

UNIVERSITY OF WATERLOO
GEOG 474/694
Climate Change and the Health of Canadians
Winter 2018

Instructor: Peter Berry
Room: EV1 Room 103
Office Hours: 12:30pm - 2:30pm
E-mail: pberry@uwaterloo.ca

Lectures: Fridays 2:30pm - 5:20pm
Lecture Room: RCH- 208

Remote Lectures: (Jan 26; Mar 9)
Lecture Room: MC2009

Note: Classes begin on January 5, 2018

[Note: Students participating in the field trip to Ottawa must pay their own accommodation and food, and must contact the instructors of any courses affected by absence from campus in order to make arrangements. Any students who do not participate in the field trip to Ottawa will complete an alternative assignment rather than work on the group presentation.]

Course Description

“Climate change is considered the biggest threat to health of the 21st century”

"Tackling climate change could be the greatest global health opportunity of the 21st century"

Lancet Commission on Climate and Health, 2015

In recent years the public health community within and outside of Canada has begun to recognize the very serious threats to human health and well-being from climate change. Health officials are also beginning to understand the potential to significantly improve health through concerted and well planned efforts to mitigate greenhouse gas emissions and to adapt to the expected impacts. Scientific evidence from recent climate change and health assessments indicates that risks to the health of Canadians are growing as the rate of climate change accelerates and a number of impacts are already being observed (Berry et al., 2014; Health Canada, 2008). Increased risks are associated with greater morbidity and mortality related to an increase in the frequency and severity of extreme weather events (e.g., extreme heat, floods, hurricanes, wildfires, ice storms and droughts), increases in illnesses and deaths due to poor air quality, food- and water-borne illnesses and the expansion of vector-borne and zoonotic diseases. Climate change can affect health risks from both zoonoses (diseases transmitted from animals to humans) and vector-borne diseases (VBD – diseases transmitted either human-to-human or animal-to-human by arthropod vectors). In fact, the tick vector that causes Lyme disease is spreading into Canada at a rate of 35-55km per year and human cases are increasing as well.

Recent extreme weather events have led to health disasters in a number of countries that were unprepared or unable to respond to them. The 2003 heatwave resulted in an estimated 70,000 excess deaths and the

2010 Russian heatwave caused 55,000 deaths (Robine et al., 2008; Barriopedro et al., 2011). Recent heatwaves in India and Pakistan have caused over 2000 deaths. In Canada, climate change increases the probability of complex emergencies and system failures and makes it more difficult for Canadians and communities to prepare for them.

In recent years, greater efforts have been taken by public health and emergency management officials and non-governmental organizations to better prepare Canadians for climate change impacts on health (Paterson et al., 2012; Poutiainen et al., 2013). Evidence suggests that climate change and health adaptation measures can protect people, particularly the most vulnerable in society. Implementation of the heatwave and health alert system in France (Système d'alerte caniculaire et santé) after the very severe extreme heat event of 2003, significantly reduced the health impacts of subsequently strong heat events in 2006, 2009 and 2010 (Ministère du Travail, de l'Emploi et de la Santé 2011). Recent studies in Toronto and Montreal have demonstrated that heat-health communications can influence the public to take protective measures during extreme heat events.

Protecting Canadians from the future impacts of climate change requires concerted efforts by public health officials at all levels of government to collaborate with leading experts in academia, non-governmental organizations, and decision makers in other sectors. Risks can be reduced through monitoring of the climate-related health burdens, assessments of health risks and vulnerabilities, the development of innovative tools to adapt and efforts to achieve health co-benefits from greenhouse gas mitigation technologies and measures.

THE COURSE AND OBJECTIVES

With this background, this course is based around the idea that scientific evidence of health impacts and effective adaptations along with strong collaborative partnerships are required to make progress in efforts to reduce health risks to Canadians. The goal of the course is to examine recent evidence of climate change impacts on the health of Canadians and to explore practical solutions for building resiliency among Canadians and the health sector. With these issues in mind, the course examines the risks to health from climate change, methods and examples of vulnerability assessment and actions being taken to prepare Canadians through lectures, discussions, and assignments.

The course is designed for students interested in: (a) understanding challenges facing societies from climate change; (b) attaining experience translating scientific information into policy and program relevant solutions by working on and presenting case studies; and (c) Canadian and international perspectives on climate change and health issues. The broad goal of the course is to inspire interest in and critical thinking around needed efforts to build healthy, climate resilient communities in Canada.

