SYLLABUS

GEOG 207 Climate Change Fundamentals

SUMMARY COURSE DESCRIPTION

Climate change is one of the most profound environmental and social issues affecting communities, nations and individuals. This course is an introduction to this global challenge, including its scientific underpinnings, history, potential impacts on natural systems and human societies around the world, and two societal responses: adaptation and greenhouse gas mitigation. Opportunities to develop sustainable resilient communities, as well as Canadian climate change policy responses will be highlighted.

GOAL: The goal of this course is to provide students of any discipline with the fundamentals of climate change: both biophysical and human dimensions. This course will be delivered entirely online, and will provide students with an opportunity to hone science communication skills, explore sources of scientific uncertainty, political complexities, and equity implications of this global challenge.

Climate change is a pervasive and challenging phenomenon that can be viewed through a multitude of lenses. A scientific lens, for instance, reveals altered ecosystems and climatic tipping points while the lens of ethics raises the question of the right to develop and influence the well-being of others while doing so. By carefully laying the scientific foundations, we will explore creative, positive, nuanced visions of the future that are rooted in scientific understanding of earth systems but also capture (or at least begins a conversation about) core human values, such as equity, compassion, innovation, and connection. A wider variety of actors are increasingly taking action on climate change, or bear some responsibility for doing so, giving us the opportunity to analyze coordinated, effective responses that go beyond international negotiations.

This course is intended for undergraduate students of all backgrounds (arts, social sciences, and sciences) who wish to explore the biophysical and human dimensions of climate change. The course will also help students to hone their abilities to communicate potential solutions to others.

Course Objectives

Through a deeply interdisciplinary approach and with an emphasis on fostering effective communication skills, successful students in this course will:

- Demonstrate understanding of key elements of the climate system, and how these elements are being altered by the human emission of greenhouse gases.
- Carefully consider the impacts of climate change on both human and natural systems.
- Articulate the difference between climate change adaptation and mitigation, and understand a portfolio of actions that communities can take to respond to climate change.
- Understand the key issues at play in international climate change negotiations, as well as recent Canadian policy proposals.
- Investigate futures that are fundamentally sustainable, low-carbon, and resilient to climate change impacts.

UNIT	TOPIC and LEARNING OBJECTIVES
MODULE 1 FOUNDATIONS: THE CLIMATE SYSTEM	
WEEK 1	**COURSE INTRODUCTION** • Introduction to the debate • Format and approach of class • Learning objectives, syllabus, schedule • The media, climate change communication, and recent trends
WEEK 2	**INTRODUCTION TO THE CLIMATE SYSTEM** • What is a system? • System dynamics • Components of the climate system
WEEK 3	**THE EARTH AND ENERGY** • Energy basics • Ins and Outs; Forcings • Reflectivity and aerosols • The Greenhouse Effect
WEEK 4	**THE CARBON CYCLE** • Carbon stocks and flows • Forcings • Emissions scenarios **Guest lectures: Dr. Maria Strack, Dr. Catherine Potvin**
WEEK 5	**PAST AND FUTURE CLIMATE** • **Guest lecture: Dr. Chris Fletcher** • Future climate, scenarios and projections
MODULE 2 IMPACTS AND ADAPTATION	
WEEK 6	**IMPACTS Part 1: Impacts on natural systems** • Aquatic systems

	• Terrestrial systems
WEEK 7	**MPACTS Part 2: Impacts on humans** • Introduction • Developing countries • Cities • **Guest lecture: Dr. Peter Berry**
WEEK 8	**ASSESSING VULNERABILITY** • Impact and vulnerability analyses • Equity, ethics, responsibility • Urban vulnerability (Dr. Patricia Romero-Lankao)
WEEK 9	**ADAPTATION** • What is adaptation? Reactive, proactive • Options and progress • Developing country context
MODULE 3 MITIGATION, POLITICS AND TRANSFORMATION	
WEEK 10	**INTRODUCTION TO MITIGATION** • Sources of emissions • Demand-side mitigation • Supply-side mitigation
WEEK 11	**POLICY, GOVERNANCE and POLITICS** • Governing climate change: actors, interests, challenges • The UNFCCC • Kyoto and Paris **Guest lecture: Dr. Marie-Claire Cordonnier Segger**
WEEK 12	**SUSTAINABILITY TRANSFORMATIONS: LINKING ADAPTATION AND MITIGATION IN COMMUNITIES** • A/M/SD synergies • Accelerating innovation • Envisioning the future

