

HUMAN HEALTH AND GLOBAL ENVIRONMENTAL CHANGE

HMS Course HO-703/HSPH Course EH-278

The Cannon Room, Building C

Wednesdays, Lectures from 1:30-4:30 PM, Section Meetings from 4:30-5:30 PM

Course website: http://chge.med.harvard.edu/education/course_2007/index.html

Course Directors

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Course Description

Human activity is changing the atmosphere and altering terrestrial and marine ecosystems on a global scale for the first time in history. Evidence is mounting that these changes may already be having serious effects on human health, and there is growing concern that in coming decades the effects could be catastrophic. This course was developed because the practice of medicine and of public health science in the next century will demand an understanding of the relationship between human health and the global environment, a relationship that is rarely addressed in current medical and public health school curricula. Physicians and public health experts need to acquire this understanding, as they will be called upon increasingly in years to come to help formulate global environmental policies and to help explain the human implications of these policies to the public. The course is also designed for students of environmental science and public policy, journalism and business to provide a solid background concerning the health dimensions of global environmental change.

The course provides an overview of the basic physical, chemical, and biological dimensions of global environmental degradation, and of the potential consequences of these changes for human health. It covers global climate change, the effects of toxic substance pollution on ecosystems, changes in terrestrial and marine environments, and the loss of species and biodiversity. The role of rapidly growing human populations, resource consumption and the generation of wastes, plus the overall human domination of the earth's biological productivity are key drivers of change. Ethical and social considerations will also be covered, as well as the economic and policy implications. Moreover, this course addresses solutions being proposed on local, national and international scales to address the issues raised. A multi-disciplinary faculty provides an integrated approach to assessing the problems and designing the solutions.

Grading

Students will have the option of pass/fail grades (available by registering either through Harvard Medical School or the Harvard School of Public Health) or ordinal grades (available only through the Harvard School of Public Health). The course may be taken for 2.5 credits (HSPH students only), or 5 credits. Final grades will be based on the following criteria:

Students enrolled for 5 credits

Participation	30%
Midterm Quiz	30%
Final Paper and Presentation	40%

Students enrolled for 2.5 credits

Participation	40%
Midterm Quiz	30%
Final Op-Ed	30%

Sections

Each student will be assigned to one of four sections led by one of the course faculty. The sections will meet for an hour following each lecture, and will provide an opportunity for students to interact with the lecturers and discuss course topics in an intimate setting.

Course Requirements

Students taking this course for 5.0 credits will be expected to complete weekly reflections, a take-home midterm quiz, write a 15-25 page paper, and to present their results at a final presentation session. HSPH students enrolled for 2.5 credits will be expected to complete weekly reflections, a take-home midterm quiz and write an op-ed.

All students are expected to read the required reading material prior to each lecture. Nearly all of the material is posted online on the course website: http://chge.med.harvard.edu/education/course_2007/index.html. If an article is not available in digital format, photocopies will be distributed in class the week prior to the lecture. From the course readings, each student should prepare a question for one of the lecturers for the subsequent course meeting. Students will be expected to attend all course meetings and to take an active role in discussion during the section meetings. If you will be absent for a course meeting, please notify the TA assigned to your section.

Weekly Reflections

These are discussions of the lecture topics, each no longer than 250 words, done in preparation for the lecture on the day they are due. Please cite and make reference to the primary readings for the day in your text. You may also choose to integrate current news topics. The reflections will be collected by your section leader. They will not be graded, but will be considered part of your class participation. Weekly reflections will not be due April 11, April 18, April 25, May 2, and the date of the op-ed presentation for 2.5 credit students.

Papers

Those taking the course for 5.0 credits will prepare a research paper. Students are encouraged to work in groups to prepare the final papers and presentations. The Teaching Assistants will provide support for these group projects, as well as to individuals choosing to work on their own.

Guidelines for Paper

Papers written individually should be 15-25 pages in length (not including title page, table of contents, abstract/executive summary, graphs, tables, references, and appendices), double-spaced, with 1" margins all around. Papers must be printed in a legible font (proportional font is okay, but not smaller than Courier 10 in size). If a group paper, each student's section should be 10-15 pages, with the author of each section indicated. One student will take responsibility for the abstract. You may choose to write the final paper in the form of an extended magazine article, as in *The New Yorker* or *The Atlantic Monthly*. These are expected to be about 7,000 words and are to include references.

