

GEOG 3215/5215
Climate change: impacts, adaptation and mitigation

Professor: Simon Brewer
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Gardner Commons, GC 4845

Class time and location: Tues/Thurs 2:00pm – 3:20pm
Gardner Commons, GC 3153
Office hours: 1:00pm-2:30pm Mon-Wed

Grading:

Exams	40pts
Final Project	60pts
Total	100pts

Course Description: One of the most widely discussed issues today is the future change in the Earth's climate, with predicted increases in global temperature and resulting effects on climate regimes world-wide. These changes will impact both natural and human systems through sea level rise, the displacement of populations, health issues and changing availability of resources. In this class we will review the expected future shifts in climate and study the expected impacts of these changes on physical, biological and social systems. With this knowledge, we will look at some of the methods that have been proposed to adapt to or mitigate these changes, including management and geoengineering of the Earth System. We will concentrate critically on the knowns and unknowns of future change and our ability to deal with it. Students will use this information to develop a report investigating the impacts of climate change and a potential solution to these for a single sector and/or region of the planet.

Course objectives: This course will introduce students to the range of issues and potential solutions related to the impacts of climate change on human and natural systems. The course will cover:

- A short review of the expected climatic changes for the next century and the models that are used for prediction.
- A discussion of the impacts of climate changes both present and future at global and regional scales.
- Proposed methods for coping with (adaptation) or reducing (mitigation) these impacts across multiple sectors.

Course materials:

- Suggested textbook:
 - Hawken, P. 2021. Regeneration: Ending the climate crisis in one generation. Penguin Books, New York, 256 pp.

- Other reading assignments may be given as the course progresses, including:
 - IPCC 6th Assessment Report Summary for Policy Makers
 - US National Climate Assessment (4th edition)
- Online materials
 - This course will use the Canvas system to provide students with access to course announcements, lecture note outlines, and other course-related materials, and for assignment submission. It is your own responsibility to check the site periodically to obtain necessary information in a timely manner.

Assessment:

- Climate change report
 - Students will be required to put together a report describing the impacts of future climate change for a single region of the planet, based on material covered in class and in the interactive lab session.
 - The report should include the following elements for the region of choice:
 - Estimates of changes in demographics
 - Estimates of future changes in temperature and precipitation
 - A discussion of one physical, biological impact or social impact linked to these changes
 - A discussion of possible adaptation strategies to this impact
 - Assessment will take part in three parts
 - A short proposal (5pt; due October 6th)
 - A written report (45 pts; due December 14th). Reports should be 8-10 pages, including figures and citations.
 - A presentation introducing your topic (10 pts; presentations will be scheduled in the second half of the semester). This should present a short background to the specific impact and sector you are interested in.
 - Material and methods for each of the report elements will be introduced over the course of the semester.
- Exam (2 x 20 pts.)
 - There will be two exams: the first exam before Fall break, and the second during the final week of class.
 - Both exams will be based on multiple-choice questions and short answers and will cover material presented during the semester.
 - No “make-up” exams will be given; notify the instructor at least two weeks in advance of a scheduled exam date if an alternative date is necessary.
- Letter grades will be assigned following the scheme provided below, using .5 as the break point:

A	95+	C+	70~74
A-	90~94	C	65~69

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B+	85~89	C-	60~64
B	80~84	D	50~59
B-	75~79	E	~49

Course schedule:

The tentative schedule of the course and associated reading assignments are listed in the table below. Please note that this schedule is subject to change in the event of extenuating circumstances (e.g. a global pandemic).

Week	Date	Topic	Subject
1	22-Aug		<i>Intro to class</i>
		Climate changes	Climate change: what do we know?
2	29-Aug		Climate models
			Socio-economic scenarios
3	5-Sep		Projected future climate
			Climate impacts I
4	12-Sep		Climate impacts II
			Adaptation or mitigation?
5	19-Sep	Sectors	Oceans I
			Oceans II
6	26-Sep		Water supply
			Forests I
7	3-Oct		Forests II
			Exam 1
8	10-Oct		<i>Fall break</i>
			<i>Fall break</i>
9	17-Oct		Wilding
			Land
10	24-Oct		People I
			People II
11	31-Oct		The city
			Health
12	7-Nov		Food I
			Food II
13	14-Nov	Solutions	Energy I
			Energy II
14	21-Nov		Industry
			Mitigation potential
15	28-Nov		Geopolitics and climate change

			<i>Thanksgiving</i>
	5-Dec		Geoengineering
			Exam 2

Class policies:

