

GEOG 2133b: Climate Change

Course Instructors

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Office hours: Wednesdays 10:30 – 11:30pm (Voogt), Mondays 10:30-11:30am (Moser) or by appointment via email.

TAs

Amber Gall (M.Sc. Candidate); Office Hours Rm. SSC 1430 Tuesdays 10:30-11:30am

Lectures: Monday 4:30-5:30 UCC-56, Tuesday 3:30-5:30 pm UCC-56

Course Description

This course examines the processes that underlie natural and human-induced climate change at global and regional scales and describes the resultant climates that have existed, those projected to occur in the future, and the past and future impacts of climate change on the physical and human environment.

Climate change is one of the most important environmental issues that faces humans. Here we provide an introduction into how Earth's climate works, how internal and external forcings lead to climate changes on different time scales and how past, current and future actions by humans to both the Earth's surface and atmospheric composition have and will affect climates. The course is in large part an examination of global scale climate change, but we will also look at regional and smaller scale climate change to illustrate that climate change is not only a large scale phenomenon. Impacts of climate change will be explored, with a range of examples chosen to illustrate geographical diversity and sectors affected. Finally, we will briefly examine options that may be used to address climate change and their linkage to the physical basis of climates.

The course is taught from a physical scientist's perspective – with an emphasis on how systems work (processes), use of the scientific method, collection and interpretation of data and development and use of numerical models to represent physical processes.

General Course Objectives

The goal of the course is to provide climate literate students. By the end of this course, students will:

- understand the principles of Earth's climate system;
- describe sources of natural variability and their impact on climate and appreciate the data sources and techniques used to assess past climate variability;
- appreciate the human impact on climate and climate change and its consequences;
- understand the interrelated nature of climate with the atmosphere, hydrosphere, biosphere, lithosphere and cryosphere;
- assess scientific data on climate;
- synthesize and communicate climate change information;
- be able to make informed decisions related to climate change.

Format

Instruction occurs during two classes (a one and a two hour time slot) and will be a mix of lectures, videos, in-class activities, quizzes and group work. It is imperative to be at all classes.

Teaching Assistants

Teaching Assistants will help deliver and evaluate course material and assignments.

Evaluation

The material covered in lectures including assigned readings and assignments will be evaluated in short in-class quizzes, a midterm and a final exam. A mixed exam format (e.g. short answer, diagram questions) will be used. Marking schemes will be used to assess answers to assignments and exams. Partial marks are awarded for incomplete answers.

Assignments (2)	20%
Quizzes (4)	20%
Midterm	20%
Final exam	30%
Participation (Exit Ticket)	10%
Total	100%

Notes:

1. Marks as posted by the course instructor are considered provisional until approved by the Department Chair. Final marks are received from the Registrar; errors may be corrected through use of a Marks Revision Form.
2. Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.
3. No electronic devices will be allowed during test and examinations

Participation

Participation is an important part of the success of the course and ensuring students learn the material in Climate Change, so part of the final grade will be based on participation. This will include attendance as determined through exit tickets. For some classes you will be asked to fill in an exit ticket, which will ask for your name, student number and ask you to address a question or provide an opinion about what you learned in class today. Eleven of these will be handed out during the term. To get a perfect grade in participation, you will have to provide exceptional answers on at least ten exit tickets.

Statement on Use of Electronic Devices

No calculators will be required or permitted in the exams. Students who require electronic assistance with language translation must obtain prior approval from the instructor.

Penalties

Exams: In accordance with university policy, missed exams cannot be made up except on written medical grounds and notification prior to exam date.

Assignments: Late assignments will have a penalty of 10% per day. Assignments submitted more than 1 week late will not be accepted. Exceptions can be made for documented medical and other significant reasons beyond your control (see subsequent sections).

Non-medical Absences

Non-medical absence from the midterm requires prior approval of the instructor or approval by the Dean's office (appropriate documentation will be required by the Faculty Dean's Office for approval if it is not obtained prior to the midterm).

Medical Absences

Students seeking academic accommodation on medical grounds for any missed tests, exams, participation components and/or assignments worth **10% or more** of their final grade must apply to the Academic

Counselling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department.

For UWO Policy on Accommodation for Medical Illness and a downloadable SMC see:

http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

Downloadable Student Medical Certificate (SMC): <https://studentservices.uwo.ca> under the Medical Documentation heading

When medical illness affects work worth **less than 10%** of the total course grade (i.e. an assignment), please contact the course instructor for academic accommodation (documentation not required).

University Statement on Academic Offences

“Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf.”

“Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.”

Mental Health

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit the site below for more information on mental health resources:

<http://www.uwo.ca/uwocom/mentalhealth/>.

Course Texts

The course text is available from the UWO Bookstore. A copy has also been placed on one day reserve at Weldon Library. It will be available shortly.

