

POSSIBLE PATHS OF FUTURE GLOBAL WARMING



http://www.cnn.com/interactive/2011/01/world/gallery.large.australia.il.com/age.garson Education, Inc.

Jan. 10: A man is rescued by emergency workers after he was stranded clinging to a tree during a flash flood ir Toowoomba, Australia.

NATS-101 (Sections 51, 52)

Introduction to Global Change (3cr)- Spring 2011

MWF 12-12:50, Space Sciences 308

[<u>NO</u> FOOD OR DRINK IN CLASSROOM] Nats 101 home

Attendance is Expected: Missing 2 consecutive classes is grounds for Administrative Drop, starting first day of classes

Instructor. Prof. Steve Leavitt

Lab. of Tree-Ring Research Room 218 W. Stadium (west side of Football stadiumup stairs to second level at Gate 15) phone: 621-6468 e-mail: sleavitt@email.arizona.edu







<u>TA</u>

Rebecca Lloyd- School of Natural Resources Office Hours in 330 Space Sciences

NOTETAKER is needed- will send their notes to Rebecca and me after each lecture, and we will convey them to DRC students



Required Textbook: Dire Predictions, Understanding Global Warming by M.E. Mann & L.R. Kump, Pearson, 2009 Recommended Textbook: Our Changing Planet by F.T. Mackenzie, Prentice-Hall, 4th Ed. 2011 Required and optional Web Readings, some TBA;



With the help of political and environmental supporters and with Hollywood production, Al Gore's lecture was turned into a highly acclaimed Movie on global climate change called

AN INCONVENIENT TRUTH





Course Content.

Global Change Science

- (a) the natural operation of Earth's atmosphere, biosphere, hydrosphere and lithosphere,
- (b) the natural and human-induced ("anthropogenic") mechanisms by which these systems may be altered, and
- (c) the nature of the changes. The consequences of such changes, whether natural or anthropogenic, could clearly be important to climate, agriculture, commerce, and human health on our planet.

This course will examine

(a) the science of global environmental change,

(b) physical and chemical characteristics of Earth systems as a prelude to

(c) a more complete and thoughtful analysis of major global change issues.

- (d) (1) the principles and jargon of global change science, and (2) our
 - limitations in understanding. Improvement of writing skills is promoted.



www.theodora.com/mapShort Description: A B

Attendance and make-ups:

Daily class presence is **expected**.

There are <u>no</u> make-ups on quizzes and in-class exercises

Make-ups are possible on exams [and group activities] with a valid excuse (If possible, notify us on or before the day of the exam depending on the nature of the crisis)

"Suzanne Delaney, a psychology professor, said when students sit in the same seat day after day, they are actually doing something called "encoding specificity", which helps them better remember information they are learning" [Arizona Daily Wildcat, 8 Dec. 2004]

<u>Grading</u>: Mid-term Exam 15% Final Exam 15% Quizzes 20%

[20 minutes in scheduled class with lecture to follow; only the highest 4 counted (2 in each half of the semester)] Group activities 20%

Writing activities 20% (of which 15% is for writing project) Other 10% (attendance/participation, in-class activities, homework)

52H students will have the above grades scaled to 90% so that their final 10% will derive from contribution to "group activities" as group leaders and participation in an electronic Discussion forum on D2L

The following are guaranteed grades: A (90.00-100%), B (80.00-90.00), C (65.00-80.00), D (55.00-65.00), E (<55.00) (e.g., a final course grade of 79.94% will be a "C")

Final Exam is on Wednesday, May 11, 10:30am-12:30pm in 308 Space Sciences

Extra Credit:

Relevant and approved TV specials (NOVA, Discovery Channel), special talks/lectures, and documentaries can be viewed and journal/magazine articles read and a 1-page double-spaced typewritten summary/critique can be submitted within 1 week of opportunity, 1 EC point each. Instructors will advertise some opportunities, and <u>you are encouraged to find others, but you must obtain approval</u> from instructors before attempting to use them for extra credit.

Max. total ExtraCredit is 6 points, and will be added on to your final class grade average.

NOTE: Only 2 extra points may be earned after April 11 and before 5pm on May 4 (none after May 4).

Class Listserve:

Announcements will be made in "News" tab of D2L, and emergency announcements will be made via e-mail through D2L

Adust your e-mail settings in D2L accordingly

"When it comes to its students, Harvard University policy shows little tolerance for plagiarism. Undergrads found guilty of "misusing sources" will "likely" be required to withdraw from the college for at least 2 semesters. They will lose all coursework they have done that semester, along with the money they paid for it.

With such a policy for students, what is Harvard to do when 2 of its most prominent law professors...publicly acknowledge that they have unintentionally misused sources, as happened this fall? " [NY Times News Service, 26 Nov. 2004]

Cheating and Plagiarism:

Academic dishonesty will not be tolerated, including cheating on quiz/exams, copying assignments, and presenting the work of others as your own (plagiarism). I will report anyone cheating, plagiarizing or violating any other aspect of the code of academic integrity to the Dean of Students and recommend the course grade of "E". Policies and procedures in the Code of Conduct can be viewed at <u>Code of Academic Integrity</u> <u>Dean of Students</u>

Writing projects will be turned in as hard copies, but you may be asked to submit an electronic version to "turnitin.com" for plagiarism evaluation.

