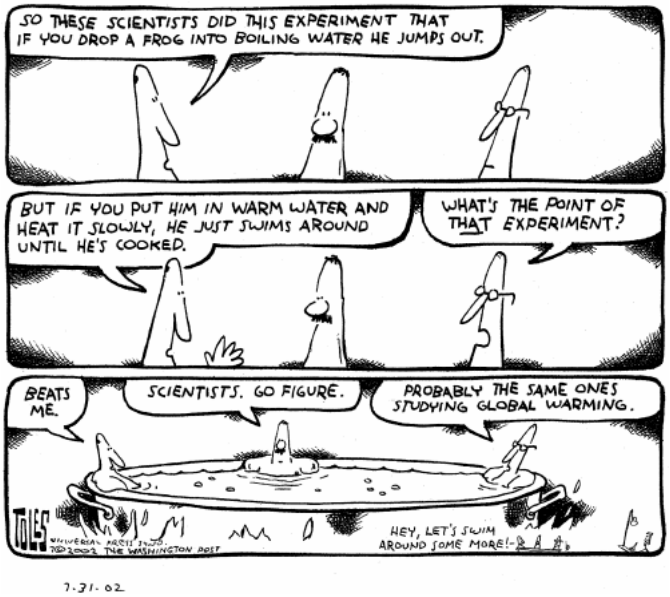
Geology 115: Earth's Climate: Past, Present, and Future
Fall 2007



Instructors:

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Teaching Assistants:
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Lectures: M, W, F 10 – 10:50 am in 108 Van Wickle Hall

Laboratory:
Section 01 Monday 1:10 – 4 pm in 106 Van Wickle Hall (Prof. Lawrence)
Section 02 Tuesday 8 – 10:50 am in 106 Van Wickle Hall (Prof. Wilson)
Section 03 Tuesday 1:10 – 4 pm in 106 Van Wickle Hall (Prof. Lawrence)

Textbook:
Earth's Climate: Past and Future by William F. Ruddiman, W.H. Freeman & Co (2001).
Supplementary reading from:

- *Dynamic Earth: An Introduction to Physical Geology* (Fifth Edition) by B.J., Skinner, S.C. Porter and J. Park, John Wiley & Sons, Inc. (2004). **Note:** The readings from this text are available on reserve in Skillman Library.
- TBA supplemental articles will be made available by the instructor.

Course Description:

Earth's climate has changed dramatically over its history moving between completely ice-free intervals to periods of global glaciation. This course will examine how and why these changes occurred by identifying the major components of the Earth's climate system and exploring the factors and processes that influence the system over a variety of timescales. Using the major lessons learned from Earth's history, we will consider the climatological impact of human activity and examine current ideas about Earth's climatic future.

Course Objectives:

1. Knowledge and Information – to learn concepts and facts about the Earth and its climate system.
2. Comprehension – to understand the meaning and significance of these concepts and facts.
3. Applications – to be able to apply this information to new situations.
4. Analysis – to be able to break down a given concept or topic into its constituent parts and understand the relationships among these parts.
5. Synthesis – to combine the new material you have learned with your previous knowledge and experience to form a more complete and complex understanding of a topic.
6. Evaluation – to be able to make judgments about the value of different aspects or components of the topics we discuss.
7. Communication – to be able to communicate you ideas and knowledge of the materials concisely and effectively.
8. Satisfaction – to enjoy learning the material in this course.

Exams:

In addition to the final exam, which will be given during final exam period, there will be two mid-term exams scheduled during the semester. Each mid-term will be taken during class time. All exams will be multiple choice questions or short-answer/ short essay questions, which will require written answers, sketching of graphs and/or diagrams, or calculations. We expect you to think critically and actively about the course material. On exams, you will be required to demonstrate your reasoning as well as your recall of facts.

Laboratories and Field Trips:

Lab activities will involve examination of geological and climatological data from a variety of sources. Many of the exercises are designed to be completed during the lab period (~3 hours). However, some lab exercises will require extra time either before or after the lab period to be completed. During a few of the lab sessions, we will take field trips to examine the local geologic record. Tentative dates and destinations are provided in the course schedule. More information will be provided as the dates for the trips approach. Labs provide an opportunity for the hands-on experiences that illustrate the concepts and ideas discussed in lecture. In addition, they provide a chance for small-group collaborative work and individualized help from instructors. Thus, ***attendance at and completion of all labs is mandatory to receive course credit***. You can download

each week's lab from the course website. ***You will be required to print, read, and bring with you to lab section a copy of each week's lab. Note that there may be a short quiz at the outset of lab period to ensure that you have properly prepared for lab section by reading through the lab in advance.***

Climate Science in the News Report:

Critical evaluation of scientific information and clear, concise written communication of scientific ideas are two essential skills of scientific investigation. To help you develop these skills you will be asked to find an article about climate science that has appeared in the News within the past 2 years. You will then be required to write a 2-page paper summarizing the article and the background climate science presented in the piece. In lab 11, you will peer review each other's reports to offer constructive criticism for revision prior to the final submission of your reports during the last week of the semester. This assignment will be worth the equivalent of two labs. You will be evaluated on the basis of your initial report, your reviews of your peer's reports, and your final revised report.

