

# **SYLLABUS: GEOG 308**

## **Human Dimensions of Global Climate Change**

Fall Term 2016  
Monday – Wednesday – Friday, 9:30-10:20  
Location: PAS 2083

**Course Instructor:** Dr. Daniel Scott  
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**Office Hours:** Weds 10.30-12.30

**Teaching Assistants:**  
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### **Calendar Description:**

Climate change is one of the most profound environmental issues affecting society. The course is an introduction to the human dimensions of global climate change, including its scientific history, potential impacts for natural systems and human societies around the world, and the two societal responses: adaptation and greenhouse gas mitigation. Canadian climate change science, impacts and policy responses will be highlighted.

*Prereq: Geog 102; Level at least 2A.*

### **Course Objectives:**

Climate change has rapidly evolved to become one of the most profound and complex international issues affecting our society and economy today and in the decades ahead. This course provides an introduction to the human dimensions of the global climate change and international policy response meant to address this challenge. The content of this course will be taught in four major sections: the physical basis of climate change, the impacts of climate change, human actions to reduce the causal drivers of climate change (mitigation), and human actions to cope with the consequences of climate change (adaptation).

This course is intended for undergraduate students of all backgrounds (arts and sciences) who wish to explore the biophysical and human dimensions of climate change.

Upon successfully completing this course, students will:

- Gain an understanding of the major components of the global climate system;
- Comprehend how and why climate has fluctuated over geological time and human history;
- Appreciate how climate variability and weather extremes have affected civilizations in the past and our contemporary economy;
- Develop an understanding of the observed evidence that the climate is changing;
- Understand the ways humans are influencing the global climate system;
- Understand what could happen to climate and environmental systems if human-induced climate change is not controlled;
- Develop an appreciation for the range of potential impacts of climate change on natural systems and human societies, the geopolitical implications, and what climate change means for Canada specifically;
- Understand the challenges (technical, planning, financial) associated with adapting to climate change and appreciate the physical limits to adaptation;

- Discuss how society could define ‘dangerous’ climate change and strategies to avoid it;
- Be familiar with the international governance response to global climate change;
- Gain an appreciation for the economics of climate change, including the potential costs of action and inaction, and recognize the trade-offs inherent in climate change response strategies;
- Appreciate the extent to which climate change science has been ‘politicized’ and how it is affecting research in this field;
- Be able to differentiate major atmospheric environmental issues of global climate change, local air quality and ozone depletion;
- Acquire an understanding of appropriate terminology and concepts relating to the study of global climate change;
- Be able to critically assess perspectives on climate change that appear in the popular media, including those of various interest groups and disinformation campaigns;
- Engage in critical discussions on a number of important and controversial topics related to global climate change science and policy responses (particularly mitigation); and
- Become a more informed consumer with regard to greenhouse gas emissions, enabling personal goals and actions to contribute to climate change mitigation and sustainability.

**Course Schedule: \*\* lecture themes subject to change, as guest lectures are still TBC**

<b>Unit</b>	<b>Date</b>	<b>Topic</b>
Course Introduction	Sept 9	Course Introduction
	Sept 12	‘Clearing the Air’ on Climate Change: Distinguishing Scientists, Lobbyists, and Deniers
Unit 1: Introduction to the Global Climate System and Understanding Past and Future Climate Change	Sept 14	Global Climate System 1 (components)
	Sept 16	Global Climate System 2 (energy balance)
	Sept 19	Global Climate System 3 (forcings and feedbacks)
	Sept 21	Paleoclimate
	Sept 23	Climate Change in Human History
	Sept 26	Human Influences on the Climate System - 1
	Sept 28	Human Influences on the Climate System - 2
	Sept 30	Climate Modeling & Projections
	Oct 3	Unit 1 Review
	Oct 5	<b>Unit 1 Test (in class)</b>
Unit 2: Climate Change Impacts and Adaptation ( <i>What could happen if climate change is not controlled</i> )	Oct 7	Assessing Climate Change Vulnerability; Assignment #1 Introduced
	Oct 10	READING BREAK – NO CLASS
	Oct 12	READING BREAK – NO CLASS
	Oct 14	Assignment #1 Research and in-class Consultation
	Oct 17	Climate Change Impacts through Human History
	Oct 19	Current Societal Impacts of Weather and Climate
	Oct 21	Global Climate Change Impacts: Natural Systems
	Oct 24	Global Climate Change Impacts: Human Systems (food, water, health)
	Oct 26	Global Climate Change Impacts: Sea Level Rise
	Oct 28	Vulnerable Regions and International Security