REQUIRED TEXT/READINGS: Readings for the class are available through the University of Waterloo library and LEARN system or will be provided in class as handouts.

GRADING

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| 1. Class participation – 10% | |
| 2. Issue Brief - 20% | DUE - February 16, 2018 |
| 3. Group presentation – 20% | Presentation on March 22, 2018 |
| 4. Submitted Final Report – 50% | DUE – March 30, 2018 |

WEEK BY WEEK OUTLINE

Jan 5, 2018 - [Week 1] – Introduction to the Course and Climate Change and Health Overview

Berry P, Clarke K-L, Fleury MD, Parker S. Human health. In: Warren FJ, Lemmen DS, (eds) Canada in a changing climate: Sector perspectives on impacts and adaptations. Ottawa: Natural Resources Canada, 2014. pp 191–232. <http://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/reports/assessments/2014/16309>

What are the priority climate change and health risks facing Canadians?

What are the populations of greatest concern? What special challenges from health impacts face Indigenous People in Canada?

Supplementary (Not required, but potentially helpful for projects)

Watts N, et al. The Lancet Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. The Lancet Commission on Health and Climate Change, *The Lancet* 2017. DOI: [http://dx.doi.org/10.1016/S0140-6736\(17\)32464-9](http://dx.doi.org/10.1016/S0140-6736(17)32464-9)

Balbus JM, and Malina C. Identifying vulnerable subpopulations for climate change health effects in the United States. *Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine* 2009; 51; 1: 33-37. <http://www.ncbi.nlm.nih.gov/pubmed/19136871>

Jan 12, 2018 [Week 2]– Public Health Adaptation to Climate Change Impacts

Paterson JA, Ford JD, Berrang Ford L, Lesnikowski A, Berry P, Henderson J, and Heymann J. Adaptation to climate change in the Ontario public health sector. *BMC Public Health* 2012; 12: 452. <http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-12-452>

Frumkin H, McMichael AJ. Climate change and public health: Thinking communicating, acting. *American Journal of Preventive Medicine* 2008; 35:403–410. <http://www.sciencedirect.com/science/article/pii/S0749379708006855>

What measures can we use to adapt to the health impacts of climate change?

What are the challenges to preparing Canadians for the health impacts of climate change?

Supplementary (Not required, but potentially helpful for projects)

Ebi KL, Semenza JC. Community-based adaptation to the health impacts of climate change. *American Journal of Preventive Medicine* 2008; 35:501–

507.http://static1.1.sqspcdn.com/static/f/551504/6467311/1270769683653/Ebi_Semenza.pdf?token=EAqrWPbWJhwNyuqnxJrUiqZrobE%3D

Jan 19, 2018 [Week 3] – Preparing the Health Sector in Canada

World Health Organization. Operational framework for building climate resilient health systems. Geneva: World Health Organization, 2015.

http://apps.who.int/iris/bitstream/10665/189951/1/9789241565073_eng.pdf

Guest Lecture – Brandie Bevis, Region of Waterloo Public Health Unit

How could climate change affect health care and social services in Canada?

How are health authorities in Canada preparing for climate change impacts on health systems?

Supplementary (Not required, but potentially helpful for projects)

Hess J, McDowell JZ, Lubet G. Integrating climate change adaptation into public health practice: using adaptive management to increase adaptive capacity and build resilience; Environmental Health Perspectives 2011; 120; 2: 171-190. <http://ehp.niehs.nih.gov/1103515/>

Paterson J, Berry P, Ebi K, Varangu L. Health care facilities resilient to climate change impacts. Int. J. Environ. Res. Public Health 2014; 11: 13097-13116. <http://www.ncbi.nlm.nih.gov/pubmed/25522050>

Jan 26, 2018 [Week 4] - Responding to Climate Change Through Mitigation of Greenhouse Gases and Enhancing Linkages to Adaptation (Remote from Ottawa) RM-MC2009

Rudolph L. Richardson MJ. Chapter 18: Health co-benefits of climate mitigation strategies. In Lubet G, Lemery J. Global climate change and human health - From science to practice. San Francisco: Jossey Bass, 2015. <http://ca.wiley.com/WileyCDA/WileyTitle/productCd-1118505573.html>

What are the health risks and benefits of measures to reduce greenhouse gas emissions?

