

# **PubH 6103 Exposure to Environmental Hazards**

## **Course Syllabus**

### **Fall 2005**

**Credits: 2**

**Instructor:** Lead Instructor: Dr. Gurumurthy Ramachandran  
Co-Instructors: Dr. Peter Raynor

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**Course Time and Place:** Tu, Th 5:45-7:40 p.m. , Mayo D327

**Important Dates:**

#### **I. Course Description**

This course explores the concepts, assessment, and control of exposure to biological, physical and chemical hazards in the environment, placing these in the context of the multi-disciplinary scientific field of environmental health as an essential component of the wider field of public health. The course is comprised of lectures, examples, group discussions, and group presentations.

This course is one of three “core” courses designed to give students in the environmental health masters program a background in the important concepts of exposure, health effects (PubH 6104), and decision-making (PubH 6105).

#### **II. Learning Objectives**

This course will provide a basic context for understanding environmental health issues. It will describe various physical, chemical, biological and behavioral exposures; their sources,

occurrence, pathways, and receptors. The course will explore strategies for control based on interactions between the agent, host, and environment.

At the end of this course the student will be able to:

- Demonstrate knowledge about the sources, and nature of exposure to potentially harmful agents
- Integrate that knowledge into the larger context of environmental health and public health
- Identify options for intervention strategies
- Apply the knowledge-based conceptual skills developed to the understanding of practical “real-world” problems
- Demonstrate the ability to express what has been learned in a quantitative manner
- Appreciate the similarities and differences in exposure concepts across disciplinary boundaries
- Articulate what has been learned through effective oral and written communication.

### **III. Methods of Instruction and Work Expectations**

The course is comprised of lectures, examples, group discussions, and group presentations.

### **IV. Evaluation and Grading**

#### **Course Grading**

There will be one take-home final exam worth 40 points. There will be weekly quizzes (at the beginning of each lecture) that will be worth 30 points. The final oral presentation will be worth 30 points. This makes a total of 100 points. Extra credit work will not be accepted to improve the final grade. Assignment of final letter grades for the course will be based on the following guidelines:

- A Outstanding achievement relative to course expectations (approx. 90-100%)  
A-
- B+
- B Achievement above course expectations (approx. 80-90%)  
B-
- C+
- C Achievement meeting the minimum course expectations (approx. 70-80%)

C-

D+

D Achievement below minimum course expectations but sufficient to be awarded credit (approx 60-70%)

F No credit awarded (approx. below 60%)

**1. Grading Option** – Students may change the grading option without permission and as specified by the University without penalty during the initial registration period or during the first two weeks of the term. **The grading option may not be changed after the second week of the term.**

**2. Course Withdrawal** – School of Public Health students may withdraw from a course through the second week of the semester without permission. No “W” will appear on the transcript. After the second week students are required to do the following:

- a) The student must contact and notify their advisor and course instructor informing them of the decision to withdraw from the course.
- b) The student must send an e-mail to the SPH Student Services Center (SSC). The email must provide the student name, ID#, course number, section number, semester and year with instructions to withdraw the student from the course, and acknowledgement that the instructor and advisor have been contacted.
- c) The advisor and instructor must email the SSC acknowledging the student is canceling the course. All parties must be notified of the student’s intent.
- d) The SSC will complete the process by withdrawing the student from the course after receiving all emails (student, advisor, and instructor). A “W” will be placed and remain on the student transcript for the course.

After discussion with their advisor and notification to the instructor, students may withdraw up until the eighth week of the semester. There is no appeal process.

**3. Course Incomplete** – An incomplete grade is permitted only in cases of extraordinary circumstances and following consultation with the instructor. In such cases an “I” grade will require a specific written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. Extension for completion of the work will not exceed one year.

**Scholastic Dishonesty** – Students are responsible for knowing the University of Minnesota Board of Regents' policy on student conduct and scholastic dishonesty: <http://www.umn.edu/regents/policies/academic/StudentConduct.html>

Scholastic dishonesty as defined in the policy and will be reported to the Office of Student Judicial Affairs: <http://www.sja.umn.edu/> and will result in a grade of "F" or "N" for the entire

course.

