Climate Change in the 21st century

Earth's climate is changing rapidly. This seminar course focuses on the Intergovernmental Panel on Climate Change reports and associated scientific articles describing the predicted changes, their causes, and their impacts. Class includes discussions of scientific research, science communication, and science policy relevant for climate change and its impacts on society. We cover historical successes and failures of global regulation agreements. Students will present and write about both natural science and its impacts, including one op-ed relating to local issues. Assignments focus on improving written and verbal communication of science, with significant peer review. 3 credits, 3 class hours per week. Prerequisites are 1 English composition course and 1 year of a science (e.g. physics, chemistry, biology), or permission of the instructor.

Instructor

Dr. Jay Brett, email: office phone:

Office Hours:

Learning Objectives:

- Summarize a scientific journal article and opine on the effectiveness of its presentation.
- Describe the scientific processes involved in climate change using appropriate vocabulary
- Accurately identify the climate of a location in contrast to its weather
- Describe current and expected impacts of climate change and some options for mitigation and adaptation
- Recognize the relevance of climate change for current politics and media, and assess whether politicians and journalists are using modern science in their work
- Give impactful short presentations related to climate change
- Write clear, well-supported essays on climate change topics
- Describe the existing international efforts to reduce future climate change and its negative impacts and the process that lead to the Montreal Protocol, Kyoto Protocol, and Paris Agreement

Texts:

There is no textbook for this course. We will be reading reports by IPCC, plus 4 assigned journal articles (I will announce these when they occur) and other reports by the US government or the UN; I will provide pdf copies through the online system whenever possible. You will also be expected to read the news; we will discuss some resources that are free or that our school has subscriptions to in the first classes. You will also be expected to read additional journal articles cited in the IPCC reports, which may be accessible in the school library's online resources but may require the use of inter-library loan services. Come to office hours if you have trouble accessing any material.

Online portal:

You must be certain you can access the online portal (Moodle, Blackboard, Canvas, etc.) for this course, including the discussion forums. If you cannot get in today, let me know—you may be incorrectly registered, which needs to be fixed for you to succeed in the course.

Assignments:

Participation- you are expected to discuss material in class, ask and/or answer questions, and give feedback to your classmates on their written work and presentations. Attendance at most class meetings is required; missing 5 or more classes will give you a zero for participation. 9% of final grade.

Reading the news- bring at least 3 news articles and 2 op-eds on topics related to climate change to our attention in the online forum. When you add one, start a new thread and summarize the article in one paragraph, providing a link or (preferably) pdf. Reply to 10 or more of these after reading the associated articles, commenting on whether the relevant science matches that from class, whether the terms 'climate' or 'climate change' are being used correctly, whether the tone is alarmist or factual, etc. The goal is to be aware of the ongoing media conversation and to discuss whether that conversation is in good faith, is representing science well, and is practical or helpful for citizens. The op-eds will also serve as examples for writing one yourself. Graded for completeness, 10%.

Reading scientific journal articles- we will discuss 4 articles as a class. In advance, bring a summary of the article, a critique of its presentation, and your remaining questions; graded for completeness, 4%. Afterwards, write a 1-page essay incorporating the summary, answers to your questions, and an opinion on how well the authors presented their material. Graded, 12%.

Natural science essay- what has changed between reports? Choose a subtopic, read the section in both IPCC working group 1 AR4 and AR5, and at least 2 cited articles. Summarize the changes in the conclusions and the reasons for these changes- new methodology, new observations, etc. 5-minute presentation to the class with peer feedback, plus peer review of an essay draft. Graded, 10% essay, 5% presentation.

Climate description of 2 towns in different settings of your home state- use ground and satellite information to describe the seasonal cycle of temperature and precipitation for two towns/cities in different regions of a state. Plot the seasonal cycles and 2 individual years and write about the difference in weather and climate for the two locations. Present (10 minutes, peer feedback). After presentations, add a paragraph on whether the differences in geography explain the differences in climate based on any consistencies across other student's reports. Graded, 10% essay, 5% presentation.