- Provide title page, with all authors, and for each author, mailing and email addresses.
- Provide an abstract or executive summary capturing the main points of the paper (1-2 pages).
- Paper should be referenced.
- If you provide details too cumbersome for the paper itself, please include as Appendices.
- Use subtitles to break up the text to give the reader a sense of the overall direction of the paper.
- In addition to the paper copy, please submit an electronic version of the paper via email or diskette.
- Please standardize all citations.

Paper Deadlines:

- **March 7:** Submit a proposed title to your section leader. If you will work in a group, one topic for the group should be submitted along with an outline of each person's subtopic. We encourage you to work in groups, particularly across disciplines -- e.g., medical/public health/policy. The maximum group size is five students. A list of sample paper topics from past courses is available at http://chge.med.harvard.edu/education/course_2006/papertopics.html.
- **March 14:** Provide a one paragraph rationale of your paper to your section leader. We will continue to fine tune paper topics and facilitate collaboration of groups in section.
- **April 4:** Please submit a one page double-spaced outline of your paper, with subheadings. If working in a group, describe the subtopics and who is responsible for each area.
- **April 4-April 27:** Section leaders and TAs will provide feedback (directly or via email) concerning your outlines.
- **April 30:** Final PowerPoint presentations are due at the Center. Please drop them off at the Center or e-mail them to margaret_thomsen@hms.harvard.edu
- **May 2:** Make final presentations to section leaders, TAs and classmates. Final papers due at presentation.

Op-Eds

These are opinion pieces on a particular issue relevant to health and global environmental change. The length is 700-800 words. The first drafts will be handed out in your section for discussion about the organization of content and “messaging.” You will then be expected to revise the draft and hand in the final at the end of the course. You may also choose to submit them for publication.

Final Presentation

5.0 students will present a brief summary of their paper with PowerPoint slides on May 2. Details about length requirements will be handed out in section.

Academic Honesty Policy

This course will abide by the same standards of academic policy that the Harvard School of Public Health dictates. Applicable standards for this course, from the HSPH Student Handbook, are as follows:

All work submitted to meet course requirements is expected to be a student's own work. In the preparation of work submitted to meet course requirements, students should always take great care to distinguish their own ideas and knowledge from information derived from sources. Whenever ideas or facts are derived from a student's reading and research the sources must be indicated. The term "sources" includes not only published primary and secondary material, but also information and opinions gained directly from other people. The responsibility for using the proper forms of citation lies with the individual student. Quotations must be placed within quotation marks, and the source must be credited. All paraphrased material also must be completely acknowledged.

Unless otherwise specified, take-home examinations are given with the understanding that students may consult notes and references, but not other students. Students who submit work either not their own or without clear attribution of its sources may be subject to disciplinary action including the possibility of being required to withdraw from the school.

Course Agenda and Reading List (To Be Updated Throughout the Semester)

Most readings are available on the course website, http://chge.med.harvard.edu/education/course_2007/index.html. If a reading is not available digitally, a paper copy will be distributed one week prior to the lecture, at the start of class.

January 31 Introduction

- 1.) Introduction and Course Overview—Paul R. Epstein MD, MPH, Harvard Medical School
- 2.) Why We Are Giving This Course—Eric Chivian MD, Harvard Medical School
 - Hardin G. The tragedy of the commons. *Science* 1968; 162:1243-1248.
 - Hardin G. Extensions of 'The Tragedy of the Commons.' *Science* 1998; 280:682-683.
 - Kennedy D. Sustainability and the commons. *Science* 2003; 302:1861.
 - McMichael AJ. Population, environment, disease, and survival: past patterns, uncertain futures. *Lancet* 2002; 359:1145-1148.
 - Raven P. Science, sustainability, and the human prospect. 2002. *Science*; 297:954-958.
- 3.) Environmental Health—Melissa Perry Sc.D., MHS, Harvard School of Public Health
- 4.) How to Prepare for this Course—Daniel A. Goodenough Ph.D., Harvard Medical School

February 7 The Ecological Context

- 5.) How Systems Work—Richard Levins Ph.D., Harvard School of Public Health
 - Levins R. Preparing for Uncertainty. *International Journal of Ecosystem Health*. 1995; 1(1):47-57. Digital copy not available.
- 6.) Symptoms of Distress: Emerging Diseases—Mary E. Wilson MD, Harvard Medical School
 - Fraser C, Riley S, Anderson RM, and Ferguson NM. Factors that make an infectious disease outbreak controllable. *PNAS*. 2004;101:6146-6151.
 - Kilpatrick AM, Chmura AA, Gibbons DW, Fleischer RC, Marra PP and Daszak P. Predicting the global spread of H5N1 avian influenza. *PNAS*. 2006;103:19368-19373.
 - Webster RG and Govorkova EA. H5N1 Influenza - Continuing Evolution and Spread. *New England Journal of Medicine*. 2006;355:2174-2177.
 - Wilson ME. Infectious diseases: an ecological perspective. *BMJ* 1995; 311:1681-4.

