

LOCATION/PROGRAM: Upper Iowa University-Madison Center, Term 2, Thursdays, 5:30 – 10:00 p.m., 2009.

COURSE IDENTIFICATION: *Global Warming & Climate Change*, ES 330, 3 cr.; prerequisite: BIO 161. This course will explore, examine, and analyze the current status of global and U.S. greenhouse gas emissions, climate variables, climate research, and estimates of human-induced atmospheric warming(global warming). An emphasis will be made to examine natural climate variability, abrupt climate change cycles, and the relationship between climate change cycles and the global warming phenomenon. Discussion of strategies to alleviate increased atmospheric warming will be included.

TERM INFORMATION: Term 2, October 26-December 19, 2009.

INSTRUCTOR INFORMATION: Alan Capelle, 278-0350, capellea@uiu.edu; capellea@peacocks.uiu.edu. Call during 9-6 most workdays, and 9-3 of Fridays.

BIOGRAPHY: Alan Capelle serves a dual role within UIU as the Center Coordinator/Director, and as your instructor for this course. He developed, and sought approval for this course in 2007. He received his B.S. and M.S. degrees in Natural Resource Management/Ecology from the UW-Stevens Point as well as a minor in Earth Science. He has coupled his disciplinary coursework with numerous business-related courses. Post-graduate work was undertaken at the U.M.-Ann Arbor. He has worked as a consultant, and in the Alberta Government in the 1970-80's. A recipient of 6 awards of merit within the environmental field, Alan previously taught at Winona State University, and Marian University of Fond du Lac, WI since 1987.

TEXTS: 1) *CO2 Rising: The World's Greatest Environmental Challenge* by Tyler Volk, MIT Press, 2008.

2) *Climate Change: Picturing the Science* by Gavin Schmidt & Joshua Wolfe, 2009.

COURSE OBJECTIVES:

- 1) Examine the nature of natural climate variability, it's complexity, components, and challenges in forecasting. Study and discuss

historic climatic cooling periods such as the Little Ice Age(17th-18th Centuries).

- 2) Study and describe the concept of atmospheric warming, the Greenhouse effect, define global warming, it's precursors, scientific evidence for, and current magnitude(describe various strategies to combat global warming, and alleviate its potential impact).
- 3) Explore various concepts of climate change over time including its causes, forcing mechanisms, adaptation and mitigation, climate systems, regional differences, and predictions. Contrast these events with the evidence for global warming and discuss differences, and potential connections between the two.
- 4) Explore the nature of abrupt climate change, deep ocean circulation, gas hydrates, and the role of the Amazon River in moderating climate.
- 5) Provide an overview of existing climate research including tree ring, pollen counts, ice core analysis, and modeling as major tools to understand current climatic forecasts. Understand the role and importance of climate scientists and paleoclimatologists as key professionals in interpreting the characteristics of global warming and climate change scenarios.
- 6) Discuss the possible future impacts of global warming. Predict and postulate possible scenarios(via the scientific method) of ecosystem and climate change as driven by the causes of global warming.

READINGS: Week 1: Volk: Chapters 1 & 2;
Schmidt/Wolfe: Chapter 1

Week 2: Volk: Chapters 3& 4
Schmidt/Wolfe: Chapters 2 & 3

Week 3: Volk: Chapters 5 & 6
Schmidt/Wolfe: Chapters 4 & 5

Week 4: Volk: Chapter 7
Schmidt/Wolfe: Chapters 6 & 7

Week 5: Volk: Chapter 8
Schmidt/Wolfe: Chapter 8

Week 6: Volk: Chapter 9
Schmidt/Wolfe: Chapter 9

Week 7: Volk: Chapter 10
Schmidt/Wolfe: Chapter 10

EXAMS: One mid-term exam-100 pts.;
One final project and presentation-250 pts.;
6 weekly quizzes-70 pts.
Participation: 45 pts.

ASSIGNMENTS: Students are encouraged to bring in weekly articles, on various aspects of global warming and climate change for classroom discussion. A study sheet will be handed out for the mid-term exam. Students will be introduced to the scientific method framework, and its application to the global warming phenomenon.

