

# **GEOG 2133b Climate Change**

## **Course Instructors**

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Office hours: Thursdays 11:30-1 pm (Voogt), Mondays 2-3:30 pm (Moser) or by appointment via email.

**Lecture:** Tuesday SSC 3022, 2:30 – 5:30 pm

## **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 is through three lecture hours.

## **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 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 (4)	40%
Midterm	25%
Final exam	35%
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

## 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.

*Labs:* 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](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](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.

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

Students may choose to purchase an electronic copy of the text rather than a hard copy.

### **Other Useful Texts**

Houghton, J., 2009: *Global Warming: The Complete Briefing*, 4<sup>th</sup> Edition, Cambridge University Press. IPCC AR5 Fifth Assessment Reports, 2013: Available from <http://www.ipcc.ch/> .

Dessler, A., 2011: *Introduction to Modern Climate Change*, Cambridge University Press.

Ruddiman, W.F. 2008: *Earth's Climate: Past and Future*. 2<sup>nd</sup> Edition. W.H. Freeman and Company.

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.

### **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:**

<b>Week</b>	<b>Date</b>	<b>Lecture Topic</b>	<b>Assignment</b>
1	Jan 7	Introduction, Scales, Climate and Climate Change, Global Environmental Systems	
2	Jan 14	The Greenhouse Effect: Greenhouse gases and the atmosphere	
3	Jan 21	Carbon Cycle	
4	Jan 28	Climate Archives, Data and Models	Assignment 1 Due
5	Feb 4	Past Climates: Tectonic and Orbital Scale Variations	
6	Feb 11	Past Climates: Climate Change within Human Time Scales	Assignment 2 Due
<b>7</b>	<b>Feb 25</b>	<b>Midterm</b>	
8	Mar 4	Projections of Future Climates: Emissions Scenarios	
9	Mar 11	Projections of Future Climates: Climate Model Results	
10	Mar 18	Climate Surprises	Assignment 3 due
11	Mar 25	Impacts of Altered Climates: Past Examples	
12	Apr 1	Impacts of Altered Climates: The Future	Assignment 4 (Group Presentations)
13	Apr 8	Addressing Climate Change	

**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.