Revised August 21, 2015

Syllabus for ENST 445 / GEOL 445 Fall 2015

Earth's Climate: Past, Present, and Future

Tuesday/ Thursday 9:30am- 10:50am, WPH 203

COURSE INSTRUCTOR:

Lisa E. Collins, Ph.D.
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Environmental Studies Program
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Office Hours: M, 10-11am, Th 1-2pm, and by appointment

COURSE TEXTS:

Bradley, R.S., 2015, Paleoclimatology: Reconstructing Climates of the Quaternary, 3rd edition, 675 pp., Academic Press. ISBN 978-0-12-386916-5

Imbrie, J., and Imbrie, K.P., 2005, *Ice Ages: Solving the Mystery*, 224 pp., Harvard University Press.

Oresekes, N. and Conway, E.M. *The Collapse of Western Civilization: A View from the Future*, 104 pp., Columbia University Press. ISBN 978-0-23-116954-7.

Wolfson, R., Energy, Environment, and Climate, W.W. Norton, 2011, ISBN 978-0-393-91274-6.

Recent journal articles to supplement the course texts, provided by instructor

Online Reading: IPCC Fourth Assessment Report (AR4): http://www.ipcc.ch/

COURSE OVERVIEW:

Students will be introduced to the tools used to reconstruct and diagnose the causes of past climate change including climate models. A thorough discussion of past climate changes on Earth with an emphasis on the recent past will follow including its impact on past human societies. Next, we will explore current climate changes and their impacts. Finally, we will focus on the future and critically examine climate change predictions and the likely impacts this change will have on humans and the environment.

COURSE GOALS:

-To understand the basic science behind the drivers of climate and how natural forcing differs from anthropogenic forcing

-To understand the tools paleoclimatologists use to determine Earth's climate fluctuations and with this information, analyze the primary peer-reviewed literature that fundamentally relies on these techniques

-To apply quantitative analysis and statistical methods to real world data sourced from publicly available websites and interpret 100+ years of data

-To understand some of the fundamental flaws in the most common climate denier arguments and be able to counter argue with peer reviewed data.

COURSE GRADING:
You will be graded on the basis of your performance on two midterms, a final, a team research project which will include a paper and an in class presentation of the project. Test questions will be drawn from the material presented in lecture. At least 20% of the graded material will be quantitative analyses. The lecture presentations will be posted on the Blackboard system for download and subsequent study. Test questions will include short answer questions, quantitative analysis and essays. Below is a list of the graded assignments, due date and their weighted value.

Paper Discussions	throughout semester	15%
Midterm 1	Thurs Sept 24	20%
Midterm 2	Thurs Oct 29	20%
Class Research Presentation	Tues Dec 1	5%
Research Project Paper	Thurs Dec 3	20%
Final	Thurs Dec 10; 11am-1pm	20%

COURSE SCHEDULE:
For the best learning experience, you are expected to have read the material listed below by the date it is discussed in class. The readings and schedule of topics may be adjusted throughout the semester depending on the progress of the class and addition of new content.

Aug 25 (T): Introduction, Earth's Climate Today (Earth's Climate Chp 2)
Aug 27 (Th): Modern Climate Dynamics (Bradley Ch. 2, Wolfson Ch.12, 13)

Sept 1 (T): Cont'd: Modern Climate Dynamics- Climate Forcing (Wolfson Ch. 13), Introduction of Research Project
Sept 3 (Th): Tools: Ice Cores, Marine & Lake Sediments (Bradley Ch. 5, 6, 9), Introduction of Statistical Methods for Research Project
Sept 8 (T): Tools: Pollen, Corals (Bradley Ch. 12, 14), Research for Group Project
Sept 10 (Th): Dendrochronology, Documentary Data (Bradley Ch 13, 15), Research for Group Project
Sept 15 (T): Ice Ages (Imbrie part I, II, & III)
Sept 17 (Th): Ice Ages Cont., Orbital Climate Change (Earth's Climate Chp 8)
Sept 22 (T): Millennial-Scale Climate Change (Bradley Ch. 5)
Sept 24 (Th): ***Midterm 1***
Sept 29 (T): Millennial-Scale Climate Change Cont. (Blunier 2001)

Oct 1 (Th): Holocene Climate Change (Thompson 2002)
Oct 6 (T): Inter-Annual Climate Change: ITCZ and ENSO (Bradley Ch. 6 & 11)
Oct 8 (Th): Inter-Annual Climate Change (Cole, 2000 & Cobb 2003)
Oct 13 (T): Climate Change Over Deep Time (Crowley 1988)
Oct 15 (Th): Cenozoic Climate Change (Hewitt, 2000)
Oct 20 (T): Climate Change and Past Human Societies (Barlow 1997)
Oct 22 (Th): Case Study: The Monsoons (Kumar 2006)
Oct 27 (T): Present Climate Change- Are We Warming? (Wolfson Ch. 14)
Oct 29 (Th): ***Midterm 2***

Nov 3 (T): Urban Heat Island: Fairbanks, AL (Curtis & Wendler, 1999)
Nov 5 (Th): Present Climate Change Impacts (IPCC Report)
Nov 10 (T): Future Climate Change (IPCC Report)
Nov 12 (Th): Present Climate Change Impacts (Grimm, *et al.* 2008; Kalnay & Cai, 2003)
Nov 17 (T): Future Climate Change (Wolfson Ch. 15)
Nov 19 (Th): Future Climate Change Impacts (Wolfson Ch. 16, McMichael, 2006)
Nov 24 (T): The Future??? (Oreskes & Conway, *The Collapse of Western Civilization*)
Nov 26 (Th): NO CLASS, THANKSGIVING RECESS

Dec 1 (T): Class Presentations- research papers
Dec 3 (Th): Research Papers due 12 NOON via blackboard
December 10 (Th): Final Exam 11am-1pm

FINAL PROJECT:
Students will be assigned collaborative working groups of 2-3 people. Using publicly available data, students will download and assess climate data to compare trends from at least 100 years of climate data. This semester, the entire class will focus on Oregon and using daily max and min temperature, compile and analyze 100 years of data to determine the impact of urbanization on climate. Assessment will include analysis of social data such as increases in housing, roads, and urbanization.
Student groups will share their data acquisition and analyses and each group will collaboratively write a 15-page, double-spaced research paper detailing the methods of data collection and analyses of the data set. Students will rely on peer reviewed journal articles and in class exercises for justification of research methods. They will use peer reviewed journal articles to support their conclusions.
Student groups will present their findings at the end of the semester in a 15-minute presentation.

SUPPORT SYSTEMS
A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. They are located in GFS 120. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* *http://emergency.usc.edu/*will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

STATEMENT ON ACADEMIC INTEGRITY
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using

another's work as one's own. ***The instructor maintains a zero tolerance policy for plagiarism and cheating***. Any instances of plagiarism or cheating will be reported to Student Judicial Affairs and Community Standards and will result in failure of the course as recommended by the University of Southern California. All students are expected to understand and abide by these principles. *Scampus,* the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.