

Climate Change and Health (EHOH 6635)

Short title: Climate Change & Health
Course Syllabus, Fall 2016

Class meeting times: Tuesdays and Thursdays, 4:00-5:20

Location: Ed 2 South 1307

Instructors: Elizabeth Carlton
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Office: Building 500, 3rd Floor, E3320
Office hours: Thursdays, 3:00-4:00

Rosemary Rochford
Department of Environmental and Occupational Health, CSPH
Department of Immunology, School of Medicine
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Office: 12800 E 19th Ave, Bldg. RC1 North Room P18-9103
By appointment

Jay Lemery, Department of Emergency Medicine, School of Medicine
Email: john.lemery@ucdenver.edu
Office: Leprino Building
By appointment

Credit Hours: 3 credits

Course Format: Lectures, discussions and workshops

Prerequisites: EHOH 6614

What are the implications of climate change for public health? What populations are most vulnerable to climate change? How can we, as public health professionals, intervene to prevent or reduce harm?

In this course, we will study the major implications of climate change for human health. We will develop skills to understand climate predictions, estimate potential health impacts, identify vulnerable populations, and evaluate interventions to help populations adapt to a changing climate. Climate change promises to affect many populations: outdoor workers and the home-bound, children and the elderly, populations here in Colorado, the US and abroad. We will examine the health challenges of climate change from the perspective of many of these stakeholders. We will also emphasize a multi-disciplinary approach to addressing climate health challenges. Guest lecturers will include atmospheric scientists, clinicians, public health practitioners, epidemiologists and social scientists. Similarly, we encourage students from across the Colorado School of Public Health to take this class – our class will benefit from the diverse perspectives of students from across different departments and professional backgrounds. Effective public health response to

climate change will require cross-cutting skills including the ability to rigorously evaluate the science, identify vulnerable populations, communicate with stakeholders and work across disciplines to promote health in a changing climate.

Catalog Description. We will study the potential health impacts of climate change with an emphasis on understanding the state of the science, and developing skills to identify vulnerable populations, evaluate climate adaptation and mitigation measures and communicate with stakeholders. Prereq: EHOH 6614.

CSPH Competencies addressed. Successful completion of this course will help the student to achieve the following public health competencies

- CN-EHOH 1. Apply the range of epidemiologic methods in the analysis of environmentally determined health and the strengths and limitations of these methods.
- CN-EHOH 4. Describe important current and emerging environmental health problems and variations in health risks across the global landscape.
- CN-EHOH 5. Define the principles of sustainability and apply these principles in the development of solutions to environmental and occupational health problems.
- CN-EHOH 9. Explain the scientific characteristics, including exposure and mode of action, of major biological, chemical, physical hazards that result in human health risk.
- CN-EPID 1. Appropriately use descriptive epidemiologic methods to describe a given condition including measures of prevalence, incidence, morbidity, mortality, demographic characteristics and risk factors.
- CN-EPID 3. Critically review and interpret public health and other scientific literature to identify strengths and weaknesses of individual studies, to synthesize evidence in a research area, to identify gaps in evidence and to demonstrate relevance of current knowledge to the practice of public health.
- CN-CBHS 7. Use clear, concise, and compelling oral, written, and visual methods for communicating program descriptions and study findings.
- CN-CBHS 8. Effectively engage and collaborate with communities and stakeholders, in an equitable and ethical manner, including developing a work plan, communicating effectively and disseminating results.
- CN-GLH 2. Describe contemporary and historic global health issues, programs, best practices and players.
- CN-GLH 3. Apply critical thinking to the political, economic and ethical issues in global health.
- CN-GLH 4. Identify and recommend public health field methods in the global arena and their correct application.
- CR-CC 1 Define, assess and report on the health status of populations, determinants of health and illness, and factors contributing to health promotion and disease prevention.
- CR-CC 3 Communicate effectively both in writing and orally with policy makers, professionals, and the public.
- CR-CC5 Identify, retrieve, appraise, and apply scientific evidence relevant in the practice of public health.
- CR-CC6 Describe and utilize leadership, team building, negotiation, and conflict resolution skills to collaborate and build partnerships for the purpose of improving the public's health.
- CR-CC 8 Define a public health problem and specify an analytic approach.

Assignments and Grading. To be successful in this course, you are expected to learn key concepts about the health impacts of climate change, and demonstrate your ability to apply these concepts to specific examples. There are a total of 1000 points available in this class. The course includes the following assignments, points are indicated in parentheses.

