BRIEF COURSE DESCRIPTION

Environmental and Occupational Epidemiology is a course for students in the Environmental Health Department who have successfully completed their first semesters of epidemiology and biostatistics. Students will gain experience reading, evaluating, and interpreting epidemiologic studies on the impact of both workplace and environmental exposures, and thinking through practical considerations. The course aims to strengthen each student’s ability to read epidemiological literature critically. This goal will be accomplished through in-depth exploration of major study designs including cross-sectional studies, cohort studies, and case-control studies; and through the weekly readings and case studies. Although some data analysis is required, the focus of the class is on conceptual issues common in environmental and occupational epidemiology research and on the interpretation of findings. Successful completion of the course will also contribute to a richer appreciation of how the environment affects public health.

LIST SCHOOL LEVEL, DEPARTMENT, AND/ OR PROGRAM COMPETENCIES

- Apply the principles of epidemiology to assess health effects of environmental exposures.

GROUND RULES FOR OPEN CLASSROOM DISCUSSIONS

In addition to the lecture format, throughout the course, there also will be dedicated periods for more open discussion to foster a student-engaged dialogue regarding the core concepts and ideas of the class (e.g., how the concepts relate to contemporary events, study design challenges in studying selected topics, social and ethical dimensions, etc.). After the first session, students will be tasked with revising a Google Document of class “Ground Rules” for optimal class discussions. These Ground Rules will be reviewed in the second session and applied to subsequent class discussions.

ACADEMIC HONOR CODE

The RSPH requires that all material submitted by a student in fulfilling his or her academic course of study must be the original work of the student.
LEARNING OBJECTIVES ASSOCIATED WITH THE COMPETENCIES

- Independently and confidently read published epidemiologic studies.
- Correctly apply common terminology to describe epidemiologic study designs and sources of bias.
- Interpret different measures of association and the results of multivariate statistical models.
- Understand the assumptions needed for various epidemiological study designs to be valid.
- Express criticism in a thoughtful, constructive, and respectful manner.

EVALUATION

Evaluation is based on 2 exams (50%), on regular classroom participation (25%), and homework assignments (25% total for all the written case studies, writing responses, and homework problem set). Class attendance is expected; if you need to miss class then e-mail me before class. This is intended to be a discussion-based classroom and so it is essential that you complete all assigned readings (what is listed on a date is homework that night, due before the next class), even if no writing assignments are due with that reading. It is okay if you struggle with some of the readings, we will be discussing in class.

Case Studies: Each case study will be assigned a week in advance and is due before the next class (uploaded to Canvas). Students must also bring a copy of their answers to class (an electronic copy is okay). The goal of these assignments is to stimulate thoughtful reflection prior to class, and richer discussion during class, so you must have your answers with you and ready to discuss.

Case studies demand deep, careful thinking; you should anticipate that a case study will take 3 or 4 hours to complete, and there are right and wrong answers. I do not expect that you will get every answer correct, but I do expect that you will make a sincere attempt to answer all the questions well. Students who attend class and who turn in a thoughtfully-completed case study will get full credit (even if some answers are wrong). Case studies that were hastily done or that contain many mistakes will not receive full credit. My intent is to reward students who work hard on the case studies.

Students may work together on the case studies. Each student must write his or her own answers. Do not copy.

Writing Responses: Writing responses (approx. 500 words) are meant to help you think more broadly and creatively about the connections of assigned articles to the themes of the course. Upload your response before the next class. All thoughtful, reasonable responses will receive full credit.

Homework Problem Set: In the first week, you will complete questions at the end of a textbook chapter as a “take-home open-book quiz”. Upload your answers to Canvas before class on January 20. We will review answers in class. This “quiz” will receive credit based on correct answers.

Exams: A week before each exam I will provide you with a journal article to read (multiple times before the exam). You are encouraged to discuss the article with classmates, but there is to be no discussion of exam questions among peers at any time including after the course has ended. Both the midterm and the final are 2 hour closed-book in class exams. Each exam is worth 25% of the final grade.

