

**GEOGRAPHY FINAL COURSE OUTLINE: FALL 2021**

**GEOGRAPHY 503  
GFC HOURS (3-0)  
Climate Change**

Section	Days	Time	Location
LEC 01	n/a	n/a	Web-based, asynchronous

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Email communication will be through your UCalgary email address.	Office hours: Virtual Office hours: Wednesdays, 14:00-16:00

The **Department of Geography** condemns the longstanding and continued injustices against those marginalized by racism, sexism, homophobia, transphobia, classism, xenophobia, able-bodied normativity, mental health profiling, and other forms of prejudice. We are pained by the fact that injustices are unevenly borne. <https://arts.ucalgary.ca/news/anti-racism-statement>

**Territorial Acknowledgement**

The Department of Geography would also like to acknowledge the traditional territories of the people of the Treaty 7 region in southern Alberta. The City of Calgary is also home to Métis Nation of Alberta, Region III. <https://www.ucalgary.ca/indigenous/cultural-protocol>

**Official Course Description:**

Overview of global climate dynamics and interactions between the ocean, atmosphere, biosphere, cryosphere and biogeochemical cycles. Analysis of climate change in Earth's past, present and future, examining both natural and anthropogenic influences on global climate.

**Course Objectives:**

Students will learn the fundamentals of the climate system and the underlying thermodynamics of global climate change on geological and anthropogenic timescales. By the end of the course, students will be equipped to think critically about climate change theories, media stories, and web content, and be able to understand and distinguish between climate change science, policy, and politics. Students will be able to discuss and analyze how climate change influences and impacts a broad spectrum of societal and environmental systems.

**Course Learning Outcomes:**

The Department of Geography is committed to student knowledge and skill development. The table below lists the key learning outcomes for this course, the program-learning outcomes they facilitate and the expected level of achievement.

Course Learning Outcomes	PLO(s)	Level(s)
Explain the essential physical, chemical, biological, and geological processes that govern Earth's climate.	2	3
Explain natural vs. anthropogenic influences on Earth's climate, and the nuanced superposition of these processes.	2, 5	3
Students should be able to explain how climate change in Earth's past informs us about future climate change, and ways in which it is not relevant.	2, 4	2
Students are expected to demonstrate independent research skills and resourcefulness in examining climate change scenarios.	7, 3	2
Students should be able to critically discuss and debate societal and policy issues concerning future climate change.	1	2
Students should be equipped to critically evaluate public and media discussions on climate change science.	1, 8	3

Students should be able to apply a solid understanding of climate science into their broader geography program and their workplace projects.	2, 5	3
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\*PLOs = Program Learning Outcomes: 1 = reflect and communicate diverse human-environment perspectives, 2 = identify and explain human-environment processes, 3 = implement sampling, data collection, analyses and communication methods, 4 = analyze spatial and temporal aspects of human-environment systems, 5 = employ knowledge, arguments, and methodologies for solving human-environment problems, 6 = evaluate geospatial data and manipulate it to create cartographic products, 7 = communicate geographic concepts using oral, written, graphic, and cartographic modes, and 8 = demonstrate literacy skills.

\*\*Levels: 1 = Introductory, 2 = Intermediate, and 3 = Advanced.

### **Prerequisites**

3 units from Geography 305 or 408. Some comfort and background in mathematics will be helpful.

### **Learning Resources:**

Required Text: Dessler, A. Introduction to Modern Climate Change, 2nd Edition (2016). Cambridge University Press. ISBN: 9781107480674. Earlier editions are fine.

Attendance at office hours is not required, but will be a good forum for class discussions. The instructor is available by email and for one-on-one Zoom meetings on request.

### **Assessment Methods**

Weekly Reflections:	15%
Quizzes (4 @ 10%):	40 %
Assignments (3 @ 15%):	45 %

There is no final examination for this course.

Students are not required to pass all components of the course to pass the course as a whole.

Late policy: late assignments will be assigned a penalty of 10% per day.

