

GEOG 3210/5210; ENVST 3210: Global Climate Change

General Education SF

Spring 2018

Professor: Andrea Brunelle, GC 4748, 585-5729, andrea.brunelle@geog.utah.edu
Office Hours: Tues/Thurs 12:30-1:30 (GC 4748) 3:20-4:00 (classroom area) and by appointment
TA: Tom Brussel, Wed/Fri 10:00 -11:30 (GC 4650), thomasbrussel@gmail.com
Prerequisite: Basic knowledge about Earth Systems and keen interest in learning more
Required Texts: Earth's Climate: Past and Future, William Ruddiman **3rd Edition** (you must have the 3rd edition!)
Also Required: Students must purchase a) a TurningTechnologies clicker (i.e., QT Device RCQR-01) and b) a subscription. Both are available at the bookstore. Students may opt to find clickers online and may search for them via ICN 9780997224801, which will bring them a bunch of options. Students with older clickers are encouraged to bring them to class and try them but there is no guarantee that these older models will work.

Course Web Page: <https://utah.instructure.com>

Grading:	Participation (quizzes and in-class exercises)	15%
	CO ₂ Research Project & Report	10%
	Current Topics Presentation	5%
	Exam I	30%
	Final Exam	40%

Course Description: Climate change has been occurring throughout Earth's history. Inherent processes such as the planet's tectonic activity, the Earth's relationship to the Sun and other extraterrestrial bodies, as well as atmospheric and hydrological processes have dictated an ever-changing climate pattern over a variety of time scales. Speciation, adaptation, migration, and extinction of living organisms have frequently resulted from climate changes, but the relatively recent evolution and expansion of humans around the globe has cast climate change in a new light. Humans are altering the atmosphere in an unprecedented manner, and stand to suffer greatly from even relatively minor alterations in climate. Yet the complexity of the issue, the inertia of industry and energy use, and the reluctance of policymakers to risk economic backlash has created a politically charged atmosphere surrounding the study of global climate change. In this class, students will be introduced to the methods and review the evidence used to study climate changes of the past, and will examine the data being used to forecast climate change into the future.

Learning Objectives: By the end of the semester you should understand: 1) the role of CO₂ in regulating the Earth's climate; 2) the long-term cycles of the Earth in and out of icehouse and greenhouse phases; 3) the cycles of glacial and interglacial periods within icehouse phases; 4) the effects of orbital variation on the Earth's climate, and 5) the current concern about climate change.

Class Policies:

Participation in is expected and will be reflected in your grade. Note: If you do not ATTEND you CANNOT participate. Reading assignments are expected to be completed BEFORE class and quizzes over the reading assignment or the previous lecture will occur each day. **There are NO make-up quizzes;** however the two lowest scores will be dropped. These quizzes will taken as individuals and in your groups, (you will be part of a group of 2-3 students) so be sure to attend class.

Once the student has their clicker and subscription code, they should go to the website below and follow the steps. This page will provide all instructions and information on how to manage your account, subscriptions and devices amongst other topics, or in other words, **how to properly register clickers.**

- <https://help.turningtechnologies.com> —> under “Student Account” click “All platforms” —> Student Account Profile

We will take “practice” quizzes the first three class periods. It is YOUR responsibility to make sure your clicker is properly registered and you are receiving scores. Grades will start counting toward your class grade on January 17th.

Current Topics in Global Change- Each group will be required to find an article (newspaper, magazine, journal) and present a 5-8 minute summary of their topic with at least one power point slide. **Time matters**, practice it. Check out the grading rubric available on Canvas. You will lose points if your presentation is too short or too long or if your group hasn’t practiced and balanced the presentation!

Exams- There will be two exams. These cannot be made up unless the instructor is contacted PRIOR to the absence, and then only at the discretion of the professor. If a make-up exam is offered, it may take any form and must be taken at the University Testing Center where a fee will be imposed.

Research Project & Report - You will be collecting data on carbon dioxide concentrations in the Salt Lake Valley. These points refer to the data collection and the report you will generate for your results. There is a document on Canvas describing the project in detail and we’ll go over it in class.

