



Introduction to Environmental Health (EHS 100) Fall 2015

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Office hours: TTh noon-1

Lectures: TTh 1:00-3:00 pm
CHS 43-105A

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Prerequisites: This course is primarily for MPH students.

Overview: Environmental Health is concerned with the biological, chemical, and physical influences on human health. This course introduces major terms and concepts used in environmental health practice, focusing on environmental exposures, resulting health effects, and appropriate controls for these hazards. We discuss basic tools for addressing a variety of current problems on the micro, regional, national, and global scale. The major application areas are: food safety, pests and pesticides, air quality, global climate change, the built environment, water quality, wastewater, solid and hazardous wastes, industrial hygiene, and radiation.

Learning Objectives: Upon completion of this course, students should understand basic terms, core concepts, and fundamental skills used by environmental health practitioners. With this understanding, students should be able to access the literature (including reputable online sources) in order to:

1. Given a specific environmental agent, use data sources to develop a concise summary of the agent's sources, basic attributes, and fate.
2. Identify adverse effects of environmental agents on human health (both acute and chronic), on ecosystems, and on other risks (including economic and psychological), which requires an awareness of susceptibility, toxicity, and methods of risk analysis.
3. Recommend systematic controls of environmental health hazards, demonstrating an awareness of state and federal regulatory programs.
4. Develop a testable model of environmental insults as a means of improving forensic skills for assessing, preventing, and controlling hazards.
5. Accurately and effectively communicate environmental health risks to targeted stakeholders and explain why/whether some populations are at greater risk than others for specific agents.
6. 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.

Grading:

1. Two non-cumulative exams and a final cumulative exam, each worth up to 50 points (note: no make-up exams).
2. Two online written assignments worth a total of 50 points. Further guidelines will be given on the class website. We will deduct two points per day for submissions after the due date.
 - a. Review of a journal article (20 points)
 - b. Develop a testable hypothesis (30 points)

Text: No required textbook, but there will be online reading assigned on our Moodle page.

Other Material: Be sure to consult the course Moodle Page on at least a weekly basis!

If you wish to request an accommodation due to a disability, please contact the Office for Students with Disabilities as soon as possible at A255 Murphy Hall, (310) 825-1501, (310) 206-6083 (telephone device for the deaf). Website: www.osd.ucla.edu.

INTRODUCTION TO ENVIRONMENTAL HEALTH (EHS 100)

Scheduled Lectures

Date	Topics	Assignments (in bold black), Readings (in red), web sites for review (in blue)
Sept. 24	Tools of EH (definitions) (ppt 1-10)	<ol style="list-style-type: none"> 1. Defining Environmental Health 2. Receive email updates: EPA; Intro to RA 3. Receive email updates: CA EPA 4. Receive email updates: CDC 5. PubMed 6. CDC's Environmental Public Health Tracking Network 7. Environmental Health Perspectives 8. EPA green apps 9. Laws and Regs of the California EPA 10. Search CDC
Sept. 29 (Tues.)	Tools of EH (law) (ppt 11-16)	<ol style="list-style-type: none"> 11. Free legal research resources 12. California Health and Safety Code 13. California Law (Statutes) 14. California Code of Regulations 15. U.S. Statutes at Large 16. United States Code 17. Federal Register 18. Code of Federal Regulations
Oct. 1	Tools of EH (microbiology) (ppt 17-20)	<ol style="list-style-type: none"> 19. CDC: Diseases and Conditions 20. CDPH: Diseases and Conditions 21. Jof Emerging Infectious Diseases 22. GAO Reports
Oct. 6 (Tues.)	Tools of EH (risk analysis) (ppt 21-33)	<ol style="list-style-type: none"> 23. Toxline 24. ToxNet 25. Integrated Risk Information System 26. Hazardous Substances Data Bank 27. Office of Environmental Health Hazard Assessment 28. ChemIDPlus 29. National Toxicology Program Report on Carcinogens
Oct. 8	Food Safety (ppt 34-48)	<ol style="list-style-type: none"> 30. Foodborne illnesses 31. Email updates FDA 32. FDA videos 33. FDA Recalls, Outbreaks, and Emergencies 34. Bad Bug Book 35. Federal Food, Drug, and Cosmetic Act 36. Food Safety Modernization Act 37. LA County grading system 38. California Health and Safety Code 39. Search FDA