REQUIRED COURSE TEXT

Epidemiology: An Introduction (2nd edition) by Ken Rothman (2012) Oxford University Press is required. This book does an excellent job covering the core concepts in this course, and its other chapters beyond the scope of this class will provide a useful reference as your careers in environmental health extend beyond this classroom. The other required texts for this course are your notes from EPI 530 and BIOS 500. You will want to refer to them throughout the semester.
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Assignment</th>
</tr>
</thead>
</table>
| 1/13  | **Class Theme: Epidemiology as Critical Toolbox for Environmental Health**  
Review Syllabus  
Lecture 1: Introduction to Environmental Epidemiology  
**Assignment:**  
• Edit the Ground Rules Google Doc by 10 PM of Thursday 1/19  
• Read Rothman Chapter 3 “What Is Causation” pages 23-37  
• Problem Set Homework / “Open Book Quiz”: Rothman Chapter 3 end-of-chapter questions  
• Read “Murder by Radiation Poisoning: Implications for Public Health” |                                                                                                                                           |
| 1/20  | **Class Theme: Environmental Exposures through the One Health Lens**  
Review the classroom-consensus Ground Rules for classroom discussions.  
Discuss “Murder by Radiation” reading  
Discuss “Open-Book Quiz” (Rothman Chapter 3 end-of-chapter questions “What is Causation”)  
Lecture 2: One Health and Long-Term Contamination  
**Assignment:**  
• Read Wertelecki paper, complete Wertelecki case study before start of next class  
| 1/27  | **Class Theme: Cross-Sectional Studies**  
Discuss answers to Wertelecki case study (Ground Rules apply).  
Lecture 3: Cross-sectional studies  
**Assignment:**  
• Read Greens et al. (2014) “Determinants of bisphenol A and phthalate metabolites in urine of Flemish adolescents”  
• Greens et al. (2014) case study due (uploaded to Canvas before start of next class) |                                                                                                                                           |
| 2/3   | **Class Theme: Risk Perceptions and Science Communication (TA Presentations)**  
Molly’s Presentation: Risk Perceptions  
Discuss Readings  
Sam’s Presentation: Science Communication / Journalism  
Discussion: How to Bring All Together for Effective Pro-Environmental Behavior and Policy Change  
**Assignment:**  
• Read Kahan (2015) “What is the Science of Science Communication?”  
• Writing Response: What do you think your risk perceptions are like, compared to other people described by the Slovic and Kahan surveys? Do these frameworks for describing risk make sense to you? What questions do you have now about how risk is perceived after doing these readings? |                                                                                                                                           |
| 2/10  | **Class Theme: Considering the Human Mind in Environmental Epidemiology**  
Lecture 4: Theories of Mind: Risk Perception, Recall Bias, and Community Engagement  
• Read Hendryx et al. (2012) “Self-Reported Cancer Rates in Two Rural Areas of West Virginia with and Without Mountaintop Coal Mining”  
• Read Holzman (2011) “Mountaintop Removal Mining: Digging into Community Concerns”  
| 2/17  | **Class Theme: Ecological and Atomistic Bias**  
Lecture 5: Ecological Studies, Time-Series and other Group-Level Designs  
<table>
<thead>
<tr>
<th>Date</th>
<th>Class</th>
<th>Assignment</th>
</tr>
</thead>
</table>
Read Carlton et al. “Heavy Rainfall Events and Diarrhea Incidence”  
Upload writing response to Canvas before start of next class. |
| 2/24 | **Class: Cohort Studies (Occupational)** | Discuss writing response (Ground Rules apply).  
Lecture 6: Occupational cohort studies  
**Assignment:** Graham et al. (2004) and Atfield and Costello (2004) case study due at start of next class. |
Lecture 7: Population cohort studies  
**Assignment:** Read Moon et al. (2013) “Association between Low to Moderate Arsenic Exposure and Incident Cardiovascular Disease. A Prospective Cohort Study”  
Moon et al. (2013) case study due at start of next class. |
Optional but encouraged activity: enjoy someplace outdoors |
| 3/17 | **Class Theme: Interactions and Susceptibility** | Discuss Moon et al. case study (Ground Rules apply).  
Lecture 8: Susceptibility in environmental epidemiology  
**Assignment:** Read Salam et al. (2007) “Microsomal epoxide hydrolase, glutathione S-transferase P1, traffic and childhood asthma”  
Salam et al. case study uploaded to Canvas before start of next class. |
| 3/24 | **Class: MIDTERM REVIEW** | Discuss Salam et al. (2007) case study (Ground Rules apply).  
Review for midterm exam.  
**Assignment:** Read assigned article for the mid-term exam (will be a cross-sectional or cohort study).  
Closed book midterm will be administered in class on April 1. |
| 3/31 | **Class: Closed book midterm exam.** | I will give you a clean copy of the article at the time of the exam.  
Calculators/cell phones/class notes are not permitted.  
**Assignment:** Review Chapter 5 “Types of Epidemiologic Studies” in Rothman (2012) pp. 88-109 before start of next class. |
| 4/07 | **Today’s Class: Case-Control Studies** | Review answers to midterm exam (Ground Rules apply).  
Lecture 9: Case-control studies.  
**Assignment:** Read Gullar et al. 2002 NEJM mercury and fish oils and myocardial infarction  
Gullar et al. (2002) population-based case-control case study due at start of next class. |
<table>
<thead>
<tr>
<th>Date</th>
<th>Class: Review Three Major Study Designs in Epidemiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/14</td>
<td>Discuss Guallar et al. (2002) case study (Ground Rules apply).</td>
</tr>
<tr>
<td></td>
<td>Discussion: Study Design Options for Assessing Health Impacts of Environmental Change, and Multiple Phases of Environmental Problems</td>
</tr>
<tr>
<td></td>
<td><strong>Assignment:</strong></td>
</tr>
<tr>
<td></td>
<td>• Read Rasmussen et al. (2016) “Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations.” <strong>(Nested case-control example)</strong></td>
</tr>
<tr>
<td></td>
<td>• Rasmussen et al. (2016) nested-case control case study due at start of next class.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Class: FINAL EXAM REVIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Final Exam Review / Discussion of What Occupational and Environmental Epidemiology Can Deliver</td>
</tr>
<tr>
<td></td>
<td><strong>Assignment:</strong></td>
</tr>
<tr>
<td></td>
<td>• Read assigned article for the final exam (will be a case-control study).</td>
</tr>
<tr>
<td></td>
<td>• Closed book midterm will be administered in class on April 29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Class (Final exam period): Closed book final exam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/28</td>
<td>• I will give you a clean copy of the article at the time of the exam.</td>
</tr>
<tr>
<td></td>
<td>• Calculators/cell phones/class notes are not permitted.</td>
</tr>
</tbody>
</table>