The Earth's Climate System (ENVI 140)

Macalester College – Fall 2017

Class meetings: MWF 10.50 – 11.50am, NEILL 401
Labs: Thurs. 8.00-11.10 or 1.20-4.30pm, room varies (see Moodle)

Instructor: Louisa Bradtmiller lbradtmi@macalester.edu; 651.696.6837; Olin-Rice 249D
Office hours: M 8.45-9.30, W 1.15-2.15
Preceptor: Shelby Witherby switherb@macalester.edu
Office hours M 7-9pm, W 3.30-5.30 (OLRI 1st floor)

Course description

The Earth's climate system is complex and dynamic, and a solid understanding of this system is crucial in order to address concerns about anthropogenic influences on climate. In this course we examine the basic physical and chemical processes that control the modern climate system, including the role of incoming solar radiation, the greenhouse effect, ocean and atmospheric circulation, and El Niño. We also look critically at the methods and archives used to reconstruct climate in the past, such as ice cores, marine and lake sediments, and cave deposits. We explore the possible effects of anthropogenic greenhouse gas emissions on modern and future climate by examining the models used in climate prediction, and discuss the challenges of modeling such a complex system. Although this course is taught from a primarily scientific perspective, it includes frequent discussions of the roles policy and economics play in the current dialogue on global climate change.

Course organization

Class periods will be a mixture of lecture, discussion and group exercises. The latter two will count towards the course participation grade (see below). Lab periods will consist of pair/group work using climate datasets, models, and hands-on experimental materials. Each lab will have an accompanying assignment, due at the beginning of the next week's lab. Late work (on any assignment) will not be accepted.

Goals for students

By the end of this course, students should be able to demonstrate the ability to:

- Analyze data and draw reasonable inferences from it
- Communicate clearly and effectively through written and oral presentations of ideas
- Demonstrate a basic knowledge of important topics in climate science

Course Textbook

Kump, L. R., J. F. Kasting and R. G. Crane. The Earth System, 3rd Edition. San Francisco: Prentice Hall, 2010.

Moodle

The class Moodle page will be updated regularly, and should be your first stop for information about readings, assignments, and what to expect in class on any given day. The page is color-

coded: anything in green is a reading you should complete before class on the day of the entry, and anything in purple is an assignment due that day. This will require some looking/thinking ahead on your part.

Grading
Your final grade for this course will be determined by the number of points you accumulate throughout the semester.

Point distribution	
Participation	40
Homework (4 @ 15 points each)	60
Op-Ed	100
Labs (10 @ 20 points each)	200
Exams (3 @ 100 points each)	300
TOTAL	700

Attendance
Attendance in labs is mandatory; you are free to leave early if you have finished and turned in the assignment for the week. Attendance in lecture is at your discretion, although students who attend regularly are likely to be more successful than those who do not. The participation portion of your grade will be based on your contributions to classroom discussions/activities.

Exams
There will be three scheduled exams in this course, spaced roughly evenly throughout the semester (see Moodle for dates). They will cover material from lectures, labs, discussions, and readings assigned at any point before the date of the exam. The format usually consists of a combination of short answer questions and essays. If calculators are allowed/required, I will let you know well in advance. **Attendance at exams is required- failure to attend will result in a grade of zero for that exam.** I realize that this seems obvious. There are only 3 instances in which you may reschedule an exam: 1) serious illness 2) a family emergency 3) a college sanctioned activity that requires you to be off-campus during the exam. In all cases I will need to see some documentation (i.e. a doctor's note, note from the Dean, etc.), and I ask that you notify me as soon as you know you will miss the exam.

Homework
There will be 4 homework assignments to reinforce concepts in lecture early in the course. You will have approximately a week to complete each one from the time it is assigned. I encourage you to work in pairs/groups on these assignments. However, each student must turn in their own assignment, written in their own words. This means that you may discuss the answers together, but must write them out yourselves. See me with any questions about what this means- copying will not be tolerated.

Op-Ed letter
Being able to communicate complex information to a non-technical audience is an increasingly important skill. This assignment is designed to let you practice those skills by writing an evidence-based letter about a topic relevant to climate science. See Moodle for a more specific description of the assignment. **Due Mon., Dec 4.**

Labs
Lab section will meet on Thursday fromeither 8.00-11.10 or 1.20-4.30pm. ***Lab will meet for the first time on Thursday, 14 September—you must attend!*** We will use the weekly laboratory time to engage in a variety of activities including experiments, field trips, computer modeling, data analysis, etc. No make-up labs will be available, and missing lab will result a zero for that week's lab assignment. We will use a variety of rooms, including OLRI 187 and several computer labs. Check Moodle (main page) to see where we'll be each week. You may work in pairs for lab reports (and turn in one report per two students), and it is your responsibility to make sure that the work is divided equitably. See me with any problems.

Academic integrity
I take all instances of cheating and plagiarism very seriously. It is YOUR RESPONSIBILITY to become familiar with Macalester's policies on what constitutes each of these offenses and to behave accordingly. Instances of suspected academic dishonesty will be handled as outlined in college policies. **http://www.macalester.edu/academicprograms/integrity.html**

Disabilities
I am committed to providing assistance to help you be successful in this course. Accommodations are available for students with documented disabilities. Contact the Director of Disability Services, Allie Quinn (aquinn2@macalester.edu or 651-696-6874) to make an appointment. Please do this early in the semester to ensure that necessary accommodations are approved so that you can begin the semester successfully.

Miscellany
If you have concerns about any aspect of this course, please come see me sooner rather than later. I am always interested to hear about how you think the class could be more interesting, and if there's a topic you're just dying to see covered, we'll see if we can fit it in. I will be as accommodating as possible with respect to religious/cultural observances (with appropriate notice). I will respond to email during 'normal business hours'. While it is possible that I will check my email at 2am, I probably won't write you back until the next morning. So, don't wait until the last minute to email with that question about your lab that's due tomorrow. Laptop use is prohibited in class unless you make special arrangements with me. Cell phone use will not be tolerated- please turn phones all the way off, or put them to sleep (no vibrate!).