EHS C185C/C200C: Foundations of Environmental Health Sciences

UCLA School of Public Health
Syllabus – Winter 2018

Course information

Time: Mondays, Wednesdays, and Fridays, 3:00-4:50 PM
Location: 61-269 CHS
Cap on Attendance: 35 total (5 in C185C and 30 in C200C)
Units: 6

Instructors:

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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 gain hand-on experience on environmental exposure assessment.
- To develop technical communication skills by critically reviewing peer-reviewed literature and conducting effective oral presentations.

Suggested Readings

- Exposure Analysis, 2007 edited by Wayne R. Ott, Anne C. Steinemann, and Lance A. Wallace. Taylor & Francis. ISBN 1-56670-663-7
- Human Exposure Assessment: http://www.inchem.org/documents/ehc/ehc/ehc214.htm

Required Readings

Lecture slides and journal articles will be posted on the class website on a weekly basis. Students are required to read the posted material before coming to the class. Topics may include:

- environmental exposure assessment of air pollution in urban areas
- time activity pattern studies
- water pollution, drinking water, and waste water
- exposure-biomarker-response relationship and its applications
- exposure assessment and molecular epidemiology
- multimedia exposure assessment

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

Week	Monday	Wednesday	Friday
1	Jan 8 Course structure and group project (Zhu and Suffet)	Jan 10 • Exposure and exposure concentration • Exposure and environmental health • Elements of exposure assessment • Uses of exposure information (Zhu)	Jan 12 Zhu (Air), Suffet (Water)
2	Jan 15 Martin Luther King Holiday	Jan 17 • Types of study design • Sampling and generalization (Zhu)	Jan 19 Zhu (Air), Suffet (Water)
3	Jan 22 • Exposure assessment methods • Potential limitations (Zhu)	Jan 24 • Time patterns (Zhu)	Jan 26 Zhu (Air), Suffet (Water)
4	Jan 29 • Aerosols and Sampling techniques (Zhu)	Jan 31 • Indoor Air pollution (Zhu)	Feb 2 Zhu (Air), Suffet (Water)
5	Feb 5 • Intake fraction (Zhu)	Feb 7 • In-cabin and case studies (Zhu)	**Feb 9** **Midterm on Air (all)**
6	Feb 12 • Defining how water is the mover and shaker for our planet. (Suffet)	Feb 14 • What are the natural compounds found in water and what are the pollutants (Suffet)	Feb 16 Zhu (Air), Suffet (Water)
7	Feb 19 Presidents' Day holiday	Feb 21 • Water Quality Standards: Chemical and Microbiological (Suffet)	Feb 23 Zhu (Air), Suffet (Water)
8	Feb 26 • Water Treatment and Water Quality Standards. • Water Treatment Unit Operations related to Water Quality (Suffet)	Feb 28 • Microbiological Control of Water Quality by Chlorination and Ozonation. • Heavy Metal Control by Treatment (Suffet)	March 2 Zhu (Air), Suffet (Water)

9	March 5 • Water (Suffet)	March 7 • Water (Suffet)	March 9 Zhu (Air), Suffet (Water)
10	March 12 • Water (Suffet)	March 14 • Water (Suffet)	March 16 Group Presentation
Final Week	**Final on Water (all)**		

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 Yifang Zhu (yifang@ucla.edu).

Course Structure and Grading Methods

Lecture will be given on Mondays and Wednesdays. Fridays will be used to allow students to meet with individual instructor to work on group projects. At the first class, students will be randomly assigned into four groups, two focusing on air and two focusing on water. Each group will be led by a faculty mentor to carry out a small scale exposure project and present their research results at the end of the quarter to the rest of the class. The project will involve collect samples and analyze data. Student will also need to submit a group term paper summarizing their studies (~5 pages) at the end of the quarter. Late term papers will be marked down by 50% at least. Reading materials including lecture slides and journal articles will be assigned at the beginning of the quarter. All students are expected to attend class regularly and participate in group discussions and contribute to the group projects, etc.

Criteria	Weight	Remarks
Final group presentation	20%	Content, organization, delivery
Final group term paper	25%	Content, organization, synthesis of class topics
Midterm	25%	Close book
Final	25%	Close book
Class participation	5%	Attendance alone is not enough

Learning Objectives and Competencies

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 stakeholders individually and as part of a team.
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) techniques for assessing environmental exposures and the current topics and trends in exposure assessment science.
5. Describe how both scientific data and community engagement 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.
8. Describe an example of how regulations and/or inspections have been used to prevent environmental health problems; describe who has the authority to impose these regulations in our region.

HOW THESE LEARNING OBJECTIVES ALIGN WITH COMPETENCIES FOR SPECIFIC DEGREE PROGRAMS
MPH Core Competencies (for all MPH students)
C1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents. C2. Develop and assess appropriate data collection instruments (e.g., questionnaires, physical exam, lab assays, etc.) and evaluate the use of questionnaires and measurement instruments in collection of data to maintain internal validity C3. Identify an appropriate target population for investigating the research question. C4. Specify current environmental risk assessment methods. 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. I1.2. Identify the most important disease burdens with major environmental or occupational risk factors and the environmental or occupational risk factors that produce the most disease burden in either the general population or in heavily affected subgroups. 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. I3.2. Describe how exposures can be controlled through administrative procedures, personal protective equipment, various engineering technologies, and social interventions. I4.1. Utilize epidemiological data, with due regard to statistical validity and sources bias, in the assessment of impacts of hazardous agents on the health of human populations 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. I8.2 Define the built environment. I9.1 Explain climate change and likely direct and indirect impacts on environment and health. I10.1 Organize information and data, prepare technical reports and give oral presentations 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

A1 Retrieve and organize literature; synthesize and critically evaluate scientific literature in environmental health, public health and other relevant fields.
A2 Use existing databases to provide background information or data to address research questions and draw appropriate inferences/estimates from environmental health data.
A3 Evaluate seminars and presentations in environmental health and distill the critical and salient issues from them.
B1 Formulate a research question.
B2 Evaluate the scientific merit and feasibility of study designs.
B3 Identify an appropriate target population or organism for investigating the research question.
B4 Identify potential sources of systematic error (bias) as well as random error.
B5 Be able to articulate interdisciplinary approaches to solving public health problems.
B6 Identify potential sources of systematic error (bias) as well as random error.
B7 Implement and use a project monitoring system.
C1 Use computer systems and analytic software packages.
C2 Produce working tables, statistical summaries, and effective figures to summarize data.
D1 Make reasonable inferences from results of analysis of observational and analytic studies
E1 Prepare presentation materials including outlines, posters, and PowerPoint presentations.
E2 Deliver effective oral presentations individually and as part of a team.
E3 Explain and interpret research findings for students, professionals, the public, and media.
E4 Work effectively as part of an interdisciplinary team.