

GEOGRAPHY AND ENVIRONMENTAL STUDIES
Carleton University

COURSE OUTLINE – Winter 2021

COURSE: **Climate and Atmospheric Change - GEOG 3105A**

INSTRUCTOR: **Andrew M. Davidson**
Email: andrew.davidson@carleton.ca

OFFICE HOURS: After virtual class.

TEACHING ASSISTANTS: TBD

PREREQUISITES: GEOG 2013

LECTURES:	Day	Time	Location
	Mondays	18:05 - 19:55	Virtual via Zoom (synchronous)

LABORATORY:	Day	Time	Location
	Wednesday	11:35 - 13:25	Virtual via Zoom (synchronous)
	Wednesday	14:35 - 16:25	Virtual via Zoom (synchronous)

COURSE DESCRIPTION:

The global climate system, with emphasis on global change variability over the historical and modern periods; the changing composition of the atmosphere and its impact on climate; analysis and interpretation of climatic and atmospheric data; modeling of climate systems (*from Carleton University, Undergraduate Calendar*).

Although the Earth's climate has varied appreciably in the past due to natural forcing, human activities are increasingly contributing to climate warming. Since the Earth's climate system is interlinked with many biophysical processes on the planet, climate change has important repercussions. This course will examine climate and atmospheric change from a scientific perspective. We will look at proxy evidence of past climate change followed by historical and instrumental records, which reveal recent and current climate variability, and then models, which enable the projection of future climates under certain scenarios. Students will gain an understanding of the relative importance of climate forcing factors and feedbacks as well as an appreciation of the uncertainties and outstanding debates in climate science. The focus of this course is how and why our climate changes from an interdisciplinary scientific perspective. However, we will take some time to examine some implications and impacts of climate change as well as the interface between science, the media, the public and policy.

COURSE OBJECTIVES:

The aim of this course is to give students a solid grounding in the science of climate change. By the end of the course, students will be able to separate scientific facts from personal opinions and will be prepared to participate in solving one of the most pervasive environmental issues and great challenge of our time.

COMMUNICATION:

This course uses cuLearn, Carleton's learning management system. To access your courses on cuLearn go to <http://carleton.ca/culearn>. For help and support, go to <http://carleton.ca/students>. Any unresolved questions can be directed to Computing and Communication Services (CCS) by phone at 613-520-3700 or via email at ccs.service.desk@carleton.ca

Private correspondence with the Instructor and Teaching Assistants should be through a Carleton email account (this is accessible in cuLearn). The Instructor will check email and cuLearn every 24 hours and do their best to respond to queries within 48 hours. Information on cuLearn or sent via email will be considered to have been provided to all students within 24 hours of posting and students will be fully responsible for reading and responding appropriately to this information.

COURSE STRUCTURE:

A one term course with lectures, 5 assignments, and a term paper.

TEXTBOOK/READINGS:

Required reading:

IPCC, 2013: *Summary for Policymakers*. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom. (available online for free http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf)

Recommended reading:

Dessler, A.E. 2012: *Introduction to Modern Climate Change*. Cambridge University Press, Cambridge, United Kingdom. ISBN 978-0-521-17315-5.

White, R. 2010. *Climate Change in Canada*. Oxford University Press, Oxford, United Kingdom. ISBN-13: 9780195430608.

Recommended supplemental reading:

Intergovernmental Panel on Climate Change (IPCC). 2013. Climate Change 2013: The physical science basis. Cambridge University Press, Cambridge, United Kingdom. (available online for free http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf) Lots of pages (>1500) but the **Technical Summary** is an excellent starting point.

Other materials (articles, etc.) that may be highlighted during the lectures will be available through cuLearn.

ASSIGNMENTS/EXERCISES:

There will be 5 assignments/exercises to be submitted during the term:

- 1) You will be asked to produce an outline of your term paper and summarize a journal article. (This will follow a session where you will learn how to search for literature).
- 2, 3 and 4) You will explore recent and modeled future climates and interpret your findings using spreadsheet software and resources on the internet.
- 5) You will read several papers and come ready to discuss these in a seminar and write a report.

Assignments must be typed and handed-in on cuLearn. Assignments that are late (even by one second) will be accepted with a penalty. For each day that assignments 1-5 are late (rounding up to the nearest day), 2 marks will be deducted from your *final course grade*. Assignments later than 4 days will not be accepted.

