

CLIMATE CHANGE

GEOG/ENST 4351 Fall 2022

Instructor: Dr. Adam Cornwell

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Description

An interdisciplinary analysis of the complex issue of global climatic change. This course provides a detailed investigation of every aspect of one of the most challenging problems of our era: the physics and causes of change, the likely environmental and socio-economic impacts, and the politics and technologies behind mitigation and adaptation.

Course Text

Houghton, John (2015). *Global Warming: The Complete Briefing, 5th ed.* UK: Cambridge University Press.

Students will be assigned readings to complete *before each lecture*. Readings chosen from the academic literature will be available through either the Library or MyCourseLink.

Evaluation Scheme

| | | |
|----------------------------|------------|------------------|
| Midterm Examination | 25% | October 18 |
| Seminar Abstract | 3% | October 18 |
| Seminar | 15% | November 15 – 29 |
| Summary Paper | 7% | December 1 |
| Final Examination | 50% | TBA |

There will be one midterm test, plus a final examination. Each student will conduct a 15-minute seminar in class. Students will also write an original paper of no more than five pages on the same topic as their seminar.

Lecture Times

Tuesdays and Thursdays: 1:00 – 2:30 pm, ATAC 2006

GEOG/ENST 4351 Course Schedule

(subject to changes as necessary)

| Date | Reading | Topic(s) |
|--------------|---------------------------|--|
| September 6 | Chapter 1 | Introduction |
| September 8 | Chapter 2 | Greenhouse Effect |
| September 13 | Chapter 3a (pp. 32-45) | Carbon Dioxide and the Carbon Cycle |
| September 15 | Chapter 3b (pp. 46-62) | Other Greenhouse Gases and Radiative Forcing |
| September 20 | Chapter 4a (pp. 65-79) | Climates of the Recent Past |
| September 22 | Chapter 4b (pp. 80-88) | Climates of the Ancient Past |
| September 27 | Chapter 5a (pp. 90-105) | Modelling the Climate System |
| September 29 | Chapter 5b (pp. 106-129) | Modelling Climate Change |
| October 4 | Chapter 6 | Expected Climate Change |
| October 6 | Chapter 7a (pp. 162-174) | Sea Level Rise |
| October 11 | | Study Week |
| October 13 | | Study Week |
| October 18 | | Midterm |
| October 20 | Chapter 7b (pp. 175-186) | Impacts on Water Resources and Agriculture |
| October 25 | Chapter 7c (pp. 187-198) | Impacts on Ecosystems |
| October 27 | Chapter 7d (pp. 199-212) | Impacts on Human Systems |
| November 1 | Chapter 10 | Multilateral Regimes |
| November 3 | Chapter 11a (pp. 291-310) | Reducing End-Use Emissions |
| November 8 | Chapter 11b (pp. 311-328) | Renewable Energy |
| November 10 | Chapter 11c (pp. 329-340) | Policy Instruments |
| November 15 | | Seminars |
| November 17 | | Seminars |
| November 22 | | Seminars |
| November 24 | | Seminars |
| November 29 | | Seminars |
| December 1 | | Seminars |

Learning Outcomes

Knowledge

- Identify the physical processes that produce global climatic changes
- Describe the climatological history of Earth and theory surrounding past changes
- Connect ongoing changes in the atmosphere with observed patterns of global and local climatic changes, and anticipate future changes in the system
- Summarize the expected effects that climatic change will have on human and natural systems, including water resources, agriculture, biodiversity, and sea level rise
- Appraise alternative options that could be implemented to mitigate anthropogenic interference in the climate system
- Compare policy mechanisms and multilateral regimes for implementing mitigation options

Skill Development

- Consideration of uncertainty in decision-making
- Critical analysis of scientific literature and its significance
- Effective communication of scholarly research in both written and verbal formats

Course Delivery

In accordance with the safety protocols at Lakehead University in Fall 2022, this course will be delivered in-person. The primary mode of contact will be lectures during the scheduled time periods each week. It is possible that this will change if circumstances warrant.

Course materials will be delivered through the **Desire2Learn** platform at MyCourseLink.

LU Accommodation Statement

Lakehead University is committed to achieving full accessibility for persons with disabilities/medical conditions. Part of this commitment includes arranging academic accommodations for students with disabilities/medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability/medical condition and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please email sas@lakeheadu.ca or visit <https://www.lakeheadu.ca/faculty-and-staff/departments/services/sas>.