### **Grading System**

The grading system will follow the following:

93–100	A+	74–78	B	60–63	C-
86–93	A	70–74	B-	55–60	D+
82–86	A-	67–70	C+	50–55	D
78–82	B+	63–67	C	0–50	F

These grades map onto the official grading scheme of the university (see [F.1.1 Undergraduate Grading System](#) in the University Calendar):

A+	4.00	Outstanding performance
A	4.00	Excellent performance
A-	3.70	Approaching excellent performance
B+	3.30	Exceeding good performance
B	3.00	Good performance
B-	2.70	Approaching good performance
C+	2.30	Exceeding satisfactory performance
C	2.00	Satisfactory performance
C-	1.70	Approaching satisfactory performance.
D+	1.30	Marginal pass. Insufficient preparation for subsequent courses in the same subject
D	1.00	Minimal Pass. Insufficient preparation for subsequent courses in the same subject.
F	0.00	Failure. Did not meet course requirements.

### **Flexible Grade Option (CG Grade)**

<https://www.ucalgary.ca/pubs/calendar/current/f-1-3.html>

## **Additional Course Information**

There are no expectations or requirements for real-time or live (Zoom) participation, and new material will not be taught during the weekly Zoom office hours, but class discussions are anticipated during these calls and you will profit by attending some of these. These calls will be recorded and will be available to students on request.

You will have 30 minutes to complete your quizzes, once you begin, but you will be given a 24-hour time window to complete the quizzes, to give flexibility around your schedules. Quizzes will be held on D2L – students will need a reliable internet connection. In the event that a student misses a quiz or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration may be requested <https://www.ucalgary.ca/pubs/calendar/current/m-1.html>. Please refer to <https://www.ucalgary.ca/registrar/registration/appeals/student-faq> for frequently asked questions concerning the provision of a medical note/statutory declaration.

## **Anticipated Course Content (Weekly)**

*Week 1, Sept 6: Introduction and Review of Earth's Atmosphere*

- Weather vs. climate; climate variability vs. climate change
- A brief perspective on recent climate change
- Basic structure of the atmosphere
- Atmospheric dynamics: forces and winds
- Global circulation systems

*Week 2, Sept 13: Radiative Transfer and Energy Balance*

- Characteristics of energy in the Earth system
- Shortwave and longwave radiation
- Earth's energy balance
- A simple point model for Earth's temperature

*Week 3, September 20: The Oceans*

- Overview of physical oceanography: chemistry, geography and physical properties of the world's oceans; waves, tides and currents
- Ocean dynamics: forces, global currents, thermohaline circulation
- Ekman fluxes, upwelling, and phytoplankton blooms
- **Quiz 1, Friday, September 24 (30 minutes; submissions open from 00:00-24:00)**

*Week 4, September 27: Ocean-Atmosphere Modes*

- El Niño Southern Oscillation as an example of coupled ocean-atmosphere dynamics
- The North Atlantic, Arctic, and Pacific Decadal Oscillations
- General comments on spatial patterns of climate variability

*Week 5, October 4: The Global Carbon Cycle*

- Natural and human emissions of carbon dioxide
- The marine carbon cycle
- Carbon sources and sinks on geological time scales

*Week 6, October 11: The Cryosphere and Land Surface Processes*

- Sea ice and seasonal snow
- Glaciers and the Antarctic and Greenland Ice Sheets
- Role of land surface processes in climate dynamics
- Interactions between ocean, atmosphere, and terrestrial systems
- The hydrological cycle
- **Quiz 2, Friday, October 15 (30 minutes; submissions open from 00:00-24:00)**

*Week 7, October 18: Climate Forcing and Feedbacks*

- Natural and anthropogenic forcing of the climate system
- Climate feedbacks: albedo, water vapour, land surface changes

*Week 8, October 25: Climate Change on Geological Timescales*

- Climate proxies: how do we measure current and past climate?
- A brief look at climate change in the deep (geologic) past
- A brief look at glacial ('Ice Age') cycles

*Week 9, November 1: Recent Climate Change*

- Climate change in the past millennium
- Observations of recent change: atmosphere, ocean, ice, sea level, CO<sub>2</sub>
- **Quiz 3, Friday, November 5 (30 minutes; submissions open from 00:00-24:00)**