Plagiarism is an important element of this policy. It is defined as the presentation of another's writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism, please consult University policies and procedures regarding academic integrity: <http://cisw.cla.umn.edu/plagiarism/uofmpolicies.html>.

Students are urged to be careful that they properly attribute and cite others' work in their own writing. For guidelines for correctly citing sources, go to <http://tutorial.lib.umn.edu/> and click on "Citing Sources".

In addition, original work is expected in this course. It is unacceptable to hand in assignments for this course for which you receive credit in another course unless by prior agreement with the instructor. Building on a line of work begun in another course or leading to a thesis, dissertation, or final project is acceptable. If you have any questions, consult the instructor.

**Students with Disability** - Any student with a documented disability (e.g., physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the instructor and Disability Services at the beginning of the semester. All discussions will remain confidential. For further information contact the University of Minnesota Disability Services website at <http://ds.umn.edu/> or call 612/626-1333 (V/TTY)

## V. Class Schedule:

9/06/05 **Introduction.** Course content, review of syllabus, student expectations, intro to web site, group assignments. What is environmental health? Historical context and interdisciplinary nature. "Big picture" issues. Concepts for organizing the course: physical, chemical, and biological agents; agent, environment, and host; hazard recognition, evaluation, and control; source, pathway, and receptor. Environmental hazards, exposures, and populations at risk. GR

9/08/05 **Concepts & issues in environmental hazards: residential environments, hazardous waste, environmental justice - GR**

9/13/05 **Concepts & issues in environmental hazards: air, climate - PR**  
Chemical and particulate contaminants of air; global climate change.

9/15/05 **Concepts & issues in environmental hazards: water, occupational environments – PR**  
Chemical and microbiological contaminants in water; human health and safety hazards in workplaces.

9/20/05     **Concepts & issues in environmental hazards: food, water** – Randall Singer  
Food availability, food safety, safe water supplies for agricultural use and drinking.

9/22/05     **Basic concepts of exposure: GR**  
Define exposure and related terms in context of the environmental health paradigm: define important exposure and toxicological terms; chemical fate and transport; multi-media exposure (air, food and water); receptors and human exposure pathways, exposure and population activity patterns. Application of these concepts in evaluating exposures for a specific population for a given health end-point.

9/27/05     **Hazard evaluation: Measurement, modeling and monitoring – environmental chemistry** Matt Simcik

9/29/05     **Blue Vinyl**

10/04/05    **Hazard evaluation: Measurement, modeling and monitoring; environmental microbiology-** Carrie Rigdon

10/06/05    **Monitoring networks for assessing exposures.** (Gregg Pratt, MPCA)  
Monitoring networks for air and water pollution in Minnesota, temporal trends, spatial variability, comparison with actual exposures and modeling. Uses of GIS.

10/11/05    **Biomarkers of Exposure-** William Toscano

10/13/05    **Exposure standards and interventions to limit exposure to environmental hazards-** PR

Links between exposure assessment, standards to limit exposures, and interventions to meet the standard; roles of technology, education, and public policy in limiting exposure; examples of interventions.

10/18/05    **Interventions: engineering control of exposure in the ambient and occupational environments-**PR

The hierarchy of control; examples of technological approaches to reducing pollutant emissions and limiting human exposure to pollutants.

**Assign Take Home Exam**

10/20/05 **Class Presentations**

10/25/05 **Class Presentations** Course Evaluation, Take Home Exam due.

## **VI. Term Paper (Take Home Exam)**

**Purpose:** To write a 15-20 page paper that explores information on exposure and health effects from an environmental hazard. The paper will account for 40% of the final grade.

**Methods:** At the beginning of 6103, students will be assigned to a group. Each group will comprise 3-5 students. During the first week of class students will meet and choose the environmental hazard they will study.

Each group will work together on researching the topic, assembling the information, and discussing the issues among themselves. Once this is complete, the students will write their papers individually without any communication with the others in their group.

The environmental hazard can be any physical, chemical, biological, or social agent that is of interest to the group.

