Course information

Time: Tuesdays, and Thursdays, 4:00-5:50 PM
Location: 
Cap on Attendance: 20 total
Units: 4

Instructors:

Mel Suffet, PhD
Professor
(310) 206-8230
msuffet@ucla.edu

TA: None

Course Objectives

- To describe the basic principles and complexity of environmental exposure assessment.
- To describe the most recent (state-of-the-art) techniques for assessing environmental exposures.
  - To discuss the current topics and trends in exposure assessment science.
- To develop technical communication skills by critically reviewing peer-reviewed literature and conducting effective oral presentations.

Suggested Readings

- Environmental Chemistry ??????????????????????????????????????

Required Readings

A reader will be given to the students containing journal articles and sections assigned to the student for each class. A Text Chapter will be assigned to the students for each class. Topics may include:

- Environmental exposure assessment models
- The nature of organic chemicals - e.g. vapor pressure, solubility, structure-activity relationships
- Global and Multimedia models, used for Exposure Assessment - e.g. Junge Box Model, Fugacity Models. Multimedia Models
- Transport and Interfacial Phenomena
- Chemical Reactions Related to Environmental Exposure - e.g. Hydrolysis, Photolysis
- Biological Exposures in the Environment - Bioaccumulation, Biodegradation
- Multimedia exposure assessment - Evaluations of different chemical types in the environment

Useful Website

- International Society of Exposure Analysis: http://www.isesweb.org/
- European EXPOLIS Study: http://www.ktl.fi/expolis/
- EPA Fate, Exposure and Risk Analysis website: http://www.epa.gov/ttn/fera/index.html

Course Topics and Tentative Schedule
<table>
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<tr>
<th>Week</th>
<th>Tuesday</th>
<th>Thursday</th>
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| 1    | • Course structure - modeling assessment  
• Background description of the air, water and soil environments.  
• Elemental cycles in the environment  
  o | • Interaction between the environments-source and sinks of environmental exposure  
• Water - Defining how water is the mover and shaker for our planet.  
• Uses of exposure information |
| 2    | • Environmental assessment models  
• Simple equilibrium models of exposure between the atmosphere/hydrosphere/biosphere  
• Model limitation | • Exposure assessment methods  
• The nature of organic chemicals - e.g. vapor pressure, solubility, structure-activity relationships  
• Limitations of methods of determination of data for exposure assessment |
| 3    | • Environmental assessment models  
• Junge Box Model | • Environmental assessment models  
• Fugacity Models |
| 4    | • Transport and Interfacial Phenomena  
• Overview Cycles of Organic Toxics | • Transport and Interfacial Phenomena  
• Water-Soil interface  
• Natural Organic Matter Chemistry |
| 5    | • Transport and Interfacial Phenomena  
• Water-Soil Interface (surface and ground water)  
• Natural Organic Matter Chemistry Continues | • Transport and Interfacial Phenomena  
• Water-Sediment interface |
| 6    | • Transport and Interfacial Phenomena  
• Air-Soil Interface | • Environmental assessment of Hydrolysis acid-base reactions and kinetics in the environment |
| 7    | • Environmental assessment of oxidation-reduction reactions and kinetics in the environment | • Environmental assessment of Hydrolysis acid-base reactions and kinetics in the environment |
| 8    | • Environmental assessment of Photolysis reactions and kinetics in the environment | • Environmental assessment of biochemical response of man to chemical pollutants  
• Removal of pollution from man. |
| 9    | • Environmental assessment of microbiological reactions and kinetics in the environment  
• Understand toxic response of microbes | |
| 10   | • Examples of environmental assessment models for PCBs, and other organic chemicals in the environment | • Examples of environmental assessment models for different pesticide groups, and other organic chemicals in the environment |
| Final Week | | |

**Course Website**

All homework assignments are posted on the course website:
https://ccle.ucla.edu/course/view/15W-ENVHLTC200B-1

If you are unable to access the course website, please contact Mel Suffet (msuffet@ucla.edu)
Course Structure and Grading Methods

- Lecture will be given on Tuesday and Thursday. Student will develop and submit an individual 10 page single spaced mid-term paper on Transport Phenomena of Pollutants in an between environments. For example - river transfer of chemicals by flow, soil transport, mid-ocean riff transport, ocean transport of plastics.

- Three modeling assignments will be completed for Environmental assessment models by 2 different pollutants - a polar and non-polar organic chemical. The literature will be searched for that chemical’s fate in the environment and the models will be compared to real situation. The students will learn that picking the parameter of the model is critical. Is it a watershed? Airshed? River, Groundwater??? What is the flow of air or water etc.

- A final Exam using a gyp sheet will be allowed.

