UDCC 1050-5: Global Warming: Will climate make history again?
&
UDCC 1050-12: Carbon dioxide and water: The global impact of two simple molecules

Instructor's Information

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Class meetings: Monday and Wednesday 1:00 – 2:50 pm, Boettcher Center West 123

Required Course Items

- Anthony, S., Ferret, T.A. and Bender, J (2003) What Should We Do About Global Warming? W.W. Norton, New York, NY.
- Alley, R.B. (2000). The Two-Mile Time Machine: Ice Cores, Abrupt Climate Change and Our Future. Princeton University Press. Princeton, NJ.
- National Geographic Magazine, September 2004 Issue, National Geographic Society, Washington, D.C.
- An inexpensive calculator is required. It should have the capabilities for square roots, logarithms, and exponential (scientific) notation operations. You are responsible for understanding how to perform each of the operations on your calculator. **Remember to bring your calculator (or laptop) with you to every class.**

Supplemental Course Texts

- Silberberg, M.S. (2003) Chemistry: The molecular nature of matter and change, 3rd ed. McGraw-Hill, New York, NY. *(textbook used for CHEM 1010 and CHEM 1510)*
- Harte, J. (1988) Consider a Spherical Cow. A Course in Environmental Problem Solving. University Science Books, Sausalito, CA.

COURSE DESCRIPTION

Over the past quarter century, many environmental issues associated with the growth of our industrial society have risen to the forefront of the public's attention. Atmospheric CO_2 levels continue to increase and are currently higher than at any time in at least the past 400,000 years. Computer models suggest that increased concentrations of CO_2 and other atmospheric greenhouse gasses (i.e., CH_4 and N_2O) will generate global warming during the next century. Sea level will continue to rise and many regions will see an increased frequency of severe droughts and more frequent and powerful storms. In reality, the recorded history of climate and the paleoclimate record (from polar ice cores and other proxy indicators) suggest that global warming is already underway and has contributed to new and unexpected threats to agricultural productivity, coastal development, and public health.

This first year seminar is designed to introduce students to the scientific principles and potential ramifications of trace gas induced global warming. Students will be asked to consider how humans have contributed to the greenhouse effect, how certain regions could be impacted over the course of their

lifetime, and what steps might be taken to counter the ever-growing discharge of greenhouse gasses from our largely industrial society.

COURSE OBJECTIVES

At the end of the course all students should be able to answer with expertise the following questions:

- What is the scientific basis of global warming?
- What are the natural and anthropogenic sources of global warming?
- What are the chemical and physical properties of specific gases that make them greenhouse gases?
- What is the primary evidence that supports or refutes the concept of global warming?
- What are the projected consequences of global warming and over what time frame would they occur?
- Has global warming happened in the past? When and Why?
- What potential economic impact might global warming have?
- What national or international events have taken place to discuss global warming?
- What policies, if any, have been put in place regarding global warming?
- Is any legislation regarding global warming pending at any level now?

CLASS MEETINGS

The seminar will be predominately conducted in an active-learning environment. Students are expected to come to each class prepared to discuss the assigned topic and participate in integrated activities. These activities will include discussions, laboratory exercises and experiments that have been specifically designed to re-enforce the course material. We will also lecture over material that may not be found in the assigned readings. At times, we will ask you to work with other students to solve problems or answer questions. We encourage you to make the most of these interactions. Experience has shown us that other students often succeed in describing concepts where professors and instructors fail. Group participation is expected, and thus portions of these group activities will be graded.

Class attendance and participation is mandatory. A significant portion of your final grade will be assigned to each.

READINGS AND DAILY ASSIGNMENTS

Reading assignments for each topic will be completed prior to class. These assignments will be from the assigned texts, modules, or supplemental material. When a reading is assigned, you are expected to come to the next class prepared to discuss the material. To facilitate these discussions, you will be required to turn in a paragraph describing your reaction to the assigned reading, and three (3) thoughtful questions. The paragraph <u>should not</u> merely be a summary of the material. When a worksheet from the module is assigned, it, or a photocopy of it, will be collected at the beginning of the period prior to aid our discussion and class activities. Each of these daily assignments will be graded, and returned to the student. One of our goals for this seminar is to help each of you learn how to critical evaluate a piece of scientific writing and convey your evaluation in a concise, written manner. We therefore expect to you improve throughout the quarter, and our grading of your written work will be reflective of this expectation.