The following information will be developed:

1. Characteristics of agent
2. Fate and transport of the agent in the environment
3. Methods for monitoring the agent in the environment
4. Exposure pathway
5. Methods for measuring human exposure to the agent
6. Strategies for preventing or controlling exposure

On October 11, 2004, the various groups will interact with each other in class and exchange information on how their exposure characteristics for their hazard differ from those of other groups. This information should be discussed in the final paper.

**Evaluation:** Take home exams will be written to elucidate each student's understanding of these issues for their particular agent.

## **VII. Group Oral Presentation**

Each group will make a 15 minute presentation on their topic during the last two classes. The time-limit will be strictly enforced to be fair to everyone. There will be a 5 minute period for questions from the audience after each presentation. The presentation will account for 30% of the final grade for the students in each group.

### **VIII. Course Text and Readings: There is no text book for this course.**

#### **9/06/05 (Ramachandran)**

<http://www.health.gov/healthypeople/document/HTML/Volume1/08Environmental.htm> or  
<http://www.health.gov/healthypeople/document/pdf/Volume1/08Environmental.pdf>

Healthy People 2010. Chapter 8. Environmental Health.

#### **9/08/05 (Ramachandran)**

1. Potential Exposures to Airborne and Settled Surface Dust in Residential Areas of Lower Manhattan Following the Collapse of the World Trade Center --- New York City, November 4--December 11, 2001. February 21, 2003/52(07); 131-136. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5207a3.htm>.
2. Greenberg, M., C.Lee, C. Powers. 1998. Public health and brownfields: recovering the past to protect the future. *J. Am. Med. Assoc.* 88(12):1759-1760.
3. Litt JS, Tran NL, Burke TA. 2002. Examining urban brownfields through the public health "macroscope". *Environ Health Perspect* 110 Suppl 2:183-93
4. Maantay J. Mapping environmental injustices: pitfalls and potential of geographic information systems in assessing environmental health and equity. 2002. *Environ Health Perspect*;110 Suppl 2:161-71.

#### **9/13/05 (Raynor)**

Please read the following documents available on the web:

- U.S. EPA (2003): Latest Findings on National Air Quality: 2002 Status and Trends, EPA

454/K-03-001, Washington, 30 pp.

[http://www.epa.gov/air/airtrends/aqtrnd02/2002\\_airtrends\\_final.pdf](http://www.epa.gov/air/airtrends/aqtrnd02/2002_airtrends_final.pdf)

- Intergovernmental Panel on Climate Change (2001): *Climate Change 2001: The Scientific Basis, Summary for Policymakers*, Cambridge: Cambridge University Press, pp. 1-20.

<http://www.ipcc.ch/pub/spm22-01.pdf>

Here are three items on the influence of global climate change on hurricanes, all written before Katrina:

- Trenberth, K. (2005): Uncertainty in Hurricanes and Global Warming, *Science*, 308:1753-1754.

<http://www.sciencemag.org/cgi/reprint/308/5729/1753.pdf>

- Pielke, R.A., Landsea, C., Mayfield, M., Laver, J., and Pasch, R. (2005): Hurricanes and Global Warming, *Bulletin of the American Meteorological Society*, in press.

[http://sciencepolicy.colorado.edu/admin/publication\\_files/resource-1766-2005.36.pdf](http://sciencepolicy.colorado.edu/admin/publication_files/resource-1766-2005.36.pdf)

- Extended abstract for talk entitled *New Orleans, Hurricanes and Climate Change: A Question of Resiliency* by T. Knutson and S. Laska, presented at the American Meteorological Society's Environmental Science Seminar Series, Washington, DC, June 20, 2005.

<http://www.ametsoc.org/atmospolicy/documents/SeminarFlyer.pdf>

## **9/15/05 (Raynor)**

Please read the following documents available on the web:

- U.S. EPA (2003): *Water on Tap: What You Need to Know*, EPA 816-K-03-007, Washington, 32 pp.