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<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Modeling homework</td>
<td>20%</td>
<td>Content, organization, results</td>
</tr>
<tr>
<td>Mid-term paper</td>
<td>20%</td>
<td>Content, organization, synthesis of class topics</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50%</td>
<td>Gyp sheet allowed</td>
</tr>
<tr>
<td>Class participation</td>
<td>10%</td>
<td>Attendance alone is not enough</td>
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Upon completion of this course, you should be able to demonstrate the skills listed as “Course Learning Objectives” below. These learning objectives were selected to help you build skills related to help undergraduates build competencies outlined in the ASPH Undergraduate Public Health learning Outcomes Model (http://www.asph.org/document.cfm?page=1085) and to help MPH and MS students in Environmental Health Sciences.

### COURSE LEARNING OBJECTIVES

1. Accurately and effectively communicate environmental health risks to critical.

2. Tailor written communications so that they are appropriate to the target audience.

3. Describe the basic principles and complexity of environmental exposure assessment.

4. To describe the most recent (state-of-the-art) models and techniques for assessing environmental exposures and the current topics and trends in exposure assessment science.

5. Describe how both scientific data are critical to implementing important environmental health policies.

6. Describe an example of environmental exposure and related health effects and how a prevention approach could be used to address this problem.

7. Gain hand-on experience on environmental exposure assessment.
### MPH Core Competencies
(For all MPH students)

- C1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents.
- C3. Identify an appropriate target population for investigating the research question.
- C5. Identify potential sources of systematic error (bias) as well as random error.
- C6. Identify key sources of data and use existing databases to provide background or supportive data to address research questions.
- C7. Develop an efficient design for collecting, recording, managing, and storing data. Adapt principles of data management and quality assurance to different study designs.
- C8. Develop a testable model of environmental insult.
- F11. Articulate how biological, chemical and physical agents affect human health.
- F12. Discuss sentinel events in the history and development of the public health profession and their relevance for practice in the field.

### ESH MPH Discipline-Specific Competencies
(For MPH students in the EHS concentration)

- I1.1. Describe major direct and indirect human health and safety effects of major environmental or occupational agents or conditions.
- I1.3. Identify significant gaps in the current knowledge base concerning health effects of environmental or occupational agents.
- I2.1. Explain the general mechanisms of toxicity in eliciting a toxic response to various environmental or occupational exposures.
- I2.2. Describe how chemical agents are tested for acute, sub-chronic and chronic health effects, including reproductive, developmental and carcinogenic effects, and use of “omics” methods, and interpret toxicological data in terms of relevance to human health.
- I3.1. Describe how humans are exposed to chemical, physical, and biological agents in the workplace and environment and how exposures are determined.
- I5.2. Identify areas of uncertainty in exposure and risk assessment processes.
- I6.1. Describe major types of institutions responsible for occupational or environmental health policy.
- I6.2. Identify major state, federal, international regulatory programs or authorities for occupational or environmental health.
- I7.1. Define environmental justice and give examples of environmental exposures that are distributed unequally with regard to race/ethnicity and/or socio economic status.
- I8.1. Describe importance of community and home environments and what contributes to cumulative impacts.
- I9.1. Explain climate change and likely direct and indirect impacts on environment and health.
- I10.1. Organize information and data, prepare technical reports on environmental contaminants and impacts.
- I11.1. Draw upon scientific knowledge and assessment methods to develop approaches to assess, prevent and control environmental hazards that pose risks to human health and safety.
- I12.1. Present cogent and well substantiated arguments for actions to address environmental health concerns.

### EHS MS Competencies
<table>
<thead>
<tr>
<th>A1 Retrieve and organize literature; synthesize and critically evaluate scientific literature in environmental health, public health and other relevant fields.</th>
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<tr>
<td>A2 Use existing databases to provide background information or data to address research questions and draw appropriate inferences/estimates from environmental health data.</td>
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<td>A3 Evaluate seminars and presentations in environmental health and distill the critical and salient issues from them.</td>
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<td>B1 Formulate a research question.</td>
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<td>B2 Evaluate the scientific merit and feasibility of study designs.</td>
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<tr>
<td>B3 Identify an appropriate target population or organism for investigating the research question.</td>
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<td>B4 Identify potential sources of systematic error (bias) as well as random error.</td>
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<td>B5 Be able to articulate interdisciplinary approaches to solving public health problems.</td>
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<tr>
<td>B6 Identify potential sources of systematic error (bias) as well as random error.</td>
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<td>B7 Implement and use a project monitoring system.</td>
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<tr>
<td>C1 Use computer systems and analytic software packages.</td>
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<td>C2 Produce working tables, statistical summaries, and effective figures to summarize data.</td>
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<td>D1 Make reasonable inferences from results of analysis of observational and analytic studies.</td>
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<td>E3 Explain and interpret research findings for students, professionals, the public, and media.</td>
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