- Journal club (400 points). There will be 6 journal clubs throughout the semester. For each journal club, you will be asked to critically evaluate the assigned reading and write a brief response. Assignments will be posted online and will be due before class. Come to class prepared to discuss your response. You will also be asked to lead one journal club discussion.
- Class participation (100 points). We expect you to attend class and be an active participant – show us you are thinking about the course material! Come to class with questions – for your classmates, for your instructors and for guest lecturers. Class participation will be based on the following criteria: active participation, evidence of preparation, and quality of contribution.
- Climate health vulnerability assessment (500 points). Using the climate and health vulnerability assessment framework we will discuss in class, evaluate the potential impacts of climate change and adaptation measures for a specific health outcome and region. Students will be expected to review the literature and provide a critical assessment of health vulnerabilities to climate change and an evaluation of potential interventions to prevent harm. In addition, students will be required to identify and meet with at least one potential stakeholder to discuss the potential vulnerabilities and challenges. This assignment is intended to challenge you to apply the concepts studied in class to a concrete climate-health problem. It is also intended to teach critical communication and team-work skills. More details of the assignment will be provided in class.

Grades will be assigned as follows.

<u>Points</u>	<u>Grade</u>	<u>Points</u>	<u>Grade</u>
934-1000	A	800-833	B-
900-933	A-	767-799	C+
867-899	B+	734-766	C
834-866	B	700-733	C-

Readings and resources. Readings will be assigned from the course textbook:

Luber and Lemery (eds.) 2015. Global Climate Change and Human Health, from Science to Practice. Jossey-Bass. San Francisco.

The textbook is available at the CU Anschutz Bookstore (cuanschutz.bncollege.com).

In addition, assigned readings will include reports from groups such as the Intergovernmental Panel on Climate Change (IPCC), the World Health Organization, US Federal and state governments, peer-reviewed literature and popular media. These readings will be posted on the course website.

Please complete assigned readings **before** class.

Attendance Policy. Students are expected to attend class and be active participants in class. Please silence all cell phones and beepers. If you would like to use laptops and/or tablets in class, limit your activities to those relevant to class.

Course website. Readings, assignments and announcements will be posted on the course website. Please check this website regularly.

Academic Conduct Policy. All students are expected to abide the Honor Code of the Colorado School of Public Health. Unless otherwise instructed, all of your work in this course should represent completely independent work. Students are expected to familiarize themselves with the Student Honor Code that can be found at http://www.ucdenver.edu/academics/colleges/PublicHealth/resourcesfor/currentstudents/academics/Documents/PoliciesHandbooks/CSPH_Honor_Code.pdf or in the Policies and Handbooks section under Student Resources of the ColoradoSPH website. Any student found to have committed acts of misconduct (including, but not limited to cheating, plagiarism, misconduct of research, breach of confidentiality, or illegal or unlawful acts) will be subject to the procedures outlined in the CSPH Honor Code.

Citing other sources. When you use outside information in your writing, you must cite the sources of information. Any information quoted directly from another publication or website must be indicated by quotation marks. Otherwise, you should use your own words to describe the findings/ideas of others and cite the source at the end of each thought or sentence. Please use the citation format used by the journal Environmental Health Perspectives (available [here](#)). Any text that is directly quoted from other sources without attribution will be considered a violation of the honor code.

Accommodations for Disabilities. Students requesting accommodations for a disability must contact one of the following people:

Sherry Holden | Coordinator

University of Colorado Anschutz Medical Campus Disability Resources & Services
Bldg. 500, Room Q20-EG 305A
Phone: (303) 724-5640, Fax (303) 724-5641
Part-time: Monday, Tuesday and Thursday
sherry.holden@ucdenver.edu

Selim Özi | Assistive Technology Specialist, Accommodation Coordinator

University of Colorado Anschutz Medical Campus Disability Resources & Services
Mail Stop A010, Building 500, Room Q20-EG 306
Phone: (303) 724 8428, Fax: (303) 724 5641
selim.oz@ucdenver.edu

Be aware that the determination of accommodations can take a long period of time. No accommodations will be made for the course until written documentation is provided by the Disability resources and services office to the course directors. It is the student's responsibility to coordinate approved accommodations with the Disability resources and services office in advance.

Further general Information regarding disability resources and services can be found at: <http://www.ucdenver.edu/student-services/resources/disability-resources-services/accommodations/Pages/accommodations.aspx>

Students can set up an appointment at: <http://www.ucdenver.edu/student-services/resources/disability-resources-services/about-office/contact-us-CUAnschutz/Pages/form.aspx>

COURSE SCHEDULE

Introductions

Aug 30 Introduction to Climate Change and Health Carlton, Rochford

Sept 1 Climate and health vulnerability assessments Carlton

Readings

- Textbook, Chapter 12: Climate and Health Vulnerability Assessments
- APHA. 2015. Adaptation in Action.
- Balbus JM, Malina C (2009) Identifying vulnerable subpopulations for climate change health effects in the United States. *J Occup Environ Med* 51: 33-37.