**TENTATIVE
COURSE OUTLINE:**

Week 1:*Earth's atmosphere & the greenhouse effect;
*Major climate change drivers;
*Overview of global warming;
* U.S. poll/survey on global warming;
* Assessment of where we are at relative to this problem;
* Getting started on group project

Week 2: *Past climate change & analysis of the complexity and conditions necessary for change;
*More recent climate change events and their causes;
*Overview of UW-Madison's Climate Center, and Dept. of Atmospheric Study(local resources)
*An Inconvenient Truth DVD' discussion;
* Climate variability/abrupt climate change

Week 3: * Scientific research on global warming: status;
*Global warming effects on terrestrial and marine life;
*Global warming-potential impact(s) on ozone depletion;
* Status on melting glaciers(U.S.), temperature, precipitation, and rising sea level changes.
* Teleconference with Dr. James Hansen, NASA

Week 4: * Effects on human health(guest speaker)
*Impacts on coastlines, storms & floods, biodiversity, and agriculture;
* Nature of ENSO(El Nino-Southern Oscillation), deep-ocean circulation, gas hydrates, and the Amazon River; their relationship to global climate conditions and changes.
* Potential videoconference with the National Hurricane Center, Miami, FL.

Week 5: * Current research & study of global warming
* Symptoms and severity of global warming in the U.S. and abroad;
* Predictions of the degree of magnitude(forcing) that global warming has in modifying existing climates, and climate change cycles.

Week 6: * The ‘politics’ of the global warming debate;
*Existing and potential economic impacts;
* The ‘anti-global warming’ argument;

Week 7: * Discussion re: strategies(‘Best Practices) and tactics that may be useful to alleviating current, and future global warming;
*The future of global warming, and potential climate change-how will societies and the earth react and adapt?
* What are the alternatives?
a) Adaptation and mitigation strategies;
b) Concept of technofixes-are they feasible?

c) The Iron hypothesis

- Week 8:** * Global warming predictions/consequences;
* Analysis of BAS(Business as usual) scenario/implications;
* Cap & trade vs. CO2 reduction strategies;
* Group project presentations & wrap-up

SKILLS: The university goal of writing-across-the-curriculum will be met through a detailed group project analysis following the Scientific Method format. Virtually all of the General Education Learning Outcomes will be met through this course.

GRADING CRITERIA: A= 95- 100% of all points;
A- = 91 – 95% of all points;
B+ = 88 – 91% of all points;
B- = 85-88% of all points;
C+ = 80-84% of all points;
C- = 75-80% of all points;
D+ = 70-75% of all points;
D- = 65 – 70% of all points;
F= 64% of all points and below

- No extra credit will be available.

MISSED EXAMS/ASSIGNMENTS: Unless learners provide a valid rationale for missed exams and/or assignments, they will not be accepted. Late assignments due to medical and/or family emergencies must be adequately documented.

CITATION: Encyclopedias of any kind, including the very popular Wikipedia, are not primary sources, and should not be cited or used in constructing academic papers at the graduate or undergraduate level. They can, however, be useful to help gather some background information and to point the way to more reliable sources.

ATTENDANCE: You are strongly encouraged to attend class on a regular basis. Although classroom attendance is not graded, test material may be drawn from classroom lectures and discussions. Class participation will be used as a component of the final grade.

GENERAL EDUCATION TASK STATEMENT: Apply scientific method, including observation, hypothesis and experiment, to support conclusions involving either physical or biological problems. Students will accomplish this task in each of two separate disciplines, or in sequence in one particular discipline.

GENERAL EDUCATION TASK ASSIGNMENT: Students will:

- 1) Students write a logical statement defining a problem, after either directly observing or being presented with observations of a scientific phenomenon(eg. *does global warming actually exist?*)
- 2) Students write a logical hypothesis which offers a solution to a problem, after making pertinent observations, or reviewing pertinent literature on a scientific phenomenon(eg. *at least 5 sources/references are reviewed on each side of this issue, pro and con*).
- 3) Students write a logical conclusion that explains how further scientific observation either supports or refutes the above hypothesis being tested by the experiment.