****Students taking 5210 will be held to a higher standard on the exams (greater depth of knowledge and more questions) and the report.****

Essential Learning Outcomes: ELO’s are skills that should be gained in general education coursework that prepare students to be “effective 21st century global citizens” (U of U General Education Guidelines). Through the discussions over the course of the semester and with assignments described above, we will specifically work on several of these outcomes and they will be incorporated and assessed as follows:

- *Critical Thinking and Reasoning*- Critical thinking and reasoning skills will be developed and employed on a daily basis through the presentation, discussion, and consideration of scientific data on climate change. These skills will be assessed during the in-class and online quizzes and on the exams which will include short answer and essay responses.
- *Inquiry and Analysis*- The CO₂ research project and report will require students to develop a research hypothesis, collect primary CO₂ data, organize and analyze those data and then report on implications of what they found in the context of emissions and climate on local and global scales. The report will be the assessment tool for this outcome.
- *Oral Communication* – Each group of 2-3 students will be required to present on a current topic related to global climate change. Students will prepare their own presentation but also observe other student presentations, learning what makes an effective presentation and what doesn’t. The presentation evaluation will be the instrument for assessing this outcome. In addition, peer reviews will be conducted to help students critically consider their peer’s presentations.
- *Written Communication* – Student written communication skills will be assessed and constructive feedback provided during the research report and on the written portions of the exams.
- *Teamwork* – Students must work in a team on their current topics presentation. This will be assessed during the presentation as the instrument (and student grade) includes a variable on group preparation and cohesion. In addition, several of the in-class quizzes will be taken in their groups and require teamwork.

***Incompletes will only be given at my discretion and only if the student is passing at the time.**

***You are responsible for all information presented in lecture and over the course website (Canvas).**

Preliminary Lecture & Reading Schedule (subject to change, WATCH Canvas FOR UPDATES!):

WEEK OF:	Topic	Reading
Jan 7	Introductions Climate Change Foundations	<i>Complete the syllabus quiz!</i>
Jan 14	Overview of Climate Science & Earth's Climate System Today Climate Archives, Data, and Models	Chapter 1 Chapter 2/3
Jan 21	CO ₂ and Long term Climate Continue Plate Tectonics and CO ₂	Chapter 4 Chapter 5
Jan 28	Greenhouse Earth Catchup & CO ₂ Project intro	Chapter 6
Feb 4	"Cracking the Ice Age" From Greenhouse to Icehouse	<i>Viewing Guide Quiz</i> Chapter 7
Feb 11	From Greenhouse to Icehouse Finish up and Review parts 1 & 2	Chapter 7
Feb 18	EXAM I (Andrea at PACLIM) Orbital Variations and Insolation	Chapter 8
Feb 25	Insolation Control of Monsoons Insolation Control of Ice Sheets	Chapter 9 Chapter 10
Mar 4	Orbital Scale Changes in CO ₂ and CH ₄ Orbital Scale Interactions	Chapter 11 Chapter 12
Mar 11	Spring Break!	
Mar 18	The Last Glacial Maximum Climate Since the Last Glacial Max	Chapter 13 Chapter 14
Mar 25	Humans and Preindustrial Climate Climate Changes in the last 1000 yrs	Chapter 16 Chapter 17
Apr 1	Climate Change since 1850 Global Dimming (Andrea at AAG)	Chapter 18 <i>Viewing Guide Quiz</i>
Apr 8	Warming in the last 125 years Current & Future Climate Change	Chapter 19 Chapter 20
Apr 15	Current & Future Climate Change Chasing Ice (Andrea in Bozeman)	Chapter 20 <i>Viewing Guide Quiz</i> CO₂ Monitoring report due 4/15 to Canvas by 5:00 pm!
Apr 22	Climate Change Implications What we can do+ Regina Pistilli from CCL	Pacala and Socolow 2004; Socolow 2011; 4 Degrees (on Canvas)
FINAL EXAM: Thursday, April 25, 2019 1:00 – 3:00 pm		

Additional readings may also be assigned as appropriate for the discussion topic

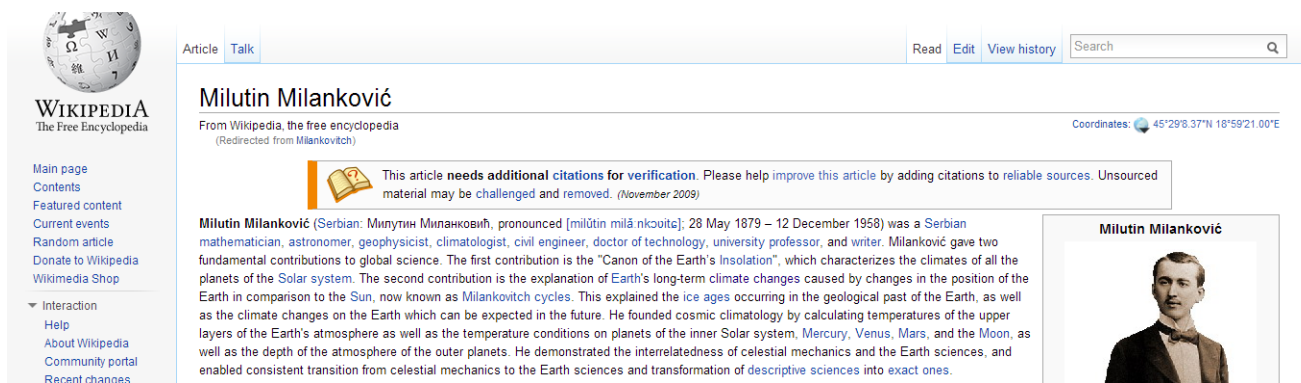
The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and I to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