Climate science

Sept 6 Climate science, an introduction Caspar Amman, National Center for Atmospheric Research

Readings

- Textbook, Chapter 1: Primer on Climate Science

Sept 8 Journal club 1. The National Climate Assessment. Carlton

Readings

- Walsh JD et al. 2014. Chapter 2: Our Changing Climate. In *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67.
- Pal JS, Eltahir EAB (2016) Future temperature in southwest Asia projected to exceed a threshold for human adaptability. *Nature Climate Change* 6: 197-200.
- Schar C (2016) CLIMATE EXTREMES The worst heat waves to come. *Nature Climate Change* 6: 128-129.

Sept 13 No class. Work on group projects.

Sept 15 No class

Final project deadline: topic due.

Frameworks for evaluating climate health risks

- Sept 20 Defining climate health risks Andrew Monaghan,
National Center for
Atmospheric Research
- Reading
- Smith KR et al. 2014. Human health: impacts, adaptation, and co-benefits. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects*. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

- Sept 22 Predicting health impacts of climate change Carlton
- Reading
- Chapter 13. Climate Change Health Impact Predictions: Looking into the Future.
 - Longstreth J (1991) Anticipated public health consequences of global climate change. *Environ Health Perspect* 96: 139-144.
 - McMichael AJ (2001) Global environmental change as "risk factor": can epidemiology cope? *Am J Public Health* 91: 1172-1174.

Climate health risks and vulnerabilities: Heat and disasters

- Sept 27 Climate change, heat and health effects Brooke Anderson,
Colorado State University
- Reading
- Textbook, Chapter 5: Ozone, Oppressive Air Masses, and Degraded Air Quality
 - White-Newsome JL, et al. (2014) Survey of county-level heat preparedness and response to the 2011 summer heat in 30 U.S. States. *Environ Health Perspect* 122: 573-579.
 - Anderson GB (2014) Commentary: Tolstoy's heat waves: each catastrophic in its own way? *Epidemiology* 25: 365-367.

Sept 29	Journal Club 2. Predictions.	Carlton
	<p>Readings</p> <ul style="list-style-type: none"> • Hodges M, et al. (2014) Delays in reducing waterborne and water-related infectious diseases in China under climate change. <i>Nature Clim Change</i> 4: 1109-1115. • Kolstad EW, Johansson KA (2011) Uncertainties associated with quantifying climate change impacts on human health: a case study for diarrhea. <i>Environmental Health Perspectives</i> 119: 299-305. 	
Oct 4	Climate change and disasters	Lemery
	<p>Reading</p> <ul style="list-style-type: none"> • Textbook, Chapter 2: Extreme Weather Events: The Role of Public Health in Disaster Risk Reduction as a Means for Climate Change Adaptation 	
Oct 6	Journal club 3. Preparing for disasters.	Rochford
	<p>Reading</p> <ul style="list-style-type: none"> • Hess, J. J., Heilpern, K. L., Davis, T. E., & Frumkin, H. (2009). Climate change and emergency medicine: impacts and opportunities. <i>Academic Emergency Medicine</i>, 16(8), 782-794. • Klinenberg E. (2002) Heatwave. Chapter 1. Dying Alone. 	
Oct 11	Heat and metabolic disease	Richard Johnson, University of Colorado School of Medicine
	<p>Reading</p> <ul style="list-style-type: none"> • Glaser J, Lemery J, Rajagopalan B, Diaz HF, Garcia-Trabanino R, et al. (2016) Climate Change and the Emergent Epidemic of CKD from Heat Stress in Rural Communities: The Case for Heat Stress Nephropathy. <i>Clin J Am Soc Nephrol</i> 11: 1472-1483. • CIRES. 2016. Climate Change's Likely Role in Kidney Disease Epidemics. • Roncal-Jimenez C, Garcia-Trabanino R, Barregard L, Lanaspá MA, Wesseling C, et al. (2016) Heat Stress Nephropathy From Exercise-Induced Uric Acid Crystalluria: A Perspective on Mesoamerican Nephropathy. <i>Am J Kidney Dis</i> 67: 20-30. 	
Oct 13	In class workshop for final projects	Carlton, Lemery

Climate health risks and vulnerabilities: Rainfall, drought and infectious diseases

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| Oct 18 | Climate change and the hydrological cycle

Final project deadline: First team and self-assessment due.

