

ENV H 551 A: Principles Of Human Exposure Science

Autumn Quarter -- 3 Credits

Class Web Site: <https://canvas.uw.edu/courses/848572>

Department of Environmental and Occupational Health Sciences

Tuesdays & Thursdays, 3:00 - 4:20pm
Health Sciences Building BB 1602

Faculty: Michael Yost, PhD, Professor (airion@uw.edu or 206.685.7243 or Health Sciences Building F225)

Required Readings

- *Exposure Assessment in Occupational and Environmental Epidemiology* (Oxford Medical Publications). 2003. Mark J. Nieuwenhuijsen (Editor). Oxford University Press, USA.
- *Additional links to weekly reading materials will be posted on the course website*

Description. Exposure assessment science plays a critical role in risk assessment, epidemiology, and environmental public health interventions. This course provides an overview of the principles of exposure science and an examination of how these principles are applied to characterize the hazards of chemical and physical disease agents in both occupational and community environments. The course is divided into four modules: exposure pathway analysis, exposure data analysis, biological markers of exposure, and the energetics of physical agents and injuries.

Learning Objectives.

At the conclusions of this course, students will be able to

1. Describe the major and minor exposure pathways for occupational and environmental disease agents
2. Write basic equations for dispersion modeling of environmental contaminants
3. Define the relationship between exposure and dose for the dermal, oral, and respiratory routes of exposure
4. Identify the major occupational and environmental health regulations in the United States that require exposure assessment data
5. Distinguish between exposure assessment strategies used for epidemiology, risk assessment, and environmental public health interventions
6. Describe the strengths and limitations of exposure data collected through self-reports, micro-environmental measurement methods, and personal monitoring methods

7. Explain the origin and quality of selected elements of the EPA Exposure Factors Handbook
8. Construct plausible exposure scenarios using a combination of measurement data and standard exposure factors
9. Characterize a large exposure dataset with statistical descriptors
10. Explain the difference between deterministic and probabilistic exposure models
11. Describe the basic procedures involved in Monte Carlo analysis
12. Describe the procedures used to map pollutants over time and space using geographic information systems and global positioning systems
13. Describe the absorption, distribution, metabolism and excretion process for chemical agents
14. Describe the electromagnetic spectrum in terms of energy and categories of radiation relevant to human exposures
15. Describe the relationship between human anatomical and physiological characteristics and stressors of force and repetitive motion

Exams, Assignments and Grading.

There will be a midterm exam, a final exam, four homework assignments, one short written report (~5 pages) analyzing key aspects of the readings, and one longer written report (~10 pages) that reviews exposure assessment techniques for a specific agent/exposure. Course grading will be as follows: midterm exam - 25%, homework - 20%, short report, 25%, long report, 30%.

Session	Topic	Instructor
	Exposure Pathway Analysis	
9/26	Exposure science: sources, pathways and routes	Fenske
10/1	Exposure science drivers: regulatory mandates and risk assessment	Yost
10/3	Exposure data sources: questionnaires, measurements, databases	Seixas
10/8	Dermal Exposure assessment	Yost
10/10	Exposure factors: derivation and application of standard factors	Yost
10/15	Variability and uncertainty in exposure analysis	Yost
	Analytic Approaches to Exposure Data	
10/17	Sources of exposure variability	Yost
10/22	Exposure assessment for epidemiologic studies	Seixas
10/24	Deterministic modeling	Yost
10/29	Probabilistic modeling	Yost
10/31	Geographical Information In Exposure Assessment*	Yost
	*Midterm Exam handout (take home 10/31, DUE	

	11/7)	
	Energetics of Physical Agents and Injuries	
11/5	Quantifying energy; Non-ionizing radiation	Yost
11/7	Quantifying energy; Non-ionizing radiation	Yost
11/12	Ionizing Radiation	Yost
	Biological Markers of Exposure	
	Midterm Due 11/7	
11/14	Overview of pharmacokinetic processes	Simpson
11/19	Biomarkers of exposure	Simpson
11/21	Case study: occupational toluene exposure	Simpson
	Physical Agents: Mechanical Waves	
11/26	Acoustic energy (Noise and Vibration)	Yost
11/28	--- Thanksgiving Holiday	
12/3	Acoustic energy (Noise and Vibration)	Yost
12/5	Communicating exposure, risk and uncertainty	Yost
12/10	Discussion of papers, concluding session	Yost
	Final Exam – Thursday, December, 12th 2012 4:30-6:20 p.m.	