What is the role of health sector officials in efforts to reduce greenhouse gas emissions?

Supplementary (Not required, but potentially helpful for projects)

Haines A, McMichael AJ, Smith KR et al. Public health benefits of strategies to reduce greenhouse gas emissions: Overview and implications for policymakers. The Lancet 2009; 374; 9707: 2104–2114. [http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(09\)61759-1.pdf](http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(09)61759-1.pdf)

Feb 2, 2018 [Week 5] - Assessing Health Vulnerability and Adaptation: Segment 1

World Health Organization. Protecting health from climate change: Vulnerability and adaptation assessment. Geneva: World Health Organization, 2012.

<http://www.who.int/globalchange/resources/adaptationresources/en/>

Guest Lecture – Marielle Verret, Climate Change and Innovation Bureau, Health Canada

How do climate change and health vulnerability and adaptation assessments help prepare Canadians for climate change impacts?

What are the steps in assessing health vulnerability and adaptation to climate change impacts?

Supplementary (Not required, but potentially helpful for projects)

Manangan AP, Uejio CK, Shubhayu S, Schramm PJ, Marinucci GD, Hess JJ, Lubner G. Assessing health vulnerability to climate change: A guide for health departments. Atlanta: US Centers for Disease Control and Prevention, 2015.

<https://www.cdc.gov/climateandhealth/pubs/assessinghealthvulnerabilitytoclimatechange.pdf>

Berry P, Paterson J, Buse C. Assessment of vulnerability to the health impacts of climate change in Middlesex-London. Report prepared for the Middlesex-London Health Unit. London: 2014.

<https://www.healthunit.com/climate-change>

Feb 9, 2018 [Week 6] - Assessing Health Vulnerability and Adaptation: Segment 2

Levison M, Whelan M, Butler, A. A changing climate: Assessing health impacts and vulnerabilities due to climate change within Simcoe Muskoka. Simcoe Muskoka District Health Unit. (April, 2017).

[http://www.simcoemuskokahealth.org/docs/default-source/topic-environment/smdhu-vulnerability-assessment-2017-\(final-for-posting-on-internet\).pdf?sfvrsn=0](http://www.simcoemuskokahealth.org/docs/default-source/topic-environment/smdhu-vulnerability-assessment-2017-(final-for-posting-on-internet).pdf?sfvrsn=0)

Verret M, Berry P, Fook TCT, Lai A. Assessment of climate change and health vulnerability and adaptation in Dominica: Summary and Recommendations. (May, 2016).

Guest Lecture – Louise Aubin, Peel Region Public Health Unit

What challenges and opportunities face public health officials in Canada in conducting climate change and health vulnerability and adaptation assessments?

What can we learn from assessments conducted in other countries?

Supplementary (Not required, but potentially helpful for projects)

German Federal Ministry for Economic Cooperation and Development. The vulnerability source book: Concepts and guidelines for standardized vulnerability assessments. Bonn: 2014.

https://gc21.giz.de/ibt/var/app/wp342deP/1443/wp-content/uploads/filebase/va/vulnerability-guides-manuals-reports/Vulnerability_Sourcebook_-_Guidelines_for_Assessments_-_GIZ_2014.pdf

Feb 16, 2018 [Week 7] – NO CLASS

Feb 23, 2018 [Week 8] – NO CLASS

March 2, 2018 [Week 9] – Canada’s Climate Change and Health Technical Assessment 2021

Health Canada. Human health in a changing climate: New knowledge for effective action 2021. Background material.

Guest Lecture – Rebekka Schnitter, Climate Change and Innovation Bureau, Health Canada

Supplementary (Not required, but potentially helpful for projects)

USGCRP, 2016: *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp. <http://dx.doi.org/10.7930/J0R49NQX>. <https://health2016.globalchange.gov/downloads>

Health Canada. Climate change and health vulnerability and adaptation assessment workbook (Draft).

March 9, 2018 [Week 10] - Health Adaptation Planning - Interjurisdictional and Multi-sectoral Collaboration (Remote from Ottawa) RM- MC2009

Whitmee, S et al., Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation-Lancet Commission on planetary health. *The Rockefeller Foundation-Lancet Commission on planetary health*; 386: 1973-2028, November 14, 2015.

What are the upstream drivers of health and well-being in the context of a changing climate?

How can health sector officials work with colleagues in other sectors to protect health from climate change impacts?