GEOG/ENST 4351 Individual Research Projects

Introduction

4351 is a course loaded with content from the instructor. However, as a fourth-year course it is expected that students will seek out exposure to a wider range of knowledge and viewpoints. These seminars provide the opportunity for each student to gain familiarity with an area of current research related to global climate change. The goal of the project is to present new material to the class and solicit opinions and discussion.

Material

The basis for each project is *current research*, represented by articles chosen from academic journals and emphasizing ones that were published within the last 10 years. **This research must go beyond what is covered in the course.**

Your sources should be primarily **peer-reviewed journal articles**; you are expected to make use of **at least three**. Reports from the “grey literature” (unpublished manuscripts, conference proceedings, government reports, dissertations, etc.) will be acceptable as **secondary** sources. Magazines, newspapers, web sites, etc. will generally **not** be considered useful.

Look for articles that cover the same or closely related subjects but also *complement* rather than duplicate each other. Consider both quality and quantity of papers in your research; 4-10 should be sufficient, but you must acquire a good grasp of a subject that is new and interesting.

Seminar Abstract

An abstract is a short and pithy summary of a work. The abstract for your seminar will introduce the main topic, the sources of information, and the key findings that will be presented. It should consist of summary statements, not opinions or plans. The abstract must be **250 words** or less and include at least two peer-reviewed references.

Seminars

You will be allotted **20 minutes** of class time to share your research with your peers. You may organize your seminar in many ways: presentations, discussions, games, debates, etc.

Seminars will be evaluated according to the following criteria:

- Was the seminar well-organized? Was it clear that the presenter understood the material?
- Was the material new and interesting? Did the presenter include his/her own insight and opinions?
- Was it pitched at a level appropriate to the class? How well did it solicit participation from the other students?
- Was the delivery professional? Was originality or creativity evident?

You may make use of software tools to aid in presentation of your seminar, as long as necessary equipment is available. Any videos must be five minutes or less.

Please note that since seminar topics may be included on the final exam, continued attendance at these sessions is expected.

Papers

You will write a summary paper on your seminar topic of approximately **1500 words** (roughly five pages in length at 1.5 line spacing). The paper should review and synthesize material you have collected for that topic along with your own insight.

While this is a short paper, it should still have a formal style *beginning with its own abstract and ending with a concluding section*. Tables, figures, and the reference list are not included in the five-page limit.

Remember to cite your sources within your paper! Failure to refer to your sources constitutes plagiarism. All papers are to be fully referenced using the author-date style of referencing (e.g.: Hanson et al. 2019). If you are unsure of how to do this, follow the format described in the Department of Geography and the Environment Undergraduate Thesis Manual, available through the department web site:

<https://www.lakeheadu.ca/academics/departments/geography/thesis>

A short paper may seem like an easier task, but in practice it may seem difficult to distill the material and opinions in your seminar into five pages of content. Focus your writing style.

Papers will be evaluated according to:

- Content
- Analysis
- Writing style
- Formatting and referencing

Project Support

The Library provides considerable support for students conducting academic research and accessing reputable peer-reviewed literature. Contact your librarian liaison, Nicole Stradiotto (nicole.stradiotto@lakeheadu.ca), for help refining your topic and locating the information that you need. They're **much better than Google**.

The Academic Support Zone (<https://www.lakeheadu.ca/students/academic-success/student-success-centre/academic-support-zone>) provides free consultation and coaching for writing and polishing your work.

Suggested Topics

Listed below are some suggested starting points for individual research. **This list is not exhaustive**; you may decide on a topic that does not fit any of these categories. Topics will often be focussed on a particular region, sector, or ecosystem, but could also have a global scope.

You should discuss your topic with the instructor before the end of September in order to avoid duplication with other students, and to ensure that your topic is relevant and goes beyond the basic course material.

2022 United Nations Climate Change Conference (COP 27)

- National priorities and plans
- Commitments versus objectives
- Nongovernmental participation
- History of negotiations and emissions

Climatology

- Paleoclimatology
- Global observation networks
- Emissions projections
- Climate models

Impacts

- Agricultural impacts
- Forest impacts
- Sea level rise
- Water resource impacts
- Biodiversity
- Biological surprise
- Polar impacts
- Disease
- Economic costs

Mitigation

- Setting targets for emission reductions
- Policy mechanisms
- Ethics and politics
- International cooperation
- Public perspectives
- Politics