

CLIMATE CHANGE AND HUMAN HEALTH

General Information

Course number: PUBH-EHS 632

Students: Undergraduates, graduates, and professionals

Credit: 4

Time: 8:00-11:18 am, Mondays and Wednesdays, June 20 to July 20, 2011

Instructor

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Course Basic Description

Some people may be skeptical about global warming. However, there seems no doubt that the global climate has been changing. Global climate change may have considerable direct and indirect impacts on human health. These impacts could include excessive heat-related illnesses, vector- and waterborne diseases, increased exposure to environmental toxicants, and exacerbation of cardiovascular and respiratory diseases due to declining air quality. This course will be based on scientific facts, focusing on both natural phenomena and anthropogenic activities, with emphasis on associations between disease initiation and progression in humans. It will also serve as a platform for the students to participate in discussion and debate on these issues.

EHS Core Competencies

1. Discuss the significance of the environment to population health.
2. Discuss pollutant chemical and physical factors as well as human physiologic factors that influence human exposure and the uptake of environmental contaminants.
3. Identify approaches for assessing and controlling environmental agents and strategies for reducing risks to human health.
4. Recognize individual (e.g., genetic, physiologic and psychosocial) and community (poverty, social, built, economic, race) susceptibility factors that influence population health.
5. Discuss environmental justice and its significance as a public health issue.
6. Identify federal and state regulatory programs, guidelines and authorities relevant to environmental health.

EHS Specialization Competencies in Addition to Core

1. Outline the health threat that natural and anthropogenic contaminants in the environment can pose to population health.
2. Define, recognize, and explain environmental justice and its significance as a public health issue.
3. Describe federal and state regulatory programs, guidelines and authorities relevant to environmental and occupational health.
4. Access state, federal, and local resources for assessing environmental and occupational health.
5. Determine the role of exposure assessment in environmental and occupational health.

Learning Objectives

Upon completion of this course, students will be better prepared to:

1. Recognize the current controversial issues about climate change, including global warming.
2. Summarize the evidence about climate change on human health.
3. Identify major human diseases associated with climate change and possible mechanisms.

4. Discuss and debate major climate changes and human health effects.
5. List possible actions and further research about climate change with human health impact.

Required Textbook and Readings

1. *Seasonal Forecasts, Climatic Change and Human Health*. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. OSU Web E-book. CALL # RA793.S42
2. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007:
http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm
3. *The Republican War on Science*. (2005) Chris Mooney. OSU library CALL # Q175.52.U5 M66 2005

Course Format

Each class session will consist of lecture, discussion and debate. The lecture will consist of introduction, key notes, current controversy, and summary, which will be followed by a quiz. The discussion and debate will be facilitated by the instructor, and actively participated in by the students.

Prerequisites

Undergraduates rank 3 or higher, and no prerequisite for graduates.

Class Expectations

1. The students are expected to attend each lecture and participate in class discussions. Each class will consist of a lecture, a class discussion (and debate), and a quiz. The lecture will cover the key points of the concepts and summarize the chapter. Therefore, attendance is critical to master course material.
2. The students are expected to complete one case report as the final examination. Each student chooses one topic, which is related to climate change and has significant impact on individual human or public health. The detailed requirements about the case report will be provided and explained during the course.
3. In order to receive points from the quizzes in the class, students are expected to attend lectures and complete in-class quizzes (see below). These points may not be made-up unless a student is unable to attend class for serious reasons, in which case she or he should contact the instructor immediately, if not in advance.

Grades

In-class quiz (3 points each class, 57 points) and final examination (case report, 43 points). The quizzes are primarily questions with true/false answers.

Case Report: Each student chooses one specific case, which is related to climate change and has significant impact on human individual or public health, introduce and summarize it with own analysis/critique in writing with 2-page minimum for undergraduates and 4-page for the graduates and professionals. Detailed requirement will be provided in the class meeting.

<u>Final Percentage</u>	<u>Letter Grade</u>
100-94	A
93-90	A-
89-87	B+
86-84	B
83-80	B-
79-77	C+

76-74	C
73-70	C-
69-60	D
Less than 60	E

Academic Integrity

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Academic misconduct includes (but is not limited to) plagiarism, unauthorized collaboration, copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Students should know and follow procedures for proper attribution and citation of the written work of others. Further examples of academic misconduct can be found in the Student Handbook. Ignorance of the Code of Student Conduct and the Student Handbook is never considered an excuse for academic misconduct. Any suspected violation of the Code of Student Conduct will be forwarded to the Committee on Academic Misconduct.

Accommodation for Special Needs

If you need an accommodation based on the impact of a disability, you should contact me to arrange an appointment as soon as possible. At the appointment, we can discuss the course format, anticipate your needs and explore potential accommodations. I rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you believe you need accommodation and have not previously contacted the Office for Disability Services, I encourage you to do so (more information available at <http://www.ods.ohio-state.edu/>).

Course Schedule

Class 1:

Lecture 1. Introduction to Climate Change and Global Warming

This lecture will introduce some fundamental concepts, terminations, and related issues, such as global warming, greenhouse effects and Kyoto Protocol.

Readings: Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 1

Lecture 2. Historical Overview of Climate Change Science and its Association with Health Issues

This lecture is to describe the fundamental nature of earth science, and the history of climate change science using a wide-ranging subset of examples and its association with health issues.

Readings: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007: 1

Class 2:

Lecture 3. Health Risks of Carbon Capture and Storage

This lecture will introduce the potential health risks of carbon capture and storage (CCS), which in theory would prevent carbon dioxide produced from coal-fired power plants from reaching the atmosphere.

