

# ENV H 551 A: Human Exposure to Environmental Contaminants. - Autumn 2016

4 credits, graded, SLN 14318

Instructor: Michael G Yost, Professor & Chair, DEOHS

Health Sciences Building F-463, (206) 685-7243 [airion@uw.edu](mailto:airion@uw.edu)

Office hours by appointment

Time: Monday & Wednesday at 1:30p – 3:20p,

Location: Benson 115

**Dates of lectures and assignments –displayed on the ENVH 551 Fall 2016 Canvas site.**

**<https://canvas.uw.edu/courses/1065288>**

## Required Readings

- *Exposure Assessment in Environmental Epidemiology*. 2015. 2nd Edition. Mark J. Nieuwenhuijsen (Editor). Oxford University Press, USA.
- *Additional links to weekly reading materials will be posted on the course website*

## Course Description

Exposure assessment science plays a critical role in risk assessment, epidemiology, and environmental public health interventions. This course introduces techniques such as pathway analysis, fate and transport modeling, statistical exposure estimation, exposure biomarkers, and energetics used to characterize chemical, biological and physical hazards 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.

## Exams, Assignments and Grading

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

## Learning Objectives

1. Describe the major and minor exposure pathways for occupational and environmental disease agents
2. Apply basic box and plume models to assess the fate and transport of environmental contaminants.
3. Contrast the relationship between exposure and dose for the dermal, oral, and respiratory routes of exposure
4. Identify the agencies responsible for basic 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 regulations or interventions
6. Critique and weigh 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 by combining measurement data and standard exposure factors
9. Summarize individual and group exposures with appropriate statistical descriptors and methods

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 types of radiation relevant to human exposures
15. Classify typical human anatomical characteristics subject to ergonomic stress and repetitive motion injury

### **Access and Accommodation**

Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or [uwdrs@uw.edu](mailto:uwdrs@uw.edu) or [disability.uw.edu](http://disability.uw.edu). DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

**Academic Integrity** <http://sph.washington.edu/students/academicintegrity/>

Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.

The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington **Student Conduct Code** (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and

the **SPH Academic Integrity Policy**. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington **Community Standards and Student Conduct** website

Session	Topic	Instructor
	<b>Principles of Human Exposure Science: COURSE TOPIC OUTLINE</b>	
<b>Module 1</b>	<b>Exposure Pathway Analysis</b>	
Lesson 1	Exposure science: sources, pathways and routes	Yost
Lesson 2	Exposure science drivers: regulatory mandates and risk assessment	Yost
Lesson 3	Exposure data sources: questionnaires, measurements, databases	Yost
Lesson 4	Sources of exposure: application of standard factors - (Homework Assignment # 1)	Yost
Lesson 5	Dermal Exposure assessment	Fenske
Lesson 6	Exposure to biological agents	Meschke
Lesson 7	Exposure to biological agents	Meschke
<b>Module 2</b>	<b>Analytic Approaches to Exposure Data</b>	
Lesson 8	Variability & ANOVA in exposure analysis [Expanded] (Homework #1 DUE)	Yost
Lesson 9	Exposure assessment for epidemiologic studies	Yost
Lesson 10	Chemical structures, properties, and environmental behavior	Kalman
Lesson 11	Physical transport and chemical processes	Kalman
Lesson 12	Deterministic box & Gaussian plume models	Yost
Lesson 13	Probabilistic and Monte-Carlo models (Homework #2 DUE)	Yost
Lesson 14	GIS modeling In Exposure Assessment	Yost
<b>Module 3</b>	<b>Energetics of Physical Agents and Injuries</b>	
Lesson 15	Quantifying energy; Non-ionizing radiation	Yost
Lesson 16	Ionizing Radiation - Midterm Exam DUE	Yost
Lesson 17	Ergonomics physiology and biomechanics	Johnson
Lesson 18	Ergonomics physical agents – noise, vibration and MSD's	Johnson
		--
<b>Module 4</b>	<b>Biological Markers of Exposure</b>	
Lesson 19	Overview of pharmacokinetic processes	Simpson
Lesson 20	Biomarkers of exposure	Simpson
XX-Nov	<b>NO CLASS --- Thanksgiving Holiday ---</b>	--
Lesson 21	Communicating exposure, risk and uncertainty - <b>FINAL EXAM (take home)</b>	Yost