*Week 10, November 8: Reading Week*

*Week 11, November 15: Future Climate Change and Societal Impacts*

- Anthropogenic vs. natural forcing of recent climate change
- Climate modelling and the basis of IPCC scenarios
- Changing weather: storms, the hydrological cycle
- Changing oceans: global sea level, acidification, coral reefs
- Changing lifestyles: agriculture/food security; social impacts; health

*Week 12, November 22: Managing Climate Change*

- The challenges of climate change management: mitigation, adaptation, geoengineering
- **Quiz 4, Friday, November 26 (30 minutes; submissions open from 00:00-24:00)**

*Week 13, November 29: Climate Change Policy I:*

- The challenges of carbon management: carbon taxes, cap and trade
- The UNFCCC climate change effort
- **Student presentations (Zoom videos to be posted) on climate change mitigation and adaptation.**  
**Students for this week (half the class) will need to post their videos by 08:00 on Monday, November 29.**

*Week 14, December 6: Climate Change Policy II:*

- The UNFCCC effort, continued: the Kyoto Protocol and Paris Agreement
- Climate change policy in Canada
- **Student presentations (Zoom videos to be posted) on climate change politics and policy.**  
**Students for this week (half the class) will need to post their videos by 08:00 on Monday, December 6.**

**Exams & Deferrals** <https://www.ucalgary.ca/registrar/exams>

**Human subjects**

Students in the course will not participate as subjects or researchers on human subjects.

**Supplementary Fees**

There are no supplemental fees.

**Referencing Standard**

In written work presented in this class, the accepted method for referencing the work of others will be the Chicago Manual of Style: <https://www.chicagomanualofstyle.org/home.html>

**Important Dates**

The last day to drop this course and receive a tuition fee refund is **Thursday, September 16<sup>th</sup>, 2021**. The last day to withdraw from this course is **Thursday, December 9<sup>th</sup>, 2021**.

For additional detailed course information posted by the instructor, visit the course Desire2Learn page online at <https://d2l.ucalgary.ca/d2l/home>.

### **University of Calgary Academic Integrity Policy**

Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. The University Calendar includes a statement on the principles of conduct expected of all members of the university community (including students, faculty, administrators, any category of staff, practicum supervisors, and volunteers), whether on or off university property. This statement applies in all situations where members of the university community are acting in their university capacities. All members of the university community have a responsibility to familiarize themselves with the principles of conduct statement, which is available at: [www.ucalgary.ca/pubs/calendar/current/k.html](http://www.ucalgary.ca/pubs/calendar/current/k.html).

### **Plagiarism, Cheating, and Student Misconduct**

The University of Calgary is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect.

Academic dishonesty is not an acceptable activity at the University of Calgary, and students are **strongly advised** to read the Student Misconduct section in the University Calendar at: [www.ucalgary.ca/pubs/calendar/current/k-3.html](http://www.ucalgary.ca/pubs/calendar/current/k-3.html). Often, students are unaware of what constitutes academic dishonesty or plagiarism. The most common are (1) presenting another student's work as your own, (2) presenting an author's work or ideas as your own without adequate citation, and (3) using work completed for another course. Such activities will not be tolerated in this course, and students suspected of academic misconduct will be dealt with according to the procedures outlined in the calendar at: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-procedure>

For students wishing to know more about what constitutes plagiarism and how to properly cite the work of others, the Department of Geography recommends that they attend Academic Integrity workshops offered through the Student Success Centre: <https://www.ucalgary.ca/student-services/student-success/learning/academic-integrity>

### **Instructor Intellectual Property**

Information on Instructor Intellectual Property can be found at <https://www.ucalgary.ca/legal-services/university-policies-procedures/intellectual-property-policy>

### **Freedom of Information and Protection of Privacy**

Freedom of Information and Protection of Privacy (FOIP) legislation in Alberta disallows the practice of having students retrieve assignments from a public place, such as outside an instructor's office, the department office, etc. Term assignments will be returned to students individually, during class or during the instructor's office hours; if students are unable to pick up their assignments from the instructor, they must provide the instructor with a stamped, self-addressed envelope to be used for the return of the assignment.

