

Course Title: Environmental Risk Assessment

Course Number: ENOH 0656

Course Location: SPH Room 2A

Course Date & Time: Thursday 6:10 PM – 9:00 PM

Course Instructor: Qingyu Meng, Ph.D.

Assistant Professor

Department of Environmental and Occupational Health

Rutgers School of Public Health, Room 311

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Office Hours: Before and after class, and by appointment

Course Assistant: NA

Required Course Text: Risk Assessment for Environmental Health, by Mark G. Robson and William A. Toscano, 2007

Additional/Supplemental Readings/Resources: Reading materials will be distributed in class.

Course Description: Topics central to human health and environmental risk assessment are explored. Elements in traditional and cutting-edge risk assessment paradigms are discussed. Concepts and regulatory applications are illustrated by case studies.

Selected Department Competencies Addressed: Each Department identifies competencies for each degree offered. The competencies addressed in this course for the MPH for the Department of Environmental and Occupational Health include:

- Describe the major environmental health problems to the general public as well as specific communities within that population;
- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Describe the federal and state regulatory programs that relate to environmental (community) and worker (occupational) protection;
- Specify current environmental risk assessment approaches and methods for a particular hazard or risk in a community.

The competencies addressed in this course for the PhD for the Department of Environmental and Occupational Health include:

- Explain the importance of differences of susceptibility and vulnerability to environmental toxicant/toxins based upon age, gender, race, ethnicity, genetics and socioeconomic status in different populations;
- Provide an informed expert opinion to government and/or community leaders regarding the extent or level of risk associated with a particular environmental or occupational hazard or condition;
- Explain basic principles in environmental and occupational health sciences including toxicology, quantitative risk assessment, epidemiology, and exposure science.

The competencies addressed in this course for the DrPH for the Department of Environmental and Occupational Health include:

- Determine what risks are present in a particular community and develop a basic risk assessment plan for the identification, characterization, management, and remediation of that risk;
- Diagnose and apply appropriate approaches for assessing, preventing, and controlling environmental hazards that pose risks to health and safety;
- Provide an informed expert opinion to government and/or community leaders regarding the extent or level of risk associated with a particular environmental or occupational hazard or condition;
- Understand environmental and occupational policies and regulations at both the federal and state levels.

Please visit the Department webpages on the School of Public Health's website at <http://sph.rutgers.edu/> for additional competencies addressed by this course for other degrees and departments.

Course Objectives: By the completion of this course, students will be able to:

- Describe the steps of environmental risk assessment
- Assess the types of evidence used for toxicity assessment
- Conduct risk assessment projects under the guidance of a senior risk assessor

Course Requirements and Grading:

- Activities, assignments, projects, exams, etc. that contribute to course grade, and the respective point/percentage value of each.

Class Participation	10 points
Homework	30 points (Late: -5 points/day)
Midterm	30 points
Group Project and Presentation	30 points (Late: -5 points/day)

Additional details about the course's projects and assignments will be provided during the semester.

- Grading scale.

A (points ≥ 90); B+ ($80 \leq \text{points} < 90$); B ($70 \leq \text{points} < 80$);
C+ ($65 \leq \text{points} < 70$); C ($60 \leq \text{points} < 65$); F (points ≤ 59)

Course Schedule:

Date

Topics

Lecture 1

Course introduction and problem formulation

Risk and risk assessment

The evolution of environmental risk assessment

The utility of environmental risk assessment

Pros and cons of risk assessment as a decision-making tool

Alternative methods

Problem formulation

Case study: ambient NO₂ risk assessment

Reading

Textbook Chapters 1, 2, 3, 15

Assignments:

Lecture 2

Hazard identification

Hazard Identification (HI) --- Concepts

HI --- Health Effects

HI --- Methods (Lines of Evidence)

Considerations in HI

Report HI Findings

Ethics of Conducting Human Studies

(Term project instruction is distributed)

Reading
Assignments:

Textbook Chapter 4

Chapter 4 in Calculated Risk by Joseph V. Rodricks, Cambridge University Press, 2007

Lecture 3

Exposure assessment

Scope of Exposure Science

Basic Principles and Concepts

Exposure Estimates

(Homework 1 is assigned)

Reading
Assignments:

Zartarian VG et al., 1997. A quantitative definition of exposure and related concepts. Journal of exposure analysis and environmental epidemiology, 7, 411-437

Lioy P, 2005. Defining exposure science. Journal of Exposure Analysis and Environmental Epidemiology 15, 463

Klepeis NE et al., 2001. The national human activity pattern survey (NHAPS): A resource of assessing exposure to environmental pollutants. Journal of Exposure Analysis and Environmental Epidemiology 11, 231-252

Lecture 4

Dose-response assessment

Definition of Dose Response Assessment

Non-cancer Dose Response Assessment

RfC or RfD Approach

Benchmark Dose Modeling

Cancer Dose Response Assessment

(Homework 1 is due, and homework 2 is assigned)

Homework 3 is also assigned)

Reading
Assignments:

Chapter 3 of Guidelines for Carcinogen Risk Assessment by EPA, 2005.
(http://www.epa.gov/ttn/atw/cancer_guidelines_final_3-25-05.pdf)

Lecture 5

Risk characterization

What is risk characterization

Issues in risk characterization

Risk estimation

Risk description

Default options in risk assessment

Uncertainty and variability

(Homework 2 is due)

Reading
Assignments:

Chapters 1, 3 and 4 of Risk Characterization Handbook, U.S. EPA, 2000
(<http://www.epa.gov/spc/pdfs/rchandbk.pdf>)

Lecture 6

Toxicity testing methods and biomarker (Dr. Jun-Yan Hong)

Biomedical basis of risk assessment

Reading
Assignments:

TBA

Lecture 7 Exposure and Risk Mapping (Ms. Jessica Small)

Introduction of ArcGIS

Geocoding

Creating a map with ArcGIS

Creating a buffer with ArcGIS

(Homework 3 is due)

Reading *TBA*
Assignments:

Lecture 8 & 9 Occupational Exposure and Risk Assessment (Dr. Brian Pavilonis)
Midterm Review

Reading *TBA*
Assignments:

SPRING BREAK, NO CLASS

Midterm Exam

Lecture 10 Risk communication and risk in a community setting (Dr. Mark Robson)

Risk communication

Risk in a community setting

(Term project proposal is due)

Reading *Textbook Chapter 16*
Assignments:

Lecture 11 Risk assessment case study (Dr. Alan Stern)

Risk assessments case study

Term Project Discussion

Lecture 12

Cutting edge issues in risk assessment (Dr. Michael Gochfeld)

*Reading
Assignments:*

Textbook Chapters 8, 14, 15

Guidance on Cumulative Risk Assessment, EPA, 1997.

(<http://www.epa.gov/osa/spc/pdfs/cumrisk2.pdf>)

Part A, 1. Introduction (Page 1-10) in Guidelines for Ecological Risk Assessment, EPA, 1998. (http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=36512)

In Class debate on climate change

DUE DAY FOR TERM PROJECT

School of Public Health Honor Code: The School of Public Health Honor Code is found in the student bulletin (sph.rutgers.edu/academics/catalog/index.html). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the school community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.

Policy Concerning Use of Recording Devices and Other Electronic Communications Systems:

When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.