February 14 Biodiversity

- 7.) The Scope of Biodiversity—Stuart Pimm Ph.D., Duke University, Nicholas School
 - Pimm SL and Jenkins C. Sustaining the Variety of Life. *Scientific American*. September 2005. 66-73.
- 8.) Biodiversity: Its Importance to Human Health—Eric Chivian MD, Harvard Medical School
 - Chivian E. Species loss and ecosystem disruption - the implications for human health. *Canadian Medical Association Journal*. 2001; 164(1):66-9.
 - Chivian E ed. Biodiversity: Its Importance to Human Health, Interim Executive Summary. Boston, MA:Center for Health and the Global Environment, Harvard Medical School; 2002.
 - Chivian E, Bernstein A. Guest Editorial: Embedded in nature: Human health and Biodiversity. *Environmental Health Perspectives*. 2004; 112(1):A12-A13.
 - Chivian E, Roberts C, Bernstein A. Letter to the Editor: The threat to cone snails. *Science*. 2003; 302:391.
 - Thomas CD, Cameron A, Green RE, et al. Extinction risk from climate change. *Nature*. 2004; 427:145-148.
 - Walther G-R, Post E, Convey P, et al. Ecological responses to recent climate change. *Nature*. 2002; 416:389-395.

February 21 The Changing Climate

- 9.) The Science of Climate Change—James J. McCarthy Ph.D., Harvard University
 - Impacts of a Warming Arctic: Arctic Climate Impact Assessment Executive Summary. Cambridge, UK: Cambridge University Press; 2004.
- 10.) Climate Change and Health—Paul R. Epstein MD, MPH, Harvard Medical School
 - Epstein PR ed. *Climate Change Futures: Health, Ecological and Economic Dimensions Executive Summary*. Boston, MA; Center for Health and the Global Environment. November 2005.
 - Epstein PR. Climate change and human health. *New England Journal of Medicine*. October 2005; 353:1433-1436.

- February 28 Oceans of Change**
11.) Ocean Warming and Coral Reefs—Ray Hayes Ph.D., Howard University
• TBD
12.) Coral Reefs: Canaries in the Environmental Coal Mine—Nancy Knowlton, Ph.D., Scripps Institution of Oceanography
• TBD
- March 7 The Living Sea**
13.) Storms and the Oceans—Kerry A. Emanuel, Ph.D., Massachusetts Institute of Technology
• TBD
14.) Fisheries: A Global Assessment—Carl Safina, Ph.D., Blue Ocean Institute
• TBD
- March 14 Addressing Environmental Challenges**
15.) Media and the Environment—Steve Curwood, *Living on Earth*, NPR
• TBD
16.) Power Sources for the Future—Prabhu K. Rao Ph.D., Nuvera Fuel Cells
• TBD
- March 21 Harvard Research; Harvard's Responses**
17.) Plant Responses to a Changing Climate—Michele Holbrook, Ph.D., Harvard University
18.) Greening the Campus—Jack Spengler Ph.D., Harvard School of Public Health
- March 28 Break**
- April 4 Food Production and Consumption**
19.) Sustainable Farming—Fred Kirschenmann Ph.D., Iowa State University
• TBD
20.) Nutrition and Human Health—Joan Gussow Ed.D., M.Ed., Columbia University
• TBD
Midterm is handed out.
- April 11 Chemicals and Communities**
21.) Pesticides—Melissa Perry Sc.D., MHS, Harvard School of Public Health
• TBD
22.) Community Health: Alabama to South Africa and A Life Cycle Analysis of Nuclear Energy—Richard Clapp, D.Sc., MPH, Boston University
• TBD
Midterm is collected.
- April 18 Solutions**
23.) Healthy, Green Buildings—Bob Fox, AIA, Cook + Fox Architects
• TBD
24.) Banking: Investing in Our Common Future—Amy Davidsen, JPMorgan Chase
• TBD
- April 25 More Solutions and New Alliances**
25.) Smart Growth—Howard Frumkin MD, Dr.PH., National Ctr. for Environmental Health, CDC
• TBD
26.) Building Alliances—Jerome Ringo, The Apollo Alliance
• TBD
- May 2 Final Presentations**