Geography 416
Global Warming

Spring 2009 — Dr. Helen Cox
Class No. 17422 — helen.m.cox@csun.edu
Mon., Wed. 2:00 p.m. – 3:15 p.m. — Office: Sierra Hall 130K
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Web page: http://www.csun.edu/~hmc60533/CSUN_416/416_intro.htm
Office Hours: MWF 11:00 a.m.– 12:00 p.m.

Objective

To educate the student about the climate of the Earth and the processes that have shaped its evolution since the Earth's origin 4.6 billion years ago. Global warming refers to contemporary changes to the surface temperature of the Earth which are occurring in large part due to changes in the carbon dioxide content of the atmosphere as a result of our consumption of fossil fuels. We will examine the science behind this and look at predictions for the future. Students will learn about our energy needs and to what extent they can be met by alternative energy, and examine alternatives for the future. We will learn about current legislation for limiting carbon emissions, what this means for industry and for ourselves, and how carbon emissions ('footprints') are determined.
There will be a field activity/laboratory component to this course in which students will gain hands-on experience in collecting field data and analyzing it using technology.

Description

We will cover the following broad topic areas in this course.

- What controls our temperature?
  - the sun
  - atmospheric constituents
  - the earth's surface
  - the ocean
  - the carbon cycle

- Climate history of the earth
  - 4.6 billion year history
  - the past 600,000 years
  - the past 150 years
  - opposing viewpoints

- Global warming predictions
  - emissions scenarios
  - assumptions made
  - skeptics

- Consequences
  - ecosystems
  - coastal erosion
  - disease, floods, fires
  - water needs

- What can be done
    - energy use
    - conventional energy
    - alternative energy
        - wind, water, solar, nuclear, fuel cells
    - "clean coal", carbon burial
    - recycling
    - geo-engineering solutions

- Legislation
    - international, national, state, local
    - carbon emissions trading
    - GHG inventories/ carbon footprinting

- The good news – sustainability initiatives
    - CSUN
    - case studies

Attendance

Class attendance is required. Under no circumstances should students miss more than three classes during the semester. We will be carrying out discussions, debates and exercises in class. It is important that everyone participates. Exam material is taken primarily from the material covered in class with a portion from assigned readings. Students are expected to participate in class, and are expected to arrive at class on time and remain in class for its entire duration. Cell phones and beepers must be turned off.

Text

Most of the reading material will be articles and documents made available electronically (for downloading and printing). In addition a short non-fiction book, "Field Notes from a Catastrophe: Man, Nature and Climate Change" by Elizabeth Kolbert (ISBN 978-1-59691-130-7) is assigned. This is an easy-to-read 200 page paperback, list price $13.95, but can be purchased online for $5.99 or less. Students are responsible for reading assigned material in preparation for class discussion.

Exams and grading

Grades will be based on two exams, assignments, exercises, and class participation/activities. This mid-term exam will be worth 100 points and the final exam, 150 points. The final will include material from the entire course. Assignments and exercises will be worth an additional 100 points, and class participation/activities will be worth 50 points. (The total number of points for the course is 400.)

Tentative dates for the exams are:

Mid-term: Wednesday, Feb 25
Final: Mon., May 11 at 3:00 – 5:00 p.m

The plus and minus system will be used in awarding grades.
Make-up exams will only be given in exceptional circumstances. A doctor's note is required to make-up an exam missed for illness. **No extra-credit is available**.

Schedule of classes

		Topics
week 1	Jan 21	What controls our temperature?
week 2	Jan 26, 28	EM spectrum basic principles of G-H effect other factors, feedbacks DaisyWorld and GAIA hypothesis
week 3	Feb 2 **Feb 4** **Feb 5**	carbon cycle Faint Early Sun paradox climate history of earth – long-term **No class (see Feb 5)** **(10:45 a.m. – 4:00 p.m.)** Climate Change Teach-In
week 4	Feb 9, 11	climate history of earth – short-term, ice ages recent climate change – global warming
week 5	Feb 16, 18	evidence, causes, skeptics global warming predictions emissions, models, uncertainties
week 6	Feb 23 **Feb 25**	consequences of global warming **Mid-term exam**
week 7	Mar 2, 4	energy use population conventional energy
week 8	Mar 9, 11	alternative energy wind, hydro, wave, solar, nuclear, chemical
week 9	Mar 16, 18	alternative energy wind, hydro, wave, solar, nuclear, chemical
week 10	Mar 23 **Mar 25**	other solutions – clean coal?, carbon burial, geo-engineering, recycling **Tour of campus fuel cell and rain forest project (Tom Brown)**
week 11	Mar 30, Apr 1	Should something be done? legislation carbon emissions agreements, trading
	Apr 6, 8	**Spring Break** ☺☺☺
week 12	Apr 13, 15	carbon footprinting
week 13	Apr 20, 22	carbon footprinting
week 14	Apr 27, 29	sustainability initiatives
week 15	May 4, 6	sustainability initiatives
week 16	**Mon., May 11**	Final Exam: 3:00 – 5:00 p.m.

Learning Outcomes and Assessment

Goal A: Knowledge

Students will understand the climate history of the Earth.
Students will understand the electromagnetic spectrum and the Earth's energy balance.
Students will understand the greenhouse effect and feedback effects.

- Assessment/Evaluation tool: writing assignments, discussions, exams

Students will understand the role of plate tectonics and of the ocean in controlling climate.
Students will understand the important chemical cycles which control climate.

- Assessment/Evaluation tool: writing assignments, mid-term exam, final exam

Students will understand how climate history is measured and how future climate is predicted
Students will understand the utility and limitations of model predictions.
Students will learn to think critically about the data with which they are faced.

- Assessment/Evaluation tool: class exercises, debate, mid-term exam, final exam

Students will investigate the consequences of global warming on the environment.
Students will research and learn about energy use, alternative fuels, and ecology.

- Assessment/Evaluation tool: research, writing, class discussions, final exam

Students will learn about global warming legislation, emissions trading and carbon footprinting.

- Assessment/Evaluation tool: research, writing, class discussions, final exam

Goal B: Acquiring Knowledge

Students will develop skills for acquiring new knowledge.
Students will take comprehensive lecture notes during class.
Students will read journal articles and supplementary material referenced in class.
Students will research material for class discussion and debate.

- Assessment/Evaluation tool: writing assignments, discussions, class exercises, exams.

Goal C: Problem Solving Skills

Students will demonstrate their ability to apply facts to their understanding of climate change and global warming.
Students will assimilate knowledge from different parts of the course to understand global environmental problems.
Students will apply critical thinking skills to tackle problems posed in class.
Students will apply critical thinking skills to participate in class discussions and debates.

- Assessment/Evaluation tool: class participation and discussion, writing assignments

Goal D: Communicating Knowledge

Students will communicate the knowledge they have gained to discussing and debating climate change, the factors that control it, and its environmental consequences

- Assessment/Evaluation tool: class discussion, writing assignments, exams