The Earth's Climate System (ENVI 240)
Macalester College – Fall 2020

Class meetings: M-F 9-11.30
Labs: included in above class time

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                                            Office hours: by appointment, and in class

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                                 Office hours: TBD

COVID Caveat
This semester will be like no other any of us have experienced. Those of us who were enrolled in or teaching courses in the spring got a small taste of what lies ahead. The compressed schedule and remote nature of the course provide challenges and opportunities for students and faculty alike. I am committed to making this the best remotely-taught 7.5 week course on climate change you will ever take. To that end, I have changed many things about the way I normally teach this course, and I am prepared to be flexible as the module progresses. I will work with you if problems arise, and support each of you as people and students to the best of my ability. If your needs exceed my ability to help, I promise to connect you with someone who can. I also ask for your patience and good will as I navigate pedagogies and technologies I am newly adopting for your collective benefit. Please foreground your health, take care of yourselves, and let me know as soon as possible if your physical or mental health is impeding your learning in this class.

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 exercises will consist of pair/group work using climate datasets and models. Each lab will have an accompanying assignment, due at the beginning Monday's class period. Problem sets (see below) will be due on Fridays. Revisions to problem sets (optional) are due within two days of their being returned to you.

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
Schmittner, A. Introduction to Climate Science. Oregon State University, 2018.
Available for free download at https://open.oregonstate.education/climatechange/

What to expect in class

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 or a hyperlink 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.

Attendance and participation
It is my hope that we can conduct most of this class synchronously. Student feedback from last semester as well as the survey I sent earlier in the summer suggests that many of you struggled with primarily asynchronous courses. I also find it much easier and more pleasant to interact with you in real time. Furthermore, some of the best learning in this class will happen not with me, but with your fellow classmates in small groups or teams. This necessarily requires showing up at the same time. That said, some of you may be attending from time zones that makes our meeting time difficult; you or someone in your family/pod may become ill; in other words, stuff happens. So, I ask that you attend class prepared to participate whenever possible. If you cannot, there will always be an asynchronous option to "attend" for a given day. This will likely involve watching a video/voicethread of class, and commenting/completing exercises, etc. The participation portion of your grade will reflect your contributions to class activities, whether you complete them synchronously or not.

Problem sets
There will be 4 problem sets designed to give you practice with the material and demonstrate your understanding of course content. 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. You will also have the chance to revise your work after receiving an initial score. This is totally optional, and you may choose to revise any or all of the questions where you didn't receive full credit. Revised assignments are due two days after your work is initially returned.

Speaker summaries and reflection

I ask that you "attend" three ~hour-long talks this semester, related to any aspect of climate change science, climate policy, climate justice, etc. (but it really does have to be about climate change!). I will provide plenty of suggestions for talks, and you are welcome to find your own as well. Previously recorded lectures are ok provided that they are relatively recent (let's say recorded in 2020). For each talk, you should turn in a document that answers the following:

1) What was the talk about? Summarize the main points, and include details about parts you found especially confusing/interesting/motivating. Be sure to include the speaker's name, talk title, and date you attended.
2) How does the talk connect with our work in this class? Find as many ways as possible to connect the speaker's work with topics or ideas we have touched on.
3) How did the talk make you feel? This is a chance for me to hear a little bit about how you're doing during an unusual semester, framed through the lens of this topic.

The total document length should be between 500-750 words. You can turn these in at any time, but they will be less stressful if you space them out (and more helpful to me since I'll get to hear about how you're doing!).

Labs

Labs will be completed as part of our extended class time each week, likely from ~10.15-11.15am each day. You will work in groups to complete these 5 assignments, all of which can be done online without any special software. I recommend (but don't require) that you download Microsoft Excel, which is free from Macalester and runs on Mac or Windows. I find it easier to use, especially for graphs, than Google Sheets. Labs will be completed in teams of ~4 students; turn in one assignment per group. If you cannot attend lab synchronously, please see me ASAP.

Policy memo

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 Thursday, Oct. 22 at 10am CST (our scheduled exam time)**

Grading

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

Point distribution	
Participation	40
Problem sets (4 @ 25 points each)	100
Policy memo	100
Labs (5 @ 20 points each)	100
Speaker reflections (3 @ 20 points each)	60
TOTAL	400

Diversity

It is my intent that students from diverse backgrounds and perspectives be well served by this course, that students' learning needs are addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. I am committed to presenting materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. I appreciate your feedback on this and every aspect of our course, and your suggestions for ways to improve the effectiveness of the course for you personally or for other students or student groups.

Health and wellbeing

I encourage you to be intentional about maintaining your physical and mental health during every semester at Macalester, but especially this one. Taking care of yourself in these ways will help you to be healthier, happier, and better able to focus on your academic work. It will also keep us safer as a community. Be aware of people, situations and circumstances that help you to feel focused and engaged, as well as those that cause you stress; try to maximize the former, and eliminate the latter as much as possible. While every person is different, for most of us regular and adequate sleep, healthy meals, regular exercise, and connecting with others are all ways to foster wellness. If you find that you are having trouble maintaining your health and wellbeing, please don't hesitate to set up a time to talk with me, or with one of the many individuals or programs in the Hamre Center for Health and Wellness.

Accommodations

Your experience in this class is important to me, and I am committed to creating an inclusive and accessible learning environment**.** If you have already established accommodations with the Disability Services office, please communicate your approved accommodations to me as soon as possible so that we can discuss your needs in this course. If you have not yet established accommodations, but have a temporary health condition or permanent disability that requires accommodations (this includes but is not limited to: mental health, attention-related, learning, vision, hearing, physical or health impacts), please contact Disability Services to make an appointment: disabilityservices@macalester.edu or 651-696-6974. Disability Services offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s), and the Disability Services staff.

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**

Recording policy

In order to accommodate students who will not be able to attend synchronous class meetings during this module, I plan to record our synchronous class sessions in a manner consistent with Macalester's classroom recording policy. I will share these recordings on Moodle. If you download any class recordings, you must store them in a password-protected file or on a password-protected site. Please note that the recording policy clearly states that ***students may not share, replicate, or publish any class recording, in whole or in part, or use any of the recordings for any purpose besides knowing what happened during the class period, without my written approval.***