Supplementary (Not required, but potentially helpful for projects)

City of Toronto. A climate of concern: Climate change and health strategy for Toronto 2015. Toronto: 2015. <http://www.toronto.ca/legdocs/mmis/2015/hl/bgrd/backgroundfile-81509.pdf>

Poutiainen C, Berrang-Ford L, Ford J, Heymann J. Civil society organizations and adaptation to the health effects of climate change in Canada. *Public Health* 2013 May; 127; 5: 403-9. <http://www.sciencedirect.com/science/article/pii/S0033350613000711>

Mar 16, 2018 [Week 11] - Communicating Climate Change to Protect Health

Maibach E, Nisbet M, Weathers M. Conveying the human implications of climate change: A climate change communication primer for public health professionals. George Mason University Centre for Climate Change Communication, 2011.

http://publichealth.yale.edu/alumni/events/4C%20Communication%20Primer%20-%20Conveying%20the%20Human%20Implications%20of%20Climate%20Change_tcm223-86971_tcm223-1087-32.pdf

How are health authorities in Canada communicating with Canadians about climate change impacts on health?

What are the most effective ways to communicate climate change and health issues to the public and to community organizations?

Supplementary (Not required, but potentially helpful for projects)

Health Canada. Communicating the health risks of extreme heat events: Toolkit for public health and emergency management officials. Ottawa: Health Canada, 2011. <http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/index-eng.php#toolkit>

Mar 22-23, 2018 – Field Trip to Ottawa

Students will travel to Ottawa March 22-23 to meet with decision makers and researchers in various federal government climate change impacts and adaptation programs including Health Canada, Indigenous and Northern Affairs Canada, Natural Resources Canada and Environment and Climate Change Canada. Students will make group presentations to decision makers on their respective projects. Transportation will be provided with no charge to and from Ottawa. Students will be responsible for their accommodation, food and incidental expenses.

CLASS FORMAT

The format of the classes will vary from week to week. The usual format will include:

Lecture – ranging from 30 minutes to 1 hour

Break – 10 minutes

Possible Video – ranging from 10 minutes to an hour

Group Work, Discussion, Group Presentations – 1 hour to 1.5 hours

COURSE WEBSITE/BLOG

Materials for the class (i.e., copies of lecture-slides, course outline, assignment materials) will be made available on the university's web-based learning management system - LEARN. To log into LEARN go to <http://learn.uwaterloo.ca/>

Intellectual Property: Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

- Lecture content, spoken and written (and any audio/video recording thereof);
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
- Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

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. The University's guiding principles on academic integrity can be found here:

<http://uwaterloo.ca/academicintegrity>. ENV students are strongly encouraged to review the material provided by the university's Academic Integrity office specifically for students:

<http://uwaterloo.ca/academicintegrity/Students/index.html>

Students are also expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for their actions. Students who are unsure whether an action constitutes an offense, or who need 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. Students may also complete the following tutorial:

<https://uwaterloo.ca/library/get-assignment-and-research-help/academic-integrity/academic-integrity-tutorial>

When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline: <https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71>. Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance:

<https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-70>

Note for students with disabilities: [AccessAbility Services](#), located in Needles Hall, Room 1401, 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 [AccessAbility Services](#) at the beginning of each academic term.

Mental Health: The University of Waterloo, the Faculty of Environment and our Departments/Schools consider students' well-being to be extremely important. We recognize that throughout the term students may face health challenges - physical and / or emotional. **Please note that help is available.** Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services <http://www.uwaterloo.ca/counselling-services> is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

Religious Observances: Students need to 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.

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. See Policy 70 - Student Petitions

and Grievances, Section 4, 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

Communications with Instructor and Teaching Assistants: All communication with students must be through either the student's University of Waterloo email account or via Learn. If a student emails the instructor or TA from a personal account they will be requested to resend the email using their personal University of Waterloo email account.

Recording lectures: Use of recording devices during lectures is only allowed with explicit permission of the instructor of the course.

- If allowed, video recordings may only include images of the instructor and not fellow classmates.
- Posting of videos or links to the video to any website, including but not limited to social media sites such as: facebook, twitter, etc., is strictly prohibited.

Unclaimed Assignments: Unclaimed assignments will be retained until one month after term grades become official in quest. After that time, they will be destroyed in compliance with UW's confidential shredding procedures.