In-Class Activities:

Periodically there will be in-class worksheets, discussions, and quizzes. These activities are designed to help you better learn the material and help us assess your comprehension of the concepts and information presented in this course. These activities will be completed during lecture. You will be required to submit your worksheet or quiz at the end of class. ***No worksheets will be accepted after class has ended and there will be no make-up worksheets or quizzes.***

Course Grading:

First Exam:	15%
Second Exam:	15%
Labs / Climate Science in the News Report:	30%
In-Class Activities (worksheets, participation, quizzes):	10%
Final Exam	30%

Grading and Lateness:

Assignments not turned in by the due date will be penalized by 10% of the score for each day they are late. We can accommodate for truly extenuating circumstances, yet we need to know in advance why a deadline will not be met. Any requests for assignment extensions that occur after an assignment deadline, including extensions requested because of illness, must be accompanied by a Dean's excuse.

Academic Honesty:

In the preparation of work for this course, students are expected to conduct themselves in accordance with the Lafayette College's guidelines and rules for academic honesty (see your student handbook for details).

Please make sure your cell phones, iPods, and other electronic devices are turned off before the start of class and lab!

Geology 115 Earth's Climate: Past, Present, Future
Tentative Schedule
Fall 2007

Textbook Abbreviations: Ruddiman = Rud; Skinner, Porter & Park = S,P&P

Week	Dates	Topics & Assignments	Reading
1	Aug 27, 29, 31	Introduction to Geology and Climate Science Climate System Basics **NO LAB**	Rud Ch 1,2
2	Sep 3, 5, 7	Climate System Basics Structure of the Earth Plate Tectonics **Lab 1: Circulation of the Atmosphere and Oceans**	S,P&P Ch 1,2 on Reserve in Skillman
3	Sep 10, 12, 14	Minerals and Igneous Rocks The Rock Cycle **Lab 2: Mineral and Rock Identification**	S,P&P Ch 3,4 on Reserve in Skillman
4	Sep 17, 19, 21	Weathering Sedimentary and Metamorphic Rocks **Lab 3: Rock Identification & Depositional Environments** **Quiz #1**	S,P&P Ch 6,7,8 on Reserve in Skillman
5	Sep 24, 26, 28	Geologic Time Climate Archives **Lab 4: Geologic Time Field Trip: Ringing Rocks**	S,P&P Ch 11 on Reserve Rud Ch 3
6	Oct 1,3,5	Climate Archives Long-Term Climate Change **Lab 5: Paleotempestology** **1st Mid-Term Exam**	Rud Ch 3,4
	October 8,9	**FALL BREAK**	
7	Oct 10, 12	Plate Tectonics & Climate **NO LAB**	Rud Ch 5
8	Oct 15, 17, 19	Greenhouse and Icehouse Climates **Lab 6: Tombstone Field Trip: Chemical Weathering**	Rud Ch 6, 7
9	Oct 22, 24, 26	Oribtal Scale Climate Change Astronomical Controls on Solar Radiation **Lab 7: Deep Sea Sediment Records** **Quiz #2**	Rud Ch 8, 9
10	Oct 29, 31, Nov 2	Orbital Controls on Monsoons, Ice Sheets, and Greenhouse Gases Orbital Interactions in the Climate System **NO LAB**	Rud Ch 10, 11, 12
11	Nov 5, 7, 9	Millennial Scale Climate Changes Climate of The Last Glacial Maximum **Lab 8: Quaternary Climate: Vostok Ice Core Records** **2nd Mid-Term Exam**	Rud Ch 15, 13; Additional Reading TBA
12	Nov 12, 14, 16	The Last Deglaciation Climate and Humans **Lab 9: Abrupt Climate Change: "The Day After Tomorrow"** **Climate Science in the News Report Assigned**	Rud Ch 14,17
13	Nov 19	Historical Climate Change **NO LAB** **Article for Climate Science in the News Report Selected**	Rud Ch 16
	Nov 21-25	**THANKSGIVING HOLIDAY**	
14	Nov 26, 28, 30	Humans and Climate 20th Century Climate **Lab 11: Climate Science in the News Peer-Review** **Climate Science in the News Draft Report Due in Lab** **Quiz #3**	Rud Ch 17,18
15	Dec 3, 5, 7	Modern Climate/ Climate Change Future Climate **Lab 12: Climate of the Future: "An Inconvenient Truth"** **Climate Science in the New Final Report Due December 5th**	Rud Ch 19 Additional Reading TBA
16	**FINAL EXAM - SCHEDULED DURING EXAM PERIOD**		