

Climate Change Syllabus

Department of Physics & Atmospheric Science

PHYC/OCEA/GEOG 2800 Fall 2023

Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledges held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.

Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.

Course Instructor(s)

Name	Email	Office Hours
Manuel Helbig	manuel.helbig@dal.ca	Scheduled via email

Course Description

The workings of the Earth's climate system are examined and then applied to help understand contemporary climate change. The role of numerical climate models is discussed with the aim of interpreting climate change projections for the coming decades. Finally, the impacts of climate change are studied with a focus on the various mitigation and adaptation strategies needed.

Course Prerequisites

None. The science needed to understand climate change will be presented in the lectures.

Course Exclusions

ECON2850, PHYC2850

Student Resources

Teaching assistants will be available during their office hours to discuss any questions regarding the lecture content. Office hours and contact details for teaching assistants will be shared with students during the first lecture and on Brightspace.

Course Structure

Course Delivery

In-person lectures (lectures can be recorded upon individual requests)

Lectures

Mon, Wed, Fri from 11:35am to 12:25pm in the Killam Library MacMechan Auditorium starting Sept 6, 2023

Laboratories

None

Tutorials

None

Course Materials

- All course material will be posted on the Brightspace course website.
- Suggested textbook
 - o Introduction to Modern Climate Change by Andrew E. Dessler, 3rd Edition Cambridge University Press, 2022, ISBN 978-1-108-79387-2
 - o IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, In press, doi:10.1017/9781009157896. (available online: <https://www.ipcc.ch/report/ar6/wg1/>)

Assessment

Assignments

<i>Assessment</i>	<i>Weight</i>	<i>Dates</i>
8 Assignments	40% (each 5%)	Due: Wed Sep 20, 27, Oct 4, 11, 25, Nov 1, 15, 22

Final exam

- The final exam (35% of final grade) will be held during the exam period and will be scheduled by the Registrar.

Midterm exam

- The midterm exam (25% of final grade) will be held on Wed Oct 18 in class (duration: 50 minutes). If the grade for the final exam is higher than for the midterm exam, the final exam grade will be weighted 60%.

Conversion of numerical grades to final letter grades follows the

<u>Dalhousie Grade Scale</u>			
A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (0-49)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies on Missed or Late Academic Requirements

No make-up dates for midterm and final exam.

Late Assignments will lose 10% of value per day.

If the midterm is missed for health reasons (Student Declaration of Absence Form is required) only the final exam will count for 60% of the final grade.

Course Policies related to Academic Integrity

All submitted work must be done by individual students without collaboration.

Where possible, plagiarism software will be used to identify cases of copying work from uncited sources.

Generative AI and large language models (e.g., ChatGPT) cannot be used for assignments.

Learning Objectives

After completing the course, students are expected to:

- understand the basic science explaining the causes of climate change,
- be able to interpret climate projections and their impacts,
- assess climate mitigation and adaptation pathways,
- understand relevance of uncertainty quantification for climate policy support.

Course Content

Below is a list of lecture topics along with an approximate schedule of their delivery.

Week	Date	Lesson Topic(s)	Assessment
1	Sep 5-8	Evidence of climate change	-
2	Sep 11-15	Radiation and energy imbalance	-
3	Sep 18-22	Regional climates	Assignment 1
4	Sep 25-29	Greenhouse gases & the carbon cycle	Assignment 2
5	Oct 2-6	Methane and nitrous oxide	Assignment 3
6	Oct 11-13	Water cycle	Assignment 4
7	Oct 16-20	Aerosols and climate	Midterm exam
8	Oct 23-27	Radiative forcing & climate feedbacks	Assignment 5
9	Oct 30-Nov 3	Climate models	Assignment 6
10	Nov 6-10	Climate projections / Climate impacts	Assignment 7
11	Nov 13-17	Fall Study Break	-
12	Nov 20-24	1.5 °C warming goal	Assignment 8
12	Nov 27-Dec 1	Climate mitigation	-
13	Dec 4-6	Summary / Q&A	-

University Policies and Statements

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or elders@dal.ca. Additional information regarding the Indigenous Student Centre can be found at:

https://www.dal.ca/campus_life/communities/indigenous.html

Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about-dal/internationalization.html>

Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre

(https://www.dal.ca/campus_life/academic-support/accessibility.html) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (<https://www.dal.ca/about-dal/agricultural-campus/student-success-centre.html>)

Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <http://www.dal.ca/cultureofrespect.html>

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Fair Dealing Policy

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at: https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy-.html

Originality Checking Software

The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. Additional information regarding Originality Checking Software can be found at: https://www.dal.ca/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html

Student Use of Course Materials

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.