Miscellaneous:

Work turned in late will either receive a zero (0), or loss of 5-10% per day depending on assignment

Unless explicitly requested by Instructors, assignments submitted by e-mail attachment will <u>not</u> be accepted.

Prof. Leavitt's Pet Peeve= Distracting him or your fellow students, e.g., with cell phone ringing (turn it off!), text messaging, conversations with your neighbor during class, newspaper reading, laptop use unrelated to this course, SLEEPING, etc.

If you are on sports team, leave a photocopy of your absence excuse with the Instructors during lecture.

For any other special needs, bring Instructors your paperwork and/or explain circumstances to Prof. Leavitt.

Miscellaneous:

Impromptu writing or homework exercises may be done in any class, and are not formally indicated in syllabus

Additional web reading resources will be announced in class

Homeworks can be assigned in class that are not formally indicated in syllabus

Syllabus is subject to change as announced in class; additional announcements, assignments and information will also be posted on D2L



Date Topic

Jan. 12 W Bookeeping; Introduction

Jan. 14 F The Epic Story: Pre-Historical Framework- Origins

Jan. 17 M. MLK Jr. Day- no class

Jan. 19 W Pre-Historical Framework- Evolution

Jan. 21 F. Our Physically Dynamic Solid Earth

Jan. 24 M Mineral Resources

Jan. 26 W (OUIZ) Our Atmosphere- An Ocean of Air

Jan. 28 F In-class group activity

Jan. 31 M Our Atmosphere- An Ocean of Air

Readings (M=MacKenzie: MK=Mann/Kump)

M1-8; MK44-45; (MK6-59 for fun)

M187-212; <u>Cerceo; August; Lemonick</u> <u>Electromagnetic radiation</u>

M187-212; Newton's Laws; Thermodynamics

M13-15/19-22/38/40-57; Smith

M249-254; MK160-163

M62-68

M78-85; MK36-39



NEAR-TERM "THINGS TO DO":

Make sure you marked attendance list next to your name

Buy textbooks; read text and other assigned readings

Try quiz questions at end of Syllabus

Do you know how to do conversions? Work with graphs? Scientific notation? The periodic table? Take a look at Homework 1.



istorically, the onset of the dark ages has always been shrouded in mystery, until the analysis of tree rings indicated a catastrophic change in climate starting in 535 A.D.¹ The relationship between tree rings and climate has been known since the time of Leonardo DaVinci. Samples from ancient trees yield an unbroken record of climate extending back 2000 years. It was Prof. Michael Baillie of Queen's University in Belfast, Ireland, who first noticed the connection between tree rings from Ireland, Sweden, Finland, Siberia, California, and Chile with a global catastrophe. Extensive research yielded strong evidence for a massive volcanic eruption in the South Pacific, an explosion so devastating that it outrivaled Thera in the Mediterranean, which itself erupted in the 15th century B.C., bringing the Minoan civilization and associated cultures to an untimely end, along with stifling Egypt and the Middle East for decades.²



Supporting evidence for the 535 A.D. event was found in The Book of Kings from central Java, which spoke of a mighty thunder, furious gales, darkness, rain, and floods. Contemporaneously, scholars in Constantinople, Rome, the Middle East, China, and Japan documented catastrophic cooling. The eruption caused floods, drought, and massive snowfalls over most of the planet. In turn, this caused the greatest human migration, which led directly to the fall of the Roman Empire, a weakening of Constantinople, and major disruptions of all established societies. Countless millions died through wars, starvation, and the spread of the Bubonic Plague, which was formerly confined to Central Africa. Historians now agree that this was the most important event to occur in the last 2000 years, changing the course of human history. Fortunately, civilization survived and we are here to recount the story.



The fragile existence of civilization: Are we tempting fate with acid precipitation and global warming?



Today, such global calamities as another giant volcanic eruption, a doomsday strike from a large asteroid, a devastating earthquake in a densely populated area, or a sudden change in solar output can threaten the existence of our present global society.³ Although the probability of any of these happening in our lifetime may be small, one or more of these will occur sometime in the future. Therefore, it would seem foolish for us to add to this risk the insidious effects of pollution.

From the viewpoint of global warming, evidence has been gleaned from ice cover. Consider that in 1997 researchers from NASA's Goddard Space Flight Center (Greenbelt, MD) reported that a region within the Arctic Ocean, an oblong body of water whose area is approximately one and one-half times that of the United States, had lost 5% of its ice cover between 1978 and 1996.⁴ Satellite measurements fur-

Our Place in the Universe

First Apollo (8)- 1968 Mission "Earth Rise"



Last Apollo Mission (17)- 1972 "Most commonly published photograph in all of human history"- AIT



www.tneodora.com/maps<...>

Our Place in the Universe

Earth viewed from 4 billion miles outside our solar system (Voyager 1, 1990) Carl Sagan noted that "everything that has ever happened in all of human history has happened on" this pale blue dot AIT: 298-99

Let's take a look at the Universe

.com/maps



It is an "...Epic story taking place across eternal vistas of time and space. A story of power and conflict; endless battles with the forces of nature; a dynamic story that begins at the birth of time and continues to this day and beyond...".

(Review from "At the Movees" show)



MATTER

Matter as we know it is made up of (very) very small particles (atoms and their constituents)

Atoms are the smallest particles of an element that retain the chemical properties of the element; Atoms of the same element have the same chemical properties

Atoms are not divided by chemical reactions (*Chemical* reactions involve electrons; *Nuclear* reactions involve protons and neutrons)







