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Course Description
As a second course in the Epidemiologic Methods sequence, this course builds on the basic concepts and methods of epidemiology taught in SPPH 502 -Epidemiologic Methods I. This course provides details on threats to internal validity, including confounding, information bias and selection bias, precision, and effect modification. The course also provides the opportunity for in-depth discussions on various epidemiologic designs. Finally, this course will also delve into the issue of causation in epidemiology.

Course Philosophy
Similar to any other epidemiology methods course, we will be using various examples from the literature that deal with a variety of diseases/exposures and health characteristics in our discussions, however, the course is about principles and methods. Examples are used to illustrate an underlying concept, rather than to learn about any particular disease/exposure or health characteristic.

Many students find basic principles and tools of epidemiology to be fairly straightforward. The main challenge lies in the application of those concepts and tools, in recognizing the problems in situ and then skillfully addressing them. During this course, we will try to apply concepts to real life problems from published studies in order to link theory and practice.

Course Objectives
The overall goal of this course is to provide students with the basic understanding required to conduct and critique epidemiological studies.

Upon completion of this course students will be able to:

- Apply widely accepted criteria for causal inference
● Recognize and analyze the most important threats to validity: confounding, selection, and information bias

● Evaluate effect modification

● Design epidemiologic studies to evaluate whether a certain exposure is causally associated with a certain health outcome

● Describe the strengths and weaknesses of alternative epidemiologic study designs for determining whether a given factor is a determinant of disease risk

● Critically review and appraise scientific literature

Course Format
This course includes a mixture of online self-directed learning, pre-class readings, online and face-to-face lectures and discussions, presentations, written assignment and problem sets and a final exam.

Course Texts and Readings
Readings for this course will consist of textbook chapters and journal articles.

Recommended Text:

Other supplemental texts:

Prerequisite Courses
The following courses or their equivalents are prerequisites for taking SPPH 503:

● SPPH 502 (Introduction to Epidemiology)
● SPPH 400 (Statistics for Health Research)

Course Evaluation
1. Group presentation on critique of a published paper 10%
2. End of term assignment: letter to the editor critiquing a published paper 10%
3. Online discussion 10%
4. Assignments 35%
5. Final exam 35%
### Office Hours and Teaching Assistant

Office Hours are available through Blackboard Collaborate on a pre-arranged schedule. The office hours schedule will be reviewed at the first face-to-face session and may change after that depending on student needs and TA availability.

Students are also invited to contact the TA by email as needed with questions and concerns. Meetings with the TA can be arranged for outside of office hours and will be conducted through Blackboard Collaborate, or meeting in person, whichever is appropriate.

### Module 1: Causation in Epidemiology

#### 1a: Causation and Causal Models

**Readings**


**Assignment/Activity**

- Online discussion on causal inference and causal models. **[part of 10%]**
  
  (When: Sept. 08-30, 2017)

#### 1b: From Causation to Inferring Causality

**Readings**


Cole P. Causality in epidemiology, public health and law. Environmental Law Reporter. 27 ELR 10282. [PDF available from Instructor]
1c: Critical Appraisal  (via Collaborate)  Sept 08-30, 2017

Readings

Assignments and Activities
- Group presentation on critique of a published paper by group of students assessing internal validity of a study and application of Hill’s Criteria. [10%]
  (Due: Select paper by October 8, 2017; Presentation Nov 17, 2017)
- Submission of a letter to the editor appraising an article. [10%]
  (Due: Article available by Nov 20, 2017; Submit letter Dec 3, 2017)

Module 2: Study Designs

2a: Cohort Studies  Sept 08, 2017

Readings
PMID: 9762516.
PMID: 9762506.
PMID: 9762509.
PMID: 9762508.
PMID: 9762507.

Assignments and Activities
- Exercise/Tutorial on Cohort Studies (via Collaborate)  Sept 09-16, 2017
- Assignment # 1 on Cohort Studies [10%]
  (Due: Sep 24, 2017)
2b: Case Control Studies

Readings
  Chapter 8 Case-Control Studies; pp 171-182.
  Chapter 11 Design Strategies to improve study accuracy. Matching; pp 111-127

  PMID: 1595688.

  PMID: 1595689.

Assignments and Activities
- Exercise/Tutorial on Case-Control Studies (via Collaborate)  Oct 4-21, 2017
- Assignment # 2 on Case-Control Studies [10%]
  (Due: Oct 29, 2017)

2d: Control Trials

Readings
  PMID: 12119855. doi: 10.1093/epirev/24.1.4

  PMID: 12119859. doi: 10.1093/epirev/24.1.72

  PMID: 11867132. doi: 10.1016/S0140-6736(02)07750-4

  PMID: 11853818. doi: 10.1016/S0140-6736(02)07683-3

  PMID: 12119858. doi: 10.1093/epirev/24.1.67

  PMID: 12119854. doi: 10.1093/epirev/24.1.39

  PMID: 12119853. doi: 10.1093/epirev/24.1.26

PMID: 12119861. doi: 10.1093/epirev/24.1.85

PMID: 12119860. doi: 10.1093/epirev/24.1.80

Module 3: Issues Impacting Validity of Studies

3a: Confounding – Assessment and Control Oct 13/Nov 17, 2017

Readings

Szklo M, Nieto FJ. Epidemiology: Beyond the Basics, 3rd edition. 2012  

Chapter 9 Validity in Epidemiologic Studies: Confounding; pp. 129-134.  

PMCID: PMC2744485. doi: 10.1097/EDE.0b013e3181a819a1.

PMID: 19052115. doi: 10.1093/ije/dyn253

PMID: 12453109. doi: 10.1034/j.1600-0528.2002.00008.x


Readings for Confounding by Indication

PMCID: PMC1756997. doi: 10.1136/jech.56.12.951

PMID: 10366179.
3b: Selection Bias

November 17, 2017

Readings

Chapter 9 Validity in Epidemiologic Studies: Selection Bias & Information Bias; pp. 134-146.

PMID: 15308962. doi: 10.1097/01.ede.0000135174.63482.43


Additional Readings on Bias

Chapter 19 Bias Analysis; pp. 345-380.

3c: Measurement Error

November 17, 2017

Readings

Chapter 9 Validity in Epidemiologic Studies: Selection Bias & Information Bias; pp. 134-146.

3d: Effect Modification

November 17, 2017

Readings

Szklo M, Nieto FJ. Epidemiology: Beyond the Basics, 3rd edition. 2012
Chapter 6 Interaction; pp. 185.

Chapter 5 Concepts of Interaction; pp. 71-83.
Chapter 15 Introduction to Stratified Analysis; pp. 258-282.

PMID: 19190674.

Assignment

- Exercise/Tutorial (via Collaborate) Nov 18-24, 2017
- Assignment # 3 on Internal Validity [15%]
  (Due: November 26, 2017)

Final Exam

Released: Dec 01, 2017
Due: Dec 10, 2017 [35%]