"Some of the writings, lectures, films, or presentations in this course may include material that conflicts with the core beliefs of some students. Please review the syllabus carefully to see if the course is one that you are committed to taking. If you have a concern, please discuss it with me at your earliest convenience." - *Per Accommodations Policy, Office of Academic Affairs*

Geography Department Academic Misconduct Policy

Academic misconduct will not be tolerated. Penalties may include failure of an assignment, the entire course, and/or the filing of formal charges with appropriate university authorities. Academic misconduct includes, but is not limited to, cheating, misrepresenting one's work, and plagiarism:

- Cheating involves the unauthorized possession or use of information in an academic exercise, including unauthorized communication with another person during an exercise such as an examination.
 - Misrepresenting one's work includes, but is not limited to, representing material prepared by another as one's own work or submitting the same work in more than one course without prior permission of all instructors.
 - Plagiarism means the intentional unacknowledged use or incorporation of any other person's work in one's own work offered for academic consideration or public presentation.
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- When you gather information from any source (internet, book, newspaper, journal article, etc), you need to paraphrase. This means changing the words from the original source into your own. Even though the words are yours, the content is still from somewhere else, so it still needs a citation.
 - The way that I do this is I'll read something and make notes on what I read. Then I put the original source away and explain it using my words and notes.
 - You can take text directly from a source if you put the material in quotation marks, cite the source and the page number from the excerpt. However, I don't want to see any direct quotations in any of your work. I want paraphrasing with appropriate citations.
 - Here is a good and bad example of paraphrasing from the Wikipedia entry on Milutin Milankovitch.



The screenshot shows the Wikipedia article for Milutin Milanković. At the top, there is a navigation bar with 'Article' and 'Talk' tabs, and a search box. Below the title 'Milutin Milanković', it says 'From Wikipedia, the free encyclopedia' and '(Redirected from Milankovitch)'. A yellow warning box states: 'This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. (November 2009)'. The main text begins: 'Milutin Milanković (Serbian: Милутин Миланковић, pronounced [mǐlǔtin mǐlǎnkoʋit͡s]; 28 May 1879 – 12 December 1958) was a Serbian mathematician, astronomer, geophysicist, climatologist, civil engineer, doctor of technology, university professor, and writer. Milanković gave two fundamental contributions to global science. The first contribution is the "Canon of the Earth's Insolation", which characterizes the climates of all the planets of the Solar system. The second contribution is the explanation of Earth's long-term climate changes caused by changes in the position of the Earth in comparison to the Sun, now known as Milankovitch cycles. This explained the ice ages occurring in the geological past of the Earth, as well as the climate changes on the Earth which can be expected in the future. He founded cosmic climatology by calculating temperatures of the upper layers of the Earth's atmosphere as well as the temperature conditions on planets of the inner Solar system, Mercury, Venus, Mars, and the Moon, as well as the depth of the atmosphere of the outer planets. He demonstrated the interrelatedness of celestial mechanics and the Earth sciences, and enabled consistent transition from celestial mechanics to the Earth sciences and transformation of descriptive sciences into exact ones.' On the right, there is a portrait of Milutin Milanković.

BAD:

Milutin Milankovic was a Serbian mathematician who gave two fundamental contributions to global science. These include the "Canon of the Earth's Insolation" which characterizes the climates of all the planets in the solar system. The other contribution is the explanation of the Earth's long-term climate changes caused by the position of the Earth and Sun.

GOOD:

Milutin Milankovitch made many contributions to our understanding of the Earth's climate. He was widely trained in the Earth, Geological and Astronomical sciences but is best known as a Serbian mathematician and astronomer. His most important contribution was his explanation for the ice ages, which is based on changes in the Earth's relationship with the Sun, known as Milankovitch Cycles (Wikipedia, 2012).

References Cited

Wikipedia. Accessed Dec. 30, 2012. Milutin Milanković, <http://en.wikipedia.org/wiki/Milankovitch>