TERM PAPER

The completion of a term paper will be required for the seminar. The topic of the term paper must be related in some way to global warming or climate change. Examples of acceptable topics include renewable energy strategies, carbon sequestration, carbon trading credits, and many others. A set of

milestones (due dates for outline, draft, and final paper) will be given to you to help you complete the paper on-time. Each of these milestones will be assigned a portion of the final grade. So, it is highly recommended that you meet all of them. Specific details, including a list of suggested topics, will be provided to you during the second week of class. The final paper will be due during finals week.

GREENHOUSE GAS CONTRIBUTION PROJECT

Each of you will be required to monitor your individual contribution to global warming by keeping a journal of your daily activities. A list of specific activities that you should record will be summarized in more detail in a handout given to you during one of our first meetings. Later activities in the seminar will focus on how to use these data you are collecting to calculate your contributions.

GRADES

At the end of the quarter, you will be graded according to your performance on the assigned work, class attendance, and class participation. All of your written work and many of your worksheets and laboratory exercises will be graded by each of the instructors. One composite grade will be given for each of the assignments. Your final grade will be determined by the following scale:

Class attendance	10%
Class participation	15%
Daily Assignments	40%
Term Paper	25%
Greenhouse Gas Project	10%
Total	100%

CELLULAR PHONE AND PAGER POLICY

I respect the need for each individual to stay in contact with family and friends. The use of cellular phones and pagers, however, is disrupting to the learning environment. Thus, I request that the ringers of all cellular phones and pagers be muted during class. If an emergency arises, and you need to make a call on your phone, I request that you quietly leave the room and conduct your conversation out in the hallway.

LECTURE ACCOMODATIONS

We will make every effort to accommodate students diagnosed with a learning disability. We will do this in complete confidence. We do, however, request that any student requiring these accommodations inform me the first week of class. For further information, please see the University Disability Services' website at http://www.du.edu/disability/dsp/index.html.

ACADEMIC DISHONESTY

While we advocate collaborative learning and teamwork, we also firmly believe that each individual should maintain the highest ethical standards in all of life's endeavors. As such, we support and will strictly enforce the Honor Code of the University of Denver. For your reference, we have included the links for the Honor Code Statement and Honor Code Procedures for Students below. For further information, please see the Office of Citizenship & Community Standards' website at http://www.du.edu/honorcode/statement.htm for the Honor Code Statement and at http://www.du.edu/honorcode/studentprocedure.htm for the Honor Code Procedures for Students.

TENTATIVE COURSE OUTLINE

Week 1	Introduction; background on global warming; Assessment of Discoveries Discussion of "Taking Sides" article; global warming basics; "Spherical Cow" exercise
Week 2	Visible and infrared spectroscopy of greenhouse gases (lab experience) Greenhouse gases characteristics: Lewis structures, polarity and infrared activity
Week 3	Molecular modeling of greenhouse gases with Spartan Concentration changes in greenhouse gases: the available data
Week 4	Creation and destruction of greenhouse gases in the atmosphere Carbon Cycle
Week 5	Calculating individual contributions to greenhouse gases Global impact of human activities
Week 6	Will global warming be a problem in our lifetime? Read two articles (one from WHOI, one from Smithsonian) about changes that are happening now.
Week 7	Conceptions of the general public. Watch The Day After Tomorrow. Science article. Special evening with Everest photographer, Jake Norton.
Week 8	How do we reconstruct past climate variability? Tree rings, coral reefs, lake sediments, ice cores. Natural climate change over the past 10,000 years.
Week 9	Climate variability over the past 2 million years. Rapid climate change during the last glacial cycle and climate instability. The future?
Week 10	So what should we do? Debate: Can we control Global Warming?