	Oct 31	Climate Change Adaptation – Concepts and Policy
	Nov 2	Unit 2 Review;
	Nov 4	Climate Change Adaptation – Case Studies of Action
	Nov 7	<b>Unit 2 Test (in class)</b>
Unit 3: Mitigating (controlling) Climate Change	Nov 9	Global Mitigation Policy – UNFCCC and National
	Nov 11	GHG Emission Sources and Responsibilities; <b>Assignment #1 Due</b> ; Assignment #2 Introduced
	Nov 14	Mitigation Strategies – Reducing GHG Emissions
	Nov 16	Land Use and Carbon Capture and Storage
	Nov 18	Geoengineering (Climate Engineering)
	Nov 21	Can we Avoid Dangerous Climate Change?
Unit 4: The Politics and Economics of Climate Change	Nov 23	Economics of Climate Change: Impacts, Adaptation and Mitigation
	Nov 25	Climate Change and Business
	Nov 28	Climate Change Communication and the ‘Denial Machine’
	Nov 30	Unit 3 +4 Review; <b>Assignment #2 Due</b>
	Dec 2	<b>Unit 3+ 4 Test (in class)</b>

### Assessment:

The assessment in this course consists of three unit tests and two assignments. The unit tests take place in class and are not cumulative, covering only the classes and readings since the previous test. Additional details on the two assignments will be provided in class.

Unit Test 1	Wednesday Oct 5th	20% (material from 9 Sept to 3 Oct inclusive)
Unit Test 2	Monday Nov 7th	20% (material from 7 Oct to 4 Nov inclusive)
Unit Test 3	Friday Dec 2nd	25% (material from 9 Nov to 30 Nov inclusive)

### Assignments:

1. **Term Paper** (maximum 5000 words on 1 of 2 topics)      25%      (due Friday Nov 11<sup>th</sup>)

This assignment is designed to give you an opportunity to develop a more in depth understanding of what climate change means to a specific natural system, economic sector or region of the world that is of specific interest to you. To allow you some creative freedom, the two topics are broad, but your paper should be **focused**.

- **Theme 1:** Choose a **natural system or socio-economic sector** and prepare a paper on the anticipated impacts of future climate change. The geographic scale of your topic is open for you to define (e.g., polar bears of Hudson Bay, the Great Barrier Reef, agriculture in a country or region, winter sports tourism in the Alps or Rockies). Discuss evidence of how **recent** climate change or extreme events have affected this natural system or socio-economic sector and what **future** impacts are expected, depending on the magnitude of climate change that occurs. Identify key uncertainties in the understanding of future potential impacts in your chosen area and any differences of opinion that might exist. Discuss potential **adaptation** strategies that might reduce the

damages or enhance opportunities posed by climate change.

- **Theme 2:** Choose a **specific geographical region** and prepare a paper on the multiple anticipated impacts of climate change in that area. The geographic scale of your study area is open for you to define (e.g., the City of New York, Ontario, the United States, a Small Island State). Outline the **range of potential impacts** and discuss how they are anticipated to vary depending on the magnitude of climate change that occurs. Identify which are likely to be the **most important** types of impacts. Discuss potential **adaptation** strategies that might reduce the damages or enhance opportunities posed by climate change, including key barriers to adaptation.

**2. Calculate your Personal Carbon Footprint and Develop an Emission Reduction Plan** 10% (due Wednesday Nov 30<sup>th</sup>)

This assignment will guide you through the process of determining your personal contribution to global climate change and assessing ways that you might reduce the greenhouse gas emissions that you will be responsible for during your lifetime.