### **Posting of Grades and Picking-up of Assignments**

Assignments and quizzes will be submitted and graded through the course D2L webpage. Grades and assignments will not be available at the Department of Geography's main office and assignments cannot be dropped off at the Department Office.

### **Academic Accommodations**

It is the student's responsibility to request academic accommodations, according to the university policies and procedures listed in the University Calendar.

The student accommodation policy can be found at: <https://www.ucalgary.ca/pubs/calendar/current/b-6-1.html>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/university-policies-procedures/accommodation-students-disabilities-procedure>

Students needing an accommodation based on a protected ground other than disability should communicate this need, preferably in writing to their instructor or the Department Head (email: [freeman@ucalgary.ca](mailto:freeman@ucalgary.ca)).

### **Learning Technologies and Requirements**

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology.

- A computer with a supported operating system, as well as the latest security and malware updates

- A current and updates web browser
- Webcam (built in or external)
- Microphone and speaker (built in or external) or headset with microphone
- Broadband internet connection

### **Timed Assessments for Online and Blended Courses**

If you are unable to connect online during a timed assessment (Quiz), alternative times can be arranged.

Student presentations in the last two weeks of class will be asynchronous. You will be asked to pre-record a video of yourself presenting a topic, to be uploaded on D2L. It is up to you if you wish to include video of yourself or just a voiceover of you presenting a powerpoint (or other) presentation on the topic. If you are not comfortable with being recorded, contact the instructor and you can contribute a written paper in lieu of the presentation.

### **Guidelines for Zoom Sessions**

Zoom is a video conferencing program that will allow us to meet at specific times for a “live” video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published with the instructor’s permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith and respect (as per the [Code of Conduct](#)). When entering Zoom or other video conferencing sessions (such as MS Teams), you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behavior in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g. Student Non Academic Misconduct Policy). If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your Zoom sessions visit: <https://elearn.ucalgary.ca/guidelines-for-zoom/>.

If you are unable to attend a Zoom session, please contact your instructor to arrange an alternative activity for the missed session (e.g., to review a recorded session). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (for group work, presentations, etc.).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

### **Media Recording (if applicable)**

Please note that Zoom office hours will be recorded. The University policy on media recording can be found here: [https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP\\_FINAL.pdf](https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf)

### **Course evaluations and student feedback**

Student feedback will be sought at the end of the course through the standard University Student Ratings of Instruction (USRI) and Faculty course evaluation forms. The instructor welcomes informal feedback throughout the Fall Semester, to be responsive to student suggestions to improve the delivery.

### **Accessibility**

The lecture material will be both oral and visual. Recordings will be through Zoom, which does not provide closed captioning.

### **Copyright Legislation**

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright <https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy> and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Act.

### **Wellness and Mental Health Resources**

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness, and academic success and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support, or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy website (<http://www.ucalgary.ca/mentalhealth/>).

Students requiring assistance are encouraged to email the **Student at Risk line** if they or others appear to need wellness assistance: [sar@ucalgary.ca](mailto:sar@ucalgary.ca) For more immediate response, please call: 403-210-9355 and select option #2.

### **Sexual Violence Policy**

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

### **Contact Information for Student and Faculty Representation**

- Student Union VP Academic 403-220-3911, [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca)
- Students Union Representatives for the Faculty of Arts – 403-220-3913, [arts1@su.ucalgary.ca](mailto:arts1@su.ucalgary.ca), [arts2@su.ucalgary.ca](mailto:arts2@su.ucalgary.ca), [arts3@su.ucalgary.ca](mailto:arts3@su.ucalgary.ca), [arts4@su.ucalgary.ca](mailto:arts4@su.ucalgary.ca)
- Student Ombuds Office information can be found at: [www.ucalgary.ca/ombuds/](http://www.ucalgary.ca/ombuds/)

### **Emergency Evacuation/Assembly Points**

The course does not require presence on campus.

### **Campus Safewalk**

Campus Security, in partnership with the Students' Union, provides the Safewalk service, 24 hours a day, to any location on Campus, including the LRT station, parking lots, bus zones, and university residences. Contact Campus Security at 220-5333 or use a help phone, and Safewalkers or a Campus Security officer will accompany you to your campus destination.