ASSESSMENTS and GRADING SCHEME

Assessments	Due Date	Weight
Weekly Quizzes (top 10 out of 11)		40%
Discussion Forum: Summary assignments plus quantity of posts		20%
Assignment 1: Impacts and		20%

Adaptation		
Assignment 2: Mitigation		20%

Assignments

Discussion Forum Assignments (20%)
This discussion summary assignment entails the creation of a collation and analysis of your discussion posts. At the end of each module, you will revisit the discussion forums to select your best contributions to the discussions (the number of posts varies depending on the length of the module: see details in LEARN).

As you reread your contributions, take notes, critically reading your entries as if they were written by somebody else (or at the very least, recognizing that they were written by a different you at a different time). Once you have located your best posts, copy them from the discussion area and paste them into a Word document, detailing:

1. The question you are addressing
2. The week number and the date you posted your message
3. A short description of the discussion in general
4. Any comments on how your views have changed since you posted your initial message

Assignment 1: 20% Climate change impacts and adaptation at the community scale (Dropbox)
Identify a local ecosystem, neighbourhood, or community that you have lived in or are familiar with. Keep in mind that you will be studying the same community for Assignment 2, which focuses on mitigation (so find one that has impacts/adaptation and greenhouse gas emissions data available). Based on simple secondary research (ie you don't need to collect or produce your own new data – seek reputable data that already exist) produce a 2000 word (+/- 10%) assessment of key climate change impacts and potential adaptation options. Please cover the following:

- Briefly describe the area of study demographically, socioeconomically, and environmentally.
- Summarize two potential climate change impacts on human systems and two impacts on biophysical systems that **evidence shows** can be expected in this area.
- Identify one adaptation option that might help this community respond to **each** impact (ie four adaptation options in total)
- Conclude by linking this area to the broader national/global climate change picture. Is this area particularly vulnerable? Do you think that the

community possesses adequate adaptive capacity to respond to climate change?
- Use photos, figures, and other media to enhance the readability of your assignment

Assignment 2: 20% Emissions and mitigation at the community scale (Dropbox)

Dig deeper into the neighbourhood or community that you began to study in Assignment 1. Based on simple secondary research (ie you don't need to collect or produce your own new data – seek reputable data that already exist) produce a 2000 word (+/- 10%) assessment of emissions and mitigation options for the community.

- Briefly describe the area of study demographically, socioeconomically, and environmentally.
- Summarize the major sources of greenhouse gas emissions in this area.
- Identify **four** mitigation options that address these sources of greenhouse gas emissions.
- Conclude by linking this area to the broader national/global climate change picture. Do you think that the community possesses adequate mitigative capacity to respond to climate change?
- Use images, graphs, and other compelling ways to communicate your data and illustrate emissions trajectories/mitigation options in your report. Be sure to include all sources for any images you use or data you cite.

Reflect back on your adaptation assignment – what are the synergies or trade-offs you can think of between adaptation and mitigation for this community?

READINGS AND SUPPLEMENTARY REFERENCES

Required textbook: Burch, Sarah and Sara Harris. 2014. Understanding Climate Change: Science, Policy and Practice. Toronto: University of Toronto Press.

Additional course reference material will be available from several sources:
- Journal articles available through the University of Waterloo library system (many available on LEARN)
- Source websites (urls provided, eg. IPCC).
- **The UW-LEARN system will be used to provide any readings that are in addition to the textbook, and will also house the most current version of this syllabus**

Course Policies

Exceptions and Assistance: The University accommodates students with disabilities who have registered with the AccessAbility office. Furthermore, the University has many resources to help students who are in need of assistance for any number of reasons: along with the AccessAbility office, there are also many academic resources, health and counseling services, and peer support systems. If you are struggling (or anticipate needing help) with your coursework for academic and/or personal reasons, please seek the support you need, as early as possible. If you do not know the options, please ask.

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. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

Discipline: A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, 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. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

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.

Grievance: 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. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.