Oct. 13 (Tues.)	Vectors (ppt 49-60)	Paper 1 Due 40. FIFRA 41. ToSCA 42. Endocrine Disruptors, Endocrine Primer 43. VectorBase 44. Department of Pesticide Regulation 45. U.S. Government Manual 46. REHS Program 47. Search California EPA
Oct. 15	Pesticides (ppt 61-71)	
Oct. 20 (Tues.)		EXAM 1
Oct. 22	Solid Wastes (ppt 72-80)	
Oct. 27 (Tues.)	Hazardous Wastes (ppt 81-88)	48. RCRA 49. CERCLA 50. SARA 51. EPA Toxic Release Inventory 52. CalRecycle 53. Household Products Database 54. Department of Toxic Substances Control
Oct. 29	Built environment (ppt 89-103)	55. EPA: Our Built Environment 56. http://www.countyhealthrankings.org/#app/ 57. http://www.kidsdata.org 58. http://www.cdc.gov/obesity/data/adult.html/ 59. Public Health Advocacy 60. http://nhts.ornl.gov/2009/pub/stt.pdf 61. Nation's Health (Newsletter)
Nov. 3 (Tues.)	Water Quality (ppt 104-114)	62. Groundwater recharge 63. SDWA 64. State Water Resources Control Board 65. L.A. Regional Water Quality Control Board 66. Drinking Water Data & Databases 67. Center for Environmental Health 68. Public Health Career Mart 69. Search CDPH
Nov. 5	Wastewater (ppt 115-122)	
Nov. 10 (Tues.)	Wastewater (ppt 123-136)	Paper 2 Due 70. Clean Water Act 71. National Pollutant Discharge Elimination System 72. Water recycling and reuse 73. Evolving topics ____ 74. Primer for Municipal Wastewater Treatment Systems 75. Advocacy for Public Health 76. Topics and Issues

Nov. 12	Air Quality (ppt 137-147)	77. Clean Air Act 78. Cal-EPA Air Quality 79. California Air Resources Board 80. South Coast AQMD 81. Receive email updates <u>air quality</u> 82. Receive email updates <u>u.v. index</u> 83. Air Quality, Los Angeles 84. Search EPA
Nov. 17 (Tues.)		EXAM 2
Nov. 19	Air Quality (ppt 148-159)	
Nov. 24 (Tues.)	Global climate change (ppt 160-168)	
Nov. 26	Thanksgiving Break	
Dec. 1 (Tues.)	10. Industrial Hygiene (ppt 169-181)	85. American Industrial Hygiene Association 86. American Conference of Government Industrial Hygienists 87. American Board of Industrial Hygiene 88. Occupational Safety and Health Administration 89. NIOSH Chemical Safety and Databases
Dec. 3:	Radiation (ppt 182-197)	90. Radiation Health Impacts 91. Nuclear Regulatory Commission 92. Environmental Protection Agency 93. Dept. of Energy 94. Dept. of Transportation 95. Dept. of Interior 96. OSHA 97. FDA 98. NCRP 99. ICRP 100. California Radiation Control Law
Dec. 10 (Thurs.)	(finals week)	EXAM 3

TERMS AND CONCEPTS -- Exam #1

TOOLS OF ENVIRONMENTAL HEALTH

Initial definitions:

1. environmental health
2. public health
3. health
4. environment
5. interrogatives
6. risk, hazard
7. type 3 statistical error
8. geographic information systems (GIS)
9. sustainability
10. carcinogen, mutagen, teratogen

Environmental law

11. rights, duties
12. *stare decisis*
13. constitutional
14. statutory
15. administrative
16. common
17. malfeasance, misfeasance, nonfeasance
18. police power
19. nuisance
20. eminent domain
21. embargo
22. subpoena
23. due process
24. equal protection
25. exclusionary rule
26. litigation, arbitration, negotiation

Microbiology:

27. communicable disease
28. epidemiologic triangle: agent, reservoir, host
29. pathogenicity, virulence
30. incubation period
31. carrier: asymptomatic, incubatory, convalescing
32. transmission: direct, indirect
33. vehicle borne: fomite
34. food, water: coliforms, enteric, helminthic
35. vector-borne, infestation

Risk analysis

36. epidemiology
37. toxicology
38. prevalence
39. incidence
40. synergism
41. potentiation
42. antagonism
43. risk assessment
44. hazard identification
45. weight of evidence
46. dose-response assessment, LD-50

47. exposure assessment, exposure
48. risk characterization
49. risk communication
50. source – message –channel -- receiver
51. risk perceptions, outrage factors
52. risk management