Fletcher, C. 2013. *Climate Change: What the Science Tells Us*, Wiley, ISBN 978-1-118-05753-7

Other Useful Texts

Houghton, J., 2009: *Global Warming: The Complete Briefing*, 4th Edition, Cambridge University Press. This book is available online through the Western library and is useful for understanding the science of climate change.

IPCC AR5 Fifth Assessment Reports, 2013: Available from <http://www.ipcc.ch/> .

Dessler, A., 2011: *Introduction to Modern Climate Change*, Cambridge University Press. This book is on one day reserve from Weldon library and is useful for understanding the modern climate system.

Ruddiman, W.F. 2008: *Earth's Climate: Past and Future*. 2nd Edition. W.H. Freeman and Company. This book is on one day reserve from Weldon library and is useful for understanding paleoclimates and past climate change.

A wide range of web resources and discussions (i.e. “blogs”) on climate change exist. These may help provide explanation and discussion of climate change, especially with respect to recent findings. However, many of these encompass much more than just the science of climate change. We urge some caution in using these resources – these are, unlike texts and journal articles which undergo a formal review process by independent experts in the subject matter, unreviewed commentary by individuals. We will discuss this further in class.

Supplementary Material:

Course supplementary materials will be provided through the course OWL site.

Course Web Site

Additional course information will be provided on the web using OWL. Use <http://owl.uwo.ca/> and then log in using your uwo username and password. Your log in will require that you be officially enrolled in the course. Please become familiar with this site, and carefully check that your computer meets the OWL requirements.

Western's commitment to accessibility

The University of Western Ontario is committed to achieving barrier free accessibility for persons studying, visiting and working at Western.

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Fire Drills:

Students are required to evacuate the building when the fire alarm is activated.

SCHEDULE: Assignment and quiz dates are fixed, but the lecture schedule may change periodically – double check OWL for updates.

Week	Date	Lecture Topic	Text Reading	Assignment/Quizzes
1	Jan 5	Introduction (KAM &JAV) Climate Jeopardy (KAM&JAV)	Preface, Chapter 1	
1	Jan 6	Climate and Climate Change, Global Environmental Systems, Climate data: An Introduction Class Introductions – A Game Video	Chapter 1	
2	Jan 12	The Present Climate System (JAV)	Chapter 1	
2	Jan 13	The Present Climate System (JAV) Activity/Assignment 1 – Determining fact vs fiction on the internet		
3	Jan 19	The Greenhouse Effect (JAV)	Chapter 1	
3	Jan 20	Greenhouse gases and the atmosphere (JAV) Greenhouse Gas Activity – In Class	Chapter 1	Quiz 1
4	Jan 26	Carbon Cycle (KAM)	Chapter 1	Assignment 1 Due
4	Jan 27	Carbon Cycle (KAM) Carbon budget Activity (KAM)		
5	Feb 2	Climate Archives & Isotopes (KAM)	Chapter 3	
5	Feb 3	Climate Archives & Isotopes Continued (KAM) Reading the Past Activity (KAM)	Chapter 3	Quiz 2
6	Feb 9	Return assignments, quizzes and review		
6	Feb 10	MIDTERM		
7	<i>Feb16-20</i>	<i>Reading Week</i>		
8	Feb 23	Past Climates: Tectonic and Orbital Scale Variations (KAM)	Chapter 3	
8	Feb 24	Past Climates: Climate Change within Human Time Scales (KAM)	Chapter 2, 3	

9	Mar 2	Impacts of Altered Climates: Past Examples (KAM)	Chapter 3	
9	Mar 3	Projections of Future Climates: Emissions Scenarios (JAV) Assignment 2	Chapter 4	
10	Mar 9	Projections of Future Climates: Emissions Scenarios (JAV)	Chapter 4	Quiz 3
10	Mar 10	Projections of Future Climates: Emissions Scenarios (JAV) ACTIVITY: Guest Lecture: Radoslav Dimitrov (?)	Chapter 4	
11	Mar 16	Climate Model Results (JAV)	Chapter 4	
11	Mar 17	Climate Model Results (JAV)	Chapter 4	Assignment 2 Due
12	Mar 23	Climate Surprises (KAM)	Chapter 7	
12	Mar 24	Climate Surprises (KAM)	Chapter 7	
13	Mar 30	Impacts of Altered Climates: The Future (JAV)	Chapter 5 and 6	
13	Mar 31	Impacts of Altered Climates: The Future (JAV)	Chapter 5 and 6	Quiz 4
14	Apr 6	Addressing Climate Change (JAV)	Chapter 7	
14	Apr 7	Addressing Climate Change (JAV) Review for Exam		

Support Services

Registrarial Services: <http://www3.registrar.uwo.ca/index.cfm>

Student Development Services: <http://www.sdc.uwo.ca/>

Emotional/Mental Health: Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.