TERM PAPER:

Students will write a research paper on a topic related to the course material. Students are expected to research the topic thoroughly and follow standard guidelines for academic paper writing, including proper referencing. Detailed instructions will be provided at a later date. Final papers will be due on cuLearn by **23:55 on April 14**. They should be no more than 2500 words of text (excluding figures, tables, references, etc.). Term papers that are late will be accepted with a penalty. Term papers 1 day late will be deducted 2 marks from your *final course grade*. Term papers later than 1 day will not be accepted.

Students who miss course deadlines for a valid medical reason or other extenuating circumstances must notify the instructor as soon as possible.

EVALUATION:	Assignments/exercises (x5)	65%
	Term paper	<u>35%</u>
		100%

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

Academic conduct:

Instructional & Conduct Offences:

Instructional offences include among other activities cheating, contravening examination regulations, plagiarism, submitting similar work in 2 or more courses without prior permission, and disrupting classes. Conduct offences apply in areas of discrimination and sexual harassment. Further information about University regulations which define and regulate these offences is presented in the UG Calendar:

<https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Some of the section on plagiarism is reproduced below, because it is the most common academic offence, and one that can sometimes be committed inadvertently. (Please note that plagiarism also applies to images that you present without acknowledgement).

Plagiarism: Plagiarism will not be tolerated. Students should consult the [Academic Integrity Policy](#). The University Senate defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This can include:

- reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another’s data or research findings;
- failing to acknowledge sources through the use of proper citations when using another’s works and/or failing to use quotation marks;
- handing in "substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs."

Plagiarism is a serious offence, which cannot be resolved directly with the course’s instructor. The Associate

Deans of the Faculty conduct a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.

Requests for Academic Accommodations

You may need special arrangements to meet your academic obligations during the term because of disability, pregnancy, or religious obligations. Please review the course outline and write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Department of Equity and Inclusive Communities website: <http://www2.carleton.ca/equity/>

Pregnancy obligation: Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details click [here](#).

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, For more details click [here](#).

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details click [here](#).

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable) (For more details click [here](#)).

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details click [here](#).

CLASS SCHEDULE, TOPICS AND READING LIST

Lesson	Month	Date	Lecture Topic	Dessler	IPCC	
1	Jan	11	01 - Introduction to the course and climate change	1.1, 1.2	TS-1	
2		18	02 - Energy balance and the climate system	Chapter 3, 4.1-4.3		
3		25	03 - Evidence for modern climate change	2.1	SPM-B1-4; TS-2.1-2.7	
4	Feb	1	04 - Greenhouse gas and climate forcing	4.3, Chapter 5, 8.4	SPM-B5, C, Box SPM1; TS-2.8, 3, Box TS-6	
5		8	05 - Feedbacks and the climate system	6.1	SPM-D2; TFE-6	
		15	NO CLASS, READING WEEK			
6		22	06 - Climate models	Chapter 8	SPM-D1-D4; Box TS-4, TS-5, TFE.3;	
7	March	1	07 - Lessons from past climate	2.2	Box TS.5	
8		8	08 - Impacts and consequences	Chapter 9	SPM E; TFE-5	
9		15	09 - Attribution of climate change	Chapter 7	SPM-D3	
10		22	10 - Ozone layer / internal climate variability	13.3, 7.4	TS-2.	
11		29	11 - Climate science and society/Review	Chapter 14 (loosely), 1.4	SPM-E8, TFE-8	
12	April	5				
13		12	12 – Exam help session			

IPCC – SPM is the Summary for policymakers, TS is the Technical Summary, TFE is Thematic Focus Elements (found within the TS). Boxes can be found in both the SPM and TS.

LECTURES: Lesson 1-12 Monday 18:05 - 19:55 Virtual via zoom

LAB SCHEDULE

Week	Month	Date	Lab Topic	Grade (%)
1	Jan	13	Lab 1 – Outline and article summary	5
2		20		
3		27	Lab 2 – Recent climate (Reading: IPCC SPM-B1-4; TS-2)	10
4	Feb	3		
5		10	Lab 3 – Recent climate (Reading: IPCC SPM-B1-4; TS-2)	10
		17	NO LABS, READING WEEK	
6		24		
7	Mar	1	Lab 4 – Future climate	15
8		8		
9		15	Lab 5 – Attribution of Climate Extremes (Sub-sections A1a, A2a)*	25
10		22	Lab 5 – Attribution of Climate Extremes (Sub-sections A1b, A2b)*	
11		29		
12	April	5		
13		12		

LABORATORY: A2 Wednesday 11:35 - 13:25 Virtual via Zoom
 A1 Wednesday 14:35 - 16:25 Virtual via Zoom

* Labs are held every second week up until week 9/10. See CULearn for details.

GRADING: Labs – 65%
 Paper – 35%
 Total - 100%