FOOD SAFETY

53. food related illness
54. intoxication
55. infection
56. chemical poisoning
57. CDC top risk factors for food
58. gastroenteritis
59. sterilize
60. disinfect
61. sanitize
62. spoilage organisms
63. exotoxin
64. endotoxin
65. enterotoxin
66. neurotoxin
67. pasteurization
68. ultra-pasteurization
69. thermometers
70. thermoduric
71. thermophilic
72. mesophilic
73. psychrophilic, cryophilic

VECTORS

74. mechanical vectors
75. biological vectors
76. rodents
77. *Rattus norvegicus*
78. *Rattus rattus*
79. *Mus musculus*
80. arthropods: insects, arachnids
81. cockroaches: American, Oriental
82. German, Brown-banded
83. lice: *Pediculus humanus*
84. *Pediculus capitis*
85. *Pthirus pubis*
86. fleas
87. *Ctenocephalides*
88. *Xenopsylla cheopis*
89. Flies: *Musca domestica*
90. mosquitoes: Anopheles, Culex, Aedes

PESTICIDES

91. Insecticides, Inorganics: boric acid, silica gel
92. Botanicals:
93. Pyrethrum (pyrethroids)
94. Rotenone (rotenoids)
95. Nicotine, neo-nicotinoids
96. Chlorinated hydrocarbons: DDT
97. Organophosphates: parathion, malathion
98. Carbamates: baygon, aldicarb
99. Rodenticides: bait shyness
100. Anticoagulants: warfarin
101. Quick kill: strychnine, 1080, 1081
102. Botanicals: red squill
103. Selective: Norbromide
104. Pesticide Labels (signal words):
105. Danger
106. Warning
107. Caution
108. Integrated pest management:
109. *Gambusia affinis*
110. autocide
111. pheromones
112. juvenile hormones
113. antifeedants
114. FIFRA, ToSCA

TERMS AND CONCEPTS – Exam #2

SOLID AND HAZARDOUS WASTES

115. garbage, rubbish
116. resource recovery:
117. reuse
118. reclamation
119. recycling
120. source reduction
121. sanitary landfill:
122. leachate
123. incineration
124. hazardous wastes
125. ignitibility, reactivity
126. corrosivity, toxicity
127. hazardous waste manifest
128. neutralization
129. precipitation
130. distillation
131. RCRA, CERCLA
132. SARA: ATSDR, TPQ, EPCRA, TRI

BUILT ENVIRONMENT

133. Sprawl,
134. Connectivity
135. Curb cuts, Pedestrian friendly, Bicycle friendly
136. Mixed use development
137. Brownfields
138. Permeability,
139. Low-impact development
140. Health Impact Assessment

DRINKING WATER

141. Percolation, leaching
142. Groundwater, aquifer
143. zone of aeration, zone of saturation
144. porosity
145. water table
146. surface water
147. eutrophication
148. epilimnion
149. metalimnion
150. hypolimnion
151. thermocline
152. turbidity
153. water treatment
154. coagulation, flocculation
155. sedimentation
156. reverse osmosis
157. ion exchange
158. filtration, slow sand filter
159. chlorination
160. free residual chlorine
161. hypochlorous acid
162. hypochlorite ion

WASTEWATER

163. assimilative capacity
164. total solids
165. settleable solids
166. BOD, COD, TOD, TOC
167. Municipal wastewater treatment
168. preliminary treatment
169. bar screen, grit chamber
170. comminuter
171. primary treatment
172. sedimentation
173. secondary treatment
174. activated sludge
175. trickling filters
176. rotating biological contactor
177. tertiary treatment
178. sludge digestion
179. waste stabilization ponds
180. Individual wastewater treatment
181. septic tanks
182. perc test
183. pit privy
184. retention containers
185. leaching pits
186. black water
187. gray water

AIR POLLUTION

188. content of clean dry air
189. criteria air pollutants
190. SO_x, NO_x, particulates, CO, lead, ozone
191. photochemical smog
192. particulates:
193. dust

- 194. smoke
- 195. fumes
- 196. mist
- 197. spray
- 198. PM-10, PM-2.5
- 199. UFP, nanomaterials
- 200. hydrocarbons:
- 201. VOC, PAH
- 202. respiratory regions:
- 203. nasopharyngeal
- 204. trachobronchial
- 205. respiratory bronchioles and alveoli
- 206. cilia, macrophage
- 207. absorption, adsorption
- 208. chronic obstructive pulmonary disease
- 209. asphyxiant
- 210. urban heat island
- 211. acid rain
- 212. Clean Air Act:
- 213. best practicable technology
- 214. pollutant standards index
- 215. attainment area
- 216. non-attainment area
- 217. prevention of significant deterioration
- 218. NAAQS
- 219. NESHAPS
- 220. Global warming
- 221. conduction, convection, radiation
- 222. albedo
- 223. atmosphere
- 224. troposphere
- 225. stratosphere
- 226. stratospheric ozone depletion
- 227. CFCs
- 228. destructive radicals
- 229. stabilizing reactions
- 230. indoor air quality

