RUTGERS
School of Public Health

Course Title: Environmental Risk Assessment

Course Number: ENOH 0656, 2018-Spring

Course Location: SPH Room 2B

Course Date & Time: Wednesday 6:00 PM – 8:00 PM

Course Instructor: **Mingzhu Fang, MD, PhD, DABT**

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Office Hours: Before and after class, and by appointment

Course Assistant: NA

Required Course Text:

Environmental Risk Assessment: A Toxicological Approach, by Ted Simon, 2016 (Env. RA)

Risk Assessment for Environmental Health, by Mark G. Robson and William A. Toscano, 2007 (RA Env. Hlth.)

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
Final Project	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 $\geq$ 90); A- (85 $\leq$ points < 90); B+ (80 $\leq$ points < 85); B (75 $\leq$ points < 80); B- (70 $\leq$ points < 75); C+ (65 $\leq$ points < 70); C (60 $\leq$ points < 65); F (points $\leq$ 59)

Course Schedule (see the following table)

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School of Public Health

No.	Date	Lecture Content	Lecturer
1	17-Jan	**Course Overview 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 & the focus of this course *Reading Assignment: Textbook Chapters 1, 2, 3, 15*	**Mingzhu. Fang**
2	24-Jan	**Hazard identification (HI)** HI --- Concepts HI --- Health Effects (Mode of Action, MOA) HI --- Methods (Weight of Evidence, WOE)) Considerations in HI Report HI Findings Recommended reading materials: https://www.nap.edu/catalog/12209/science-and-decisions-advancing-risk-assessment	**Marie Fortin**
3	31-Jan	**Toxicology studies for risk assessment** Introduction to Toxicology Preclinical Studies -TK/TD -Acute toxicity -Repeated-dose toxicity -Mutagenicity & carcinogenicity -Reproductive & developmental toxicity -Local toxicity Clinical Studies Recommended reading materials: Chapter 4 in books of RA for Env. Hlth. and Env. RA	**Mingzhu Fang**
4	7-Feb	**Exposure Assessment** Scope of Exposure Science Basic Principles and Concepts Exposure Estimates -Exposure dose and unit –Exposure route, exposure pathway –Microenvironment –Exposure effectiveness –Life average daily exposure (how to calculate) –The conceptualized continuum from pollution source to health effects	**Clifford Weisel**

		Homework 1 is assigned Recommended reading materials: *Lioy P, 2005. Defining exposure science. Journal of Exposure Analysis and Environmental Epidemiology 15, 463* file:///C:/Users/mark/Downloads/EFH-COMPLETE.PDF	
5	**14-Feb**	**Regulatory toxicology and safe limit** Introduction U.S Regulations -Food and Drug Administration (FDA) -Environmental Protection Agency (EPA) -Occupational Safety and Health Administration (OSHA) -Consumer Product Safety Commission (CPSC) -Governmental Agencies and Advisory Agencies International Regulations EU Regulations (e.g., REACH) Recommended reading materials: Regulatory Toxicology. In Casareet & Doull's Toxicology	**Mingzhu Fang**
6	**21-Feb**	**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** Recommended reading materials: RA for Env. Hlth. and Env. RA	**Sherwin Yan**
7	**28-Feb**	**Risk characterization and occupational risk assessment**	**Michael Gochfeld**
8	**7-Mar**	**Midterm review and / In class practice** **Homework 2 is due**	**Mingzhu Fang**
	14-Mar	**Spring Break, No Class**	
	21-Mar	**Midterm Exam**	**Mingzhu Fang**
9	**28-Mar**	**Exposure and risk mapping** Introduction of ArcGIS Geocoding Creating a map with ArcGIS Creating a buffer with ArcGIS	**Panos Georgopoulos**

	Recommended reading materials: TBA **Final project is assigned**	
10	**4-Apr** **21 Century risk assessment: new data sources and new methods** Recommended reading materials: TBA	**Mingzhu Fang**
11	**11-Apr** **Risk communication and risk in a community setting** Recommended reading materials: Chapter 16 in RA for Env. Hlth	**Mark Robson**
12	**18-Apr** **An example of full risk assessment (e.g., PFOS)** Physical and chemical properties Exposure assessment Hazard identification RfD derivation Risk characterization Recommended reading materials: http://www.nj.gov/dep/watersupply/pdf/dwqi-pfos-mcl-draft.pdf).	**Alan Stern**
13	**25-Apr** **Informal Discussion about Final Project** **Final project is due**	**Mingzhu Fang**

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.