**Course Policies - Late Penalties and Missed Tests:**

If you miss a test or are unable to complete an assignment on time because of a valid medical reason or personal emergency, you must submit documentation (e.g., 'Verification of Illness' form <http://info.uwaterloo.ca/infoheal/StudentMedicalClinic/StudentMedicalClinicVIF.htm>) within one week of the test or assignment, or, in the case of longer absences, on the date of your return to school. Otherwise, a grade of 0 will be assigned.

If a unit test is missed for a valid academic reason, you will be required to complete this unit test during the scheduled time for the make-up test (one additional time slot per unit test).

A penalty of 10% per day will be assessed for late assignments without a valid academic reason - based on a 24-hour clock starting at 5:00pm on the due date.

**Course Communications:**

According to University policy, official correspondence with students by email must use a UW email address (e.g., 'student'@uwaterloo.ca). Email received from other accounts (e.g., gmail, hotmail, etc.) can be unreliable (sometimes filtered as SPAM) and cannot be guaranteed to be received.

Send email based communications directly to the instructor, do not assume messages sent from within the LEARN system will be viewed in a timely manner.

## **Text and Readings:**

- Required textbook: Burch, Sarah and Sara Harris. 2014. Understanding Climate Change: Science, Policy and Practice. Toronto: University of Toronto Press.
- A list of 'Additional Reading Resources' for major themes in the course and for assignments will be provided on the UW-LEARN course site, along with most current version of this syllabus.

### **Course introduction**

- Burch and Harris, Chapter 1: Climate Change in the Public Sphere

### **Unit 1**

Introduction to the climate system

- Burch and Harris, Chapter 2: Basic System Dynamics

The climate system and energy balance

- Burch and Harris Chapter 3: Climate Controls: Energy from the Sun
- Burch and Harris Chapter 4: Climate Controls: Earth's Reflectivity
- Burch and Harris Chapter 5: Climate Controls: the Greenhouse Effect

Climate models and projections

- Burch and Harris Chapter 7: Climate Models
- Burch and Harris Chapter 8: Future Climate: Emissions, Climatic Shifts

### **Unit 2**

Impacts: Aquatic and terrestrial systems

- Burch and Harris Chapter 9: Impacts of climate change on natural systems

Impacts: Human systems

- Burch and Harris Chapter 10 p 237-250

Adaptation

- Burch and Harris - Chapter 9 p 226-236
- Burch and Harris - Chapter 10 p 250-259

### **Unit 3 & 4**

Mitigation

- Burch and Harris Chapter 6

Governance and Politics

- Burch and Harris Chapter 11 Understanding climate change: Pathways forward

## **UNIVERSITY POLICIES, REGULATIONS and RESOURCES:**

**Academic Integrity:** In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [www.uwaterloo.ca/academicintegrity/](http://www.uwaterloo.ca/academicintegrity/). Students who are unsure what

constitutes an academic offence are requested to visit the on-line tutorial at:

<http://www.lib.uwaterloo.ca/ait/>

**Discipline:** A student is expected to know what constitutes academic integrity, to avoid committing academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, [www.adm.uwaterloo.ca/infosec/Policies/policy71.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm).

For typical penalties, check Guidelines for Assessment of Penalties, [www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm](http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm)

**Student Grievances:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4, [www.adm.uwaterloo.ca/infosec/Policies/policy70.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm). When in doubt, please contact your Undergraduate Advisor for details.

**Appeals:** A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 – (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) [www.adm.uwaterloo.ca/infosec/Policies/policy72.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm)

**Consequences of Academic Offences:**

Students are strongly encouraged to review the material provided by the university’s Academic Integrity office (see: <http://uwaterloo.ca/academicintegrity/Students/index.html>).

**Note for students with disabilities:** The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

**Religious Observances:** Please inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

**Travel and Final Examination Period**

It is the student’s responsibility to make him/herself available for the entire examination period, and travel plans are not a sufficient reason to have a final exam deferred. For further information see: <http://www.registrar.uwaterloo.ca/exams/finalexams.html>

**Waterloo LEARN (D2L):**

Desire2Learn is uWaterloo’s web-based Learning Management System that enables instructors to manage course materials, interact with their students, and provide feedback.