Readings:

1. John Fogarty and Michael McCally. Health and Safety Risks of Carbon Capture and Storage. JAMA. 2010;303:67-68
2. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007: 2-5

Lecture 4. Public Health Benefits From Air Pollution Mitigation

This lecture is to introduce the public health benefits from the potential for cap and trade legislation to contribute to reductions in levels of greenhouse gases and other harmful air pollutants

Readings:

1. Christopher D. Barr; Francesca Dominici. Cap and Trade Legislation for Greenhouse Gas Emissions: Public Health Benefits From Air Pollution Mitigation. JAMA. 2010;303:69-70
2. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007: 5-8

Class 3:

Lecture 5. Health Impact of Climate Projections-Global

This lecture will introduce the health impact of climate change in a global level and pattern.

Readings: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007: 9 & 10

Lecture 6. Health Impact of Climate Projections- North America

This lecture will focus on the health impact of specific climate change projections in the US.

Readings: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007: 11

Class 4:

Lecture 7. Health Impact of Climate Projections- Other Regions

This lecture will summarize the health impact of specific climate change projections in other regions, such as Asia, Africa, Polar Regions and small islands.

Readings:

1. Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 5
2. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007: Chapter 9-12

Lecture 8. Climate Change, Politics, and Policy-making on Health Impact

This lecture will focus on political action about change in laws and regulations that relate to climate change, such as tax incentives, greenhouse gas emissions on human health impact.

Readings:

1. IPCC Fourth Assessment Report: Climate Change 2007: III, Chapter 13
2. Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 11

Class 5:

Lecture 9: Health Effects: Infectious Diseases

This lecture will focus on major infectious diseases transmitted primarily via parasitic, bacteria or viruses, such as malaria, cholera, and Dengue hemorrhagic fever.

Readings: Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 3, 4, & 5.

Lecture 10. Health Effects: Non-infectious Disease

This lecture will focus on major non-infectious diseases, such as cardiovascular diseases and cancer.

Readings: Jonathan A. Patz, et al. Impact of regional climate change on human health. Nature. 2005;438:310-317

Class 6:

Lecture 11. Health Effects: Impacts of Air Pollution

This lecture will focus primarily on the impact of fossil fuel and air quality on human health and diseases.

Readings:

1. Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 10.
2. Bernard, et al. The Potential Impacts of Climate Variability and Change on Air Pollution-Related Health Effects in the United States. Environ Health Perspect 109(suppl 2):199–209 (2001).

Lecture 12. Health Effects: Impacts of Temperature Changes

This lecture will focus on the role of the extreme change in temperature (heat or cold waves) on human health and disease development.

Readings:

1. Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 8 & 9.
2. McGeehin and Mirabelli. The Potential Impacts of Climate Variability and Change on Temperature-Related Morbidity and Mortality in the United States. Environ Health Perspect 109(suppl 2):185–189 (2001).

Class 7:

Lecture 13. Health Effects: Impacts of Extreme Weather Events

This lecture will focus on the role of the extreme weather events (floods, landslides, storms, cyclones, and droughts) on human health and disease development.

Readings: Greenough, et al. The Potential Impacts of Climate Variability and Change on Health Impacts of Extreme Weather Events in the United States. Environ Health Perspect 109(suppl 2):191–198 (2001).

Lecture 14: Health Effects: Changes in Food and Nutrition

This lecture will introduce the impact of changes in food-crop farming, livestock production, industrial crops, and global food trade and food security on human health.

Readings: Rose, et al. Climate Variability and Change in the United States: Potential Impacts on Water and Foodborne Diseases Caused by Microbiologic Agents. Environ Health Perspect 109(suppl 2):211–221 (2001).

Class 8:

Lecture 15: Health Effects: Cumulative Effects and Multiple Stresses

This lecture will introduce multiple environmental stresses from natural, managed, and socioeconomic systems on human health and disease development.

Readings:

1. IPCC. II. Chapter 8.
2. Seasonal Forecasts, Climatic Change and Human Health. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 7

Lecture 16. Health Effects: Impacts on Vulnerable Populations

This lecture will focus on climate change on the health of some vulnerable populations, such as children, elderly, and people with certain disease conditions.

Readings:

1. Environmental Health Perspectives. 2007;115:A196-A203
2. Perera, Children Are Likely to Suffer Most from Our Fossil Fuel Addiction. Environmental Health Perspectives. 2008;116:987–990.

Class 9:

Lecture 17. Significant Cases of Climate Change and Human Adaptation-1

This lecture will introduce historical cases about human adaptation to climate change, such as the abandonment of Viking settlements in Greenland.

Readings: Orlove. Human adaptation to climate change: a review of three historical cases and some general perspectives. *Environmental Science & Policy* 8 (2005) 589–600

Lecture 18. Significant Cases of Climate Change and Human Adaptation-2

This lecture will introduce historical cases about human adaptation to climate change, such as the US dust bowl.

Readings: Orlove. Human adaptation to climate change: a review of three historical cases and some general perspectives. *Environmental Science & Policy* 8 (2005) 589–600

Class 10:

Lecture 19: Recent Developments and Next Steps in Climate Change and Human Health

This lecture will introduce possible strategies in partnership development, global collaboration, new assessment methodologies, the characterization of future conditions, and its impact on human diseases.

Readings: *Seasonal Forecasts, Climatic Change and Human Health*. (2008) Edited by Madeleine C. Thomson, Ricardo Garcia-Herrera and Martin Beniston. Chapter 6 & 11 and their supplements