Reading <ul style="list-style-type: none">• Textbook. Chapter 4: Changes in Hydrology and Its Impacts on Waterborne Disease• Rajagopalan B, Molnar P (2014) Combining regional moist static energy and ENSO for forecasting of early and late season Indian monsoon rainfall and its extremes. <i>Geophysical Research Letters</i> 41: 4323-4331. | Balaji Rajagopalan,
University of Colorado,
Boulder and CIRES |
| Oct 20 | Food insecurity

Reading <ul style="list-style-type: none">• Textbook, Chapter 9: Addressing the Challenges of Climate Change to Food Security, Safety, and Nutrition | Nancy Krebs, University
of Colorado School of
Medicine |
| Oct 25 | Malaria and Climate Change

Readings <ul style="list-style-type: none">• Siraj et al., 2014. Altitudinal changes in malaria incidence in the highlands of Ethiopia and Colombia. <i>Science</i> 07Mar2014. 343(6175): 1154-1158.• Textbook, Chapter 8: Climate and impact on vector borne diseases, pp221-231 | Rochford |
| Oct 27 | Zika and Climate Change (POSTPONED to 12/6)

Readings <ul style="list-style-type: none">• Textbook, Chapter 8: Climate and impact on vector borne diseases, pp231-238.• Monaghan AJ, Morin CW, Steinhoff DF, Wilhelmi O, Hayden M, et al. (2016) On the Seasonal Occurrence and Abundance of the Zika Virus Vector Mosquito <i>Aedes Aegypti</i> in the Contiguous United States. <i>PLoS Curr</i> 8. | Mary Hayden, National
Center for Atmospheric
Research |

Nov 1 Climate change and health George Luber, National Center for Environmental Health, CDC
Class will be held in Education 1 Room 1400

Reading

- Hess JJ, Schramm PJ, Luber G (2014) Public health and climate change adaptation at the federal level: one agency's response to Executive Order 13514. *Am J Public Health* 104: e22-30.

Nov 3 Climate change and waterborne diseases Carlton

Final project deadline: First draft for peer review due.

Readings

- Levy K, et al. (2016) Untangling the Impacts of Climate Change on Waterborne Diseases: a Systematic Review of Relationships between Diarrheal Diseases and Temperature, Rainfall, Flooding, and Drought. *Environ Sci Technol* 50: 4905-4922.

Nov 8 Journal club 4. Climate change and water-borne diseases. Carlton

Readings

- Trtanj, JL et al. 2016: Ch. 6: Climate Impacts on Water-Related Illness. *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. U.S. Global Change Research Program, Washington, DC, 157-188.
- Wade TJ, et al. (2004) Did a severe flood in the Midwest cause an increase in the incidence of gastrointestinal symptoms? *Am J Epidemiol* 159: 398-405.

Nov 10 Peer-review workshop Carlton, Rochford

Final project deadline: Written comments for peer-review due.

Engaging health communities on climate change

Nov 15 Engaging health communities on climate change Lemery

Readings

- Textbook, Chapter 16: Climate Change Communication

Nov 17	Planetary Health	David Goff, Colorado School of Public Health
	<p>Readings</p> <ul style="list-style-type: none"> • Whitmee S, et al. (2015) Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation-Lancet Commission on planetary health. <i>Lancet</i> 386: 1973-2028. <i>Focus on the executive summary. Please also chose one other section that is of interest to you and read that section in depth.</i> 	
Nov 22	Journal Club 5. Climate change and human health in the news, AND “Economic Impact of Emerging Infectious Diseases”	Rochford and Naveed Heydari
	<p>Readings</p> <ul style="list-style-type: none"> • Shepard DS, Coudeville L, Halasa YA, Zambrano B, Dayan GH (2011) Economic impact of dengue illness in the Americas. <i>Am J Trop Med Hyg</i> 84: 200-207. 	
Nov 29	Climate change as an occupational health issue	Lee Newman
	<p>Readings</p> <ul style="list-style-type: none"> • Applebaum KM, et al. (2016) An Overview of Occupational Risks From Climate Change. <i>Curr Environ Health Rep</i> 3: 13-22. 	
Climate change adaptation, mitigation and co-benefits		
Dec 1	Climate change mitigation and adaptation, an international perspective AND Co-benefits of Climate Mitigation	Lemery, Carlton
	<p>Readings</p> <ul style="list-style-type: none"> • Textbook, Chapter 17: International Perspective on Climate Change Adaptation • Textbook, Chapter 18: Health Cobenefits of Climate Mitigation 	
Dec 6	Zika and Climate Change (rescheduled)	Mary Hayden, National Center for Atmospheric Research
	<p>Readings</p> <ul style="list-style-type: none"> • Textbook, Chapter 8: Climate and impact on vector borne diseases, pp231-238. • Monaghan AJ, Morin CW, Steinhoff DF, Wilhelmi O, Hayden M, et al. (2016) On the Seasonal Occurrence and Abundance of the Zika Virus Vector Mosquito <i>Aedes Aegypti</i> in the Contiguous United States. <i>PLoS Curr</i> 8. 	

Dec 8 Journal Club 6. Mitigation and adaptation. Carlton, Rochford

Conversation with Taryn Finnessey, Senior Climate Change Specialist, Colorado Water Conservation Board

Readings

- Colorado Climate Plan. 2015.

Dec 13 Student presentations

Dec 15 Student presentations

Dec 16 No class. Final papers, second group- and self-assessment due at 5pm.