- Evaluation-related policies
 - Individual extra credit will not be assigned.
 - There will be no “make-up” exams, quizzes, or assignments.
 - An “incomplete” grade will be given only in extreme cases when conditions beyond the student’s control require an extended period of absence.
 - Any assignments, including the final project report, submitted to the instructor after its due date will be worth only half of the earned points.
 - Materials to be turned into the instructor must be typed.
 - Students are encouraged to help each other in their work. However, final products turned into the instructor must display evidence of individual initiative and creativity. If not, no credits will be given to the particular work.
- Attendance
 - Full attendance is strongly recommended. The content of the course is often progressive, meaning you must know the material from previous class meetings in order to understand subsequent material. When missing classes, students are responsible for seeking for help to catch up with the class progress in a timely manner, if they need to.
- Email correspondence
 - Students must copy themselves on any email to the instructor to ensure documentation of submission date and time. Doing so will assist the student when system outages occur.
 - Senders must also validate that all files are in readable format. Corrupted files are the responsibility of the sender and corrupted-file assignments will be marked as late
- Cell phones
 - Please turn off your cell phones or use vibrate/silence mode during class meetings.
- Student responsibilities
 - All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook of the University of Utah (<http://www.acs.utah.edu/sched/handbook/toc.htm>). Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and

Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.

- Liability warning
 - Students are responsible for all activities on their computer accounts. Keep your user name and password confidential.

AI / LLM statement:

Large language models (LLMs, e.g. ChatGPT) may be used in the preparation of your final project reports. However, if you choose to use an LLM, you must submit an accompanying document that details which sections were generated by the LLM, the prompt used to generate the text and which LLM was used. You should also include a brief discussion and criticism of the text produced including, but not limited to, a statement about the accuracy of the text, the level of detail obtained and any adjustments or edits you subsequently made. All project reports will be submitted to an online service to detect AI-generated text. Any project that was detected as using AI, but does not have the accompanying text will not be graded.

COVID19 statement:

University leadership has urged all faculty, students, and staff to model the vaccination, testing, and masking behaviors we want to see in our campus community. These include:

- Vaccination
- Masking indoors
- If unvaccinated, getting weekly asymptomatic coronavirus testing

Vaccination:

- Get a COVID-19 vaccination if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks.
- Many in the campus community already have gotten vaccinated:
 - More than 80% of U. employees
 - Over 70% of U. students
- Visit <http://mychart.med.utah.edu/>, <http://alert.utah.edu/covid/vaccine>, or <http://vaccines.gov/> to schedule your vaccination

Masking:

- While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.
 - Check the CDC website periodically for masking updates: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html>

- Treat masks like seasonal clothing (i.e. during community surges in COVID transmission, masks are strongly encouraged indoors and in close groups outside).

Testing:

- If you are not yet vaccinated, get weekly asymptomatic coronavirus tests. This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others.
 - Asymptomatic testing centers are open and convenient:
 - Online scheduling
 - Saliva test (no nasal swabs)
 - Free to all students returning to campus (required for students in University housing)
 - Results often within 24 hours
 - Visit alert.utah.edu/covid/testing
- Remember: Students must self-report if they test positive for COVID-19 via this website: <https://coronavirus.utah.edu/>.

Student Mental Health Resources

- Rates of burnout, anxiety, depression, isolation, and loneliness have noticeably increased during and following the pandemic. If you need help, reach out for [campus mental health resources](#), including counseling, trainings and other support.
- Consider participating in a [Mental Health First Aid](#) or other [wellness-themed](#) training provided by our Center for Student Wellness and sharing these opportunities with your peers, teaching assistants and department colleagues.

ACADEMIC MISCONDUCT SYLLABUS STATEMENT

- 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.

As the only institution in the state classified in the highest research category (R1), at the University of Utah you will have access to state-of-the-art research facilities and be able to be part of the knowledge creation process. You will have the opportunity to do

research of your own with faculty who are leading experts in their field, engaging in programs that match your research interests. Further, you will interact with and often take classes with graduate students that provide an advanced understanding of the knowledge in your field.

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 this class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD) 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.

Undocumented Student Support. Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. **Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence.** The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. **To learn more, please contact the Dream Center at 801.213.3697 or visit dream.utah.edu.**

Safety & Wellness. Your safety is our top priority. In an emergency, dial 911 or seek a nearby emergency phone (throughout campus). Report any crimes or suspicious people to **801-585-COPS (801-585-2677)**; this number will get you to a dispatch officer at the University of Utah Department of Public Safety (DPS; dps.utah.edu). If at any time, you would like to be escorted by a security officer to or from areas on campus, DPS will help — just give a call.

The University of Utah seeks to provide a safe and healthy experience for students, employees, and others who make use of campus facilities. In support of this goal, the University has established confidential resources and support services to assist students who may have been affected by harassment, abusive relationships, or sexual misconduct. A detailed listing of University Resources for campus safety can be found at <https://registrar.utah.edu/handbook/campussafety.php>

Your well-being is key to your personal safety. If you are in crisis, call **801-587-3000**; help is close. The university has additional excellent resources to promote emotional and physical wellness, including the Counseling Center (<https://counselingcenter.utah.edu>), the Wellness Center (<https://wellness.utah.edu>), and the Women's Resource Center (<https://womenscenter.utah.edu>). Counselors and advocates in these centers can help guide you to other resources to address a range of issues, including substance abuse and addiction.

*To report suspicious activity or to request a courtesy escort, call campus police at **801-585-COPS (801-585-2677)**. You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.*