

Earth Space and Atmospheric Sciences 1111

Climate and Global Change

Professor Paul L. Sirvatka
Spring 2012

Description: Introduction to the earth's climate, climate change, and the interactions between climate and the global environment. Physical, chemical, biological, and social factors contributing to climate and global change are investigated. Topics explored are: climate classifications, global warming and greenhouse effect, acid rain, ozone depletion, regional drought, and cataclysmic climate change. Man-made climate change as opposed to natural variability, along with human responses to potential climate change are debated.

Prerequisite: Math 0481 with a grade of C or better or a qualifying score on the Math Placement Exam or concurrent enrollment in a math course greater than Math 1108.

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Office Hours: M 1:00 - 3:00PM; W 2:00 - 3:00PM; F 9:00 - 10:00AM; 2:00 - 3:00PM
TuTh 2:00-4:00PM
I will also be available at other times. Please try to set up an appointment if you wish to see me at any time. Please feel free to contact me with questions using email as well.

Text: Understanding Weather and Climate, Fifth Edition, Aguado and Burt, 2010.

Additional Materials: #2 pencils for tests and good colored pencils (at least red, blue, yellow and green) are required *daily*. A three-ring notebook is also required to assist in maintaining sufficient organization.

Attendance:

Attendance is extremely important, especially in this class which meets only once a week. Much of the material is covered only in class. It is expected that you will attend all classes. Attendance at the final is mandatory. Contact the instructor as soon as possible in the event of an unavoidable absence. *Quizzes and in-class assignment cannot be made up.* Only in exceptional circumstances can tests be given at a time other than the announced date. Exceptions must be pre-arranged. A missed test is a zero.

Grading:

Quizzes and homework assignments	~ 20%
Participation and attendance	~ 10%
2 Tests	~ 40%
Final exam	~ 30%

Grades will be curved based upon expected results and class participation and attitude. Generally speaking, the grades will be as follows:

A – 85%; B – 74%; C – 63%; D – 50%; F < 50%

All work must be completed. An incomplete will be given only in an exceptional circumstance. It is the student's responsibility to withdraw from the course due to non-attendance. Failure to withdraw will result in an "F". Late assignments will be penalized to a maximum credit of 50% at the discretion of the instructor. Students wishing to take this course on a pass/fail basis must earn a grade of a "C" or higher to receive a "Satisfactory" for the course. In order to fulfill the general education requirements a letter grade must be received.

Course Objectives:

Upon successful completion of this course the student should be able to do the following:

1. Identify the basic forces and processes that govern global weather and climatic conditions
2. Describe and explain the distribution of various climatic types over the surface of the earth
3. Identify both anthropogenic and natural causes of climate change

4. Recognize and debate the arguments of both sides in the global warming debate
5. Evaluate the positive and negative implications of proposed global warming mitigation strategies
6. Explain the current theory regarding the depletion of stratospheric ozone and its consequences
7. Identify the sources of, and the chemical reactions involved in, the production of acid rain
8. Describe the conditions that could lead to regional drought and desertification
9. Summarize the impact of cataclysmic climate change (i.e., planetary impact and nuclear winter)

Topical Outline:

1. Meteorological foundations of climate
 - a. Composition and structure of the atmosphere
 - b. Electromagnetic radiation and the global radiation budget
 - c. Factors influencing surface temperature
 - d. Global water budget, cloud formation, and precipitation processes
 - e. Atmospheric forces and the general circulation of the atmosphere
 - f. Koeppen climate classification scheme
2. Global climate change
 - a. The science of global change
 - b. Glaciation and ice ages
 - c. Human contribution to the greenhouse effect
 - d. Projections of climate change
 - e. Global climate change impacts and mitigations
 - f. Global warming debate and policy options
3. Acid rain
 - a. Chemistry of acid formation and deposition
 - b. Acid sources – sulfates and nitrogen dioxide
 - c. Impacts of acid rain on the environment
 - d. Acid rain mitigation
4. Ozone depletion
 - a. Chemistry of ozone formation and destruction
 - b. Human effects on ozone

- c. Projections of global ozone depletion
- d. Policy responses
- 5. Regional drought and desertification
- 6. Cataclysmic climate change
 - a. Planetary impact by a comet or asteroid
 - b. Nuclear winter

Advising:

Please feel free to speak to me concerning school plans and classes to take, whether or not you are involved in meteorology as a major. I will be more than happy to discuss anything related to school or anything else in your life that might be a problem or obstacle to your success.

Expectations:

Students are expected to attend all classes, participate fully in classroom and on-line discussions and cooperate in learning experiences with other classmates. The expected out-of-class workload is two hours of work for every hour of time spent in class.

Participation in discussion is a vital part of this course. Some are less comfortable in a classroom setting and can enhance their participation grade by writing on class discussion boards. Debate and discussion will always be respectful. This is not a television debate. You will not be graded on your opinion but on how well you are able to discuss your opinion and base it on facts and research. It is not my goal to tell you what to believe but rather help you understand an extraordinarily complex topic. I want to help you learn how to approach hot topics with composure and intelligence. Your ability to listen and respond appropriately will give you a significant advantage in class and in life.

In addition to discussion, you will be expected to understand scientific concepts. Your desire to further your knowledge in the science of climatology will factor into the curving of your grades.

Final Exam:

A cumulative final exam will be given. See <http://www.cod.edu/schedule/> for a listing of the final schedule.