TERMS AND CONCEPTS -- Exam #3

INDUSTRIAL HYGIENE

- 231. Industrial Hygiene
- 232. Hierarchy of controls:
- 233. engineering,
- 234. administrative
- 235. housekeeping,
- 236. PPE
- 237. OSHA (PEL, BEI, AL)
- 238. NIOSH (REL)
- 239. ACGIH (TLV)
- 240. Exposure values: ceiling, peak, STEL, TWA
- 241. incident, breathing zone, danger zone
- 242. Sensitizer
- 243. MSDS, General duty clause

RADIATION

- 244. ionizing radiation, ion
- 245. radioisotope
- 246. free radical

- 247. directly ionizing radiation
- 248. alpha particles
- 249. beta particles
- 250. other charged particles
- 251. indirectly ionizing radiation
- 252. gamma
- 253. X-ray
- 254. neutrons
- 255. measures (traditional, SI)
- 256. Curie,
- 257. Becquerel
- 258. Roentgen,
- 259. Exposure unit
- 260. RAD,
- 261. Gray
- 262. REM,
- 263. Seivert
- 264. LET,
- 265. RBE, QF
- 266. sources of radiation
- 267. natural (terrestrial, cosmic), artificial
- 268. radioactive half-life
- 269. biological half-life
- 270. effective half-life
- 271. factors affecting sensitivity
- 272. mitotic activity
- 273. differentiation
- 274. radiosensitizers
- 275. sulfhydryl groups
- 276. jurisdiction: NRC, EPA, DOE, etc.
- 277. effects (acute, chronic)
- 278. somatic, genetic
- 279. inverse square law
- 280. half value layer
- 281. radon
- 282. non-ionizing radiation
- 283. ultraviolet (UV)
- 284. visible
- 285. infrared (IR)
- 286. microwaves
- 287. ELF electromagnetic fie

Learning Objectives and Competencies for EHS 100

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 competencies required for the MPH program (see <http://ph.ucla.edu/current-students/programmatic-competencies>).

COURSE LEARNING OBJECTIVES	HOW THESE LEARNING OBJECTIVES ALIGN WITH MPH CORE COMPETENCIES
<p>1. Given a specific environmental agent, use data sources to develop a concise summary of the agent’s sources, basic attributes, and fate.</p>	<p>C1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents. C5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety. C6. Identify key sources of data and use existing databases to provide background or supportive data to address environmental health questions. F14. Apply evidence-based principles and the scientific knowledge base to critical evaluation and decision-making in public health.</p>
<p>2. Identify adverse effects of environmental agents on human health (both acute and chronic), on ecosystems, and on other risks (including economic and psychological), which requires an awareness of susceptibility, toxicity, and methods of risk analysis.</p>	<p>C1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents. C2. Describe physiologic and psychosocial factors that affect susceptibility to adverse health outcomes following exposure to environmental hazards. C4. Specify current environmental risk assessment methods. C6. Identify key sources of data and use existing databases to provide background or supportive data to address environmental health questions. F11. Articulate how biological, chemical and physical agents affect human health.</p>

COURSE LEARNING OBJECTIVES	HOW THESE LEARNING OBJECTIVES ALIGN WITH MPH CORE COMPETENCIES
3. Recommend systematic controls of environmental health hazards, demonstrating an awareness of state and federal regulatory programs.	C3. Describe federal and state regulatory programs, guidelines, and authorities that control environmental health issues. C5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety.
4. Develop a testable model of environmental insults as a means of improving forensic skills for assessing, preventing, and controlling hazards.	C5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety. C8. Develop a testable model of environmental insult. F14. Apply evidence-based principles and the scientific knowledge base to critical evaluation and decision-making in public health.
5. Accurately and effectively communicate environmental health risks to targeted stakeholders and explain why/whether some populations are at greater risk than others for specific agents.	C7. Discuss various risk management and risk communication approaches, including their relation to issues of environmental justice and equality. F5. Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities.
6. 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.	C3. Describe federal and state regulatory programs, guidelines, and authorities that control environmental health issues.