Climate change impact and adaptation essay- from a topic covered in the IPCC SYR, find at least 1 article describing an experienced or expected impact and 1 on an option for adapting or mitigating this going forward. Introduce the impact and possibilities for mitigation or adaptation using SYR and news articles. Then summarize the two scientific articles and describe any

problems or needed future work. 5-minute presentation to the class. Peer review on both the presentation and a draft of the essay. Graded, 10% essay, 5% presentation.

Op-ed- write a short article proposing a plan of action for local (school, this town, or your hometown) community members to take in order to mitigate local impacts of climate change or reduce local greenhouse gas emissions. Peer review of written work. 4-minute presentations with peer feedback. Graded, 10% op-ed, 5% presentation.

Reflection paper with revised previous assignment- 2 pages on what you are taking away from this course (certain scientific understanding, writing skills, reading skills, presentation skills, hope or despair for the world, etc.) and whether it is what you expected, and 2-3 paragraphs on how you revised one assignment (one of the 2 essays, climate report, or op-ed) and its presentation. When revising, you may focus on content, presentation, or both. If the revisions improve your grade on that assignment, the new grade will replace the previous one for the written portion, presentation, or both. The reflection paper is 5% of the final grade.

Schedule:

Week	Class 1	Class 2
1	Syllabus, IPCC likelihood and certainty language, climate and weather read SYR preface	Earth system heat transport and reservoirs First news article postings
2	Discuss several news articles Earth system water reservoirs and transports read SYR 1.1-6	Observations of climate change, where to find climate and weather data Get data for climate description project
3	Data analysis examples Read your chosen sections of WG1 report	Observations of climate change, good presentation techniques Continue working on climate description
4	Introduction to scientific journal articles peer review and constructive comments Choose natural science essay topic	Climate description **presentations** Read article 1
5	Article 1 discussion climate description essays due read history.aip.org/history/climate/GCM.htm	Climate Modeling Read chosen sections of WG2 report read SYR 2.1-2.4
6	Climate change projections, atmospheres and oceans Peer review natural science drafts	Climate change projections, ecosystems and human impacts Revise natural science essays
7	Natural science **presentations**, essays due Read article 2	Article 2 discussion Read SYR 3.1-3.5
8	Adaptation and mitigation pathways Read SYR 4.1-4.5	Adaptation and mitigation Read chosen sections of WG3 report, choose impact essay topic
9	Land use change, energy source change Read history.aip.org/climate/internat.htm	Ozone hole, CFCs, Montreal Protocol Read the Montreal Protocol

10	Discussion of select op-eds Read article 3, choose op-ed topic	Article 3 discussion Peer review impact essays
11	*Holiday*	Impact **presentations**, essays due Read about Kyoto and Paris at https://unfccc.int/process-and-meetings
12	Kyoto Protocol and Paris Agreement Compute your carbon and water footprint	Individual "lifestyle" impacts Peer review op-eds
13	Op-ed **presentations** Read https://www.cbo.gov/publication/14387	Economic costs of climate change Op-eds due, read article 4
14	Article 4 discussion Work on reflection papers	Discussion of select news articles
15	Revised presentations	Reflection papers due

Policies

Late Assignments: Late assignments without prior approval lose 10% credit per day. Please talk to me in advance if you are having trouble. Talking in person is best, but email is okay.

Missing Class: If you miss class when no assignments are due, please get notes from a classmate. If assignments are due, you must let me know in advance that you are missing class. Illness, car trouble, and family emergencies are understood. If we are having a paper discussion or presentations, you must make up that work at a later date, and you must work with me on scheduling that immediately.

Academic Honesty: You are expected to discuss your work with your classmates. It is your responsibility to be certain you understand all aspects of the assigned work; discuss a process or an answer and write it out for yourself. Most of the assignments are essays; all sentences or phrases by other authors must be put in quotation marks and correctly cited.

Academic Accommodations: Academic accommodations are available for students who are registered with the Office of Accessibility. If you are registered with that office, please share with me your accommodations letter. If you have challenges that cannot be addressed through those means, please schedule a meeting with me and your academic advisor at the start of the semester.

Links to some course material

https://www.ipcc.ch/reports/
https://history.aip.org/climate/index.htm#contents
https://history.aip.org/history/climate/GCM.htm
https://www.cbo.gov/publication/14387
https://unfccc.int/process-and-meetings