describe the structure and composition of the atmosphere and how it has changed with time; (2) know the factors causing solar radiant energy variations on earth and be able to describe global radiation balance; (3) be able to explain the physical processes leading to the formation of atmospheric features including clouds, precipitation, winds and storms; (4) have a good understanding of the physical behavior of gases, and of the different forms of energy and

their role in atmospheric motion and weather systems; (5) have a good understanding of environmental issues pertaining to the atmosphere including the "greenhouse effect", ozone depletion, air pollution and urban climate modification; and (6) be able to describe the general distribution on the world of temperature, precipitation and climates - and the factors and physical mechanisms which cause these distributions to occur as they do.

Methods for accomplishing these objectives:

The objectives of the course will be accomplished through the lectures, homeworks/assignments, in-class presentations, and examinations. The lectures will include some material not covered in the textbook and may incorporate math to the level of algebra. Determination of your grade will be as follows:

Homeworks or in-class assignments/quizzes (one per week – 7 total – will drop your worst score)	35%
One in-class presentation (10 minutes)	10%
Attendance, professionalism, and active participation	10%
Two midterms and one final exam (3 total – will drop your worst exam score)	45%

- This means each midterm is worth 22.5% of your grade. If you do well on both, you can skip the final exam! The midterms will cover only the recent material, while the final will be comprehensive. All exams will be multiple-choice (50 questions for each exam).

The grading scale is as follows: 100-93% A, 92-90% A-, 89-87% B+, 86-83% B, 82-80% B-, 79-77% C+, 76-73% C, 72-70% C-, 69-67% D+, 66-63% D, 62-60% D-, 59% and below E.

Please take note that a large portion of the materials that appear on the midterm and final exams will be covered in lecture only. Therefore, *you are strongly encouraged to attend all classes or your final grade will suffer*. The grading policy is very forgiving: the lowest scores on both the homeworks/assignments and exams will be dropped when calculating your final grade. Therefore, no make-up exam will be given. Proof of a medical problem is necessary to excuse an absence on an examination date. The paper may not be handed in late. The in-class presentation can be on *any topics that you are interested in* and are related to weather, climate or climate change, which is designed to encourage you to surf the climate-related websites and do your own research. Attendance is required for all in-class presentations and will count for 10% of your final grade (can improve your grade from C to B or from B to A!). **If you attend all classes and finish all the homeworks/assignments, you will likely do well on the exams.** Lecture notes will be posted on the course website.

Academic Misconduct It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not

limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

Disability Services Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>.

Cell Phones Like on airplanes, interfere with navigation of the course, therefore, cell phones and pagers must be turned *OFF* during class as they interfere with the navigation of the course.

Some Tips for Doing Well:

1. Attend classes – 55% of your grade is based on in-class assignments and attendance/professionalism/participation.
2. Actively participate in the in-class presentations and discussions.
3. Check the course website frequently for updates.
4. Have fun.

Final Exam: June 4, 9:30-11:18am

The schedule may change, probably only slightly, as the class evolves. Instructor will alert students if/when schedule changes.

Course website <http://lightning.sbs.ohio-state.edu/geo520/index.htm>

COURSE LECTURE OUTLINE

Date LECTURE (click the title of each lecture to download the powerpoint file)

- 03/24 Atmospheric Sciences at a Glance I
- 03/26 Atmospheric Sciences at a Glance II
- 03/28 In-class assignment I: Ice Man – The story of Lonnie Thompson

- 03/31 Composition and Structure of the Atmosphere
- 04/02 Global Energy Balance I: Solar Radiation and the Seasons
- 04/04 In-class assignment II: Mitigation of global warming

- 04/07 Global Energy Balance II: Greenhouse Effect
- 04/09 Atmosphere Pressure and Winds
- 04/11 In-class assignment III: The magic of water vapor

- 04/14 Midterm I Review
04/16 MIDTERM I
04/18 Preparation of in-class presentation
- 04/21 General Circulation of the Atmosphere and Oceans
04/23 Global Water Cycle I: Clouds and Fogs
HW#1: Find and plot climate datasets on the web
04/25 In-class presentation
- 04/28 Global Water Cycle II: Precipitation Processes
04/30 Global Water Cycle III: Organized Precipitation Systems (from hurricanes to tornadoes)
HW#2: Data collocation-Rainfall associated with major floods in U.S.
05/02 In-class presentation
- 05/05 Midterm II Review
05/07 MIDTERM II
05/09 In-class presentation
- 05/12 Tropical and Extratropical Climate
05/14 Modeling and Predicting the Global Climate System
HW#3: Forecasting the global impacts of El Nino/Southern Oscillation in 2008
05/16 In-class presentation
- 05/19 Global Climate Change I: Observed Climate Change
05/21 Global Climate Change II: Projections and Impacts
HW#4: Exploring the simulations of a global climate system model used for IPCC climate change projections
05/23 In-class presentation (current grades)
- 05/26 NO CLASS – Memorial Day
05/28 Final Exam Review
05/30 In-class presentation
- 06/02 NO CLASS (Final exam week)
06/04 **FINAL EXAM, 9:30-11:18am**

Some climate-related websites:

NASA's earth missions:

<http://science.hq.nasa.gov/missions/earth.html>

NOAA Watch – NOAA's All Hazard Monitor:

<http://www.noaawatch.gov/>

El Nino Theme Page:

<http://www.pmel.noaa.gov/tao/elnino/nino-home.html>

Hurricane Katrina

<http://www.katrina.noaa.gov/>

Intergovernmental Panel on Climate Change (IPCC- 2007 Nobel Peace Prize Winner):

<http://www.ipcc.ch/>

Climate TimeLine (Exploring weather & climate change through the powers of 10):

<http://www.ngdc.noaa.gov/paleo/ctl/>