[http://www.epa.gov/safewater/wot/pdfs/book\\_waterontap\\_full.pdf](http://www.epa.gov/safewater/wot/pdfs/book_waterontap_full.pdf)

- Berman, J. (2005): Officials Worry About Infectious Diseases in Hurricane Areas, *Voice of America News*, Washington, D.C., September 4, 2005

<http://www.voanews.com/english/2005-09-04-voa28.cfm>

- Thomas, G. (2005): Katrina Poses Potential Environmental Nightmare, *Voice of America News*, Washington, D.C., September 4, 2005

<http://www.voanews.com/english/2005-09-04-voa16.cfm>

As an example of an occupational environment, we will discuss mining. Therefore, please read the following two selections available on the web:

- Joyce, S. (1998): Major Issues in Miner Health, *Environmental Health Perspectives*, 106 (11):A538.

<http://ehp.niehs.nih.gov/docs/1998/106-11/focus.html>

- Harris, G. and Dunlop, R. (1998): Dust, Deception, and Death, *The Courier-Journal* (Louisville, KY), April 19-26, 1998. Only the Day 1 articles are required; articles from other days are interesting supplemental reading.

<http://www.courier-journal.com/dust/index.html>

## **9/20/04 (Singer)**

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4840a1.htm>:

Achievements in public health, 1900-1999: safer and healthier foods. Environmental Protection Agency; US Department of Agriculture; Center for Food Safety and Applied Nutrition; Food and Drug Administration; Div. Nutrition Research and Coordination; National Institutes of Health; National Center for Health Statistics; National Center for Environmental Health; National Center for Infectious Diseases; National Center for Chronic Disease Prevention and Health Promotion, CDC. 1999. *MMWR* 48:905-913.

<http://www.copenhagenconsensus.com>

*Copenhagen Consensus Challenge papers on:*

- Malnutrition and Hunger  
Sanitation and Water

## **9/22/04 (Ramachandran)**

Reading: <http://www.inchem.org/documents/ehc/ehc/ehc214.htm#SectionNumber:1.6>

Sexton, K., M.A. Callahan, and E.F. Bryan. 1995. Estimating exposure and dose to characterize health risks: the role of human tissue monitoring in assessing exposure. *Environ. Health Perspect.* 103(Suppl 3):13-29.

Stevens, J.P and D.L. Swackhamer. 1989. Environmental pollution: a multimedia approach to modeling human exposure. *Environ. Sci. Technol.* 23:1180-1186.

**9/27/04 (Ramachandran)**

**9/29/04 (Toscano)**

**10/04/04 (Simcik)**

**10/06/04 (Pratt)**

**10/12/04**

None

**10/13/05 (Raynor)**

Please read the following journal article available on the web or through the University of Minnesota Libraries:

- Benner, T.C. (2004): Brief Survey of EPA Standard-Setting and Health Assessment, *Environmental Science & Technology*, 38(13):3457-3464

<http://pubs.acs.org/cgi-bin/article.cgi/esthag/2004/38/i13/pdf/es035132h.pdf>

Please read the following articles that discuss important achievements in environmental and occupational health during the 20th century: Please note that you may want to print only the relevant pages from the PDF files.

- CDC (1999): Achievements in Public Health, 1900-1999: Motor-Vehicle Safety: A 20th Century Public Health Achievement, *MMWR* 48(18):369-374.

<http://www.cdc.gov/mmwr/PDF/wk/mm4818.pdf>, or  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4818a1.htm>

- CDC (1999): Achievements in Public Health, 1900-1999: Improvements in Workplace Safety-United States, 1900-1999, *MMWR* 48(22):461-469.

<http://www.cdc.gov/mmwr/PDF/wk/mm4822.pdf>, or  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4822a1.htm>

- CDC (1999): Achievements in Public Health, 1900-1999: Control of Infectious Diseases, *MMWR* 48(29):621-629.

<http://www.cdc.gov/mmwr/PDF/wk/mm4829.pdf>, or  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4829a1.htm>

### **10/18/05 (Raynor)**

Read the following document about interventions building owners and managers might wish to consider to protect against terrorist attacks:

- NIOSH (2002): Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks, DHHS (NIOSH) Publication No. 2002-139, Cincinnati, 28 pp.

<http://www.cdc.gov/niosh/bldvent/pdfs/2002-139.pdf>

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have documented disability conditions (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services for a confidential discussion of their individual needs for accommodations. Disability Services is located in Suite 180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612/626-1333 voice or TTY. The website is <http://disserv3.stu.umn.edu/index2.html>