EPID 701: Introduction to Epidemiologic Research

1. Background and Learning Objectives

This course is part of a two-course sequence (with EPID 702) designed to provide in-depth exposure to the theory and methods of epidemiologic research. Topics covered include measures of disease frequency and association, study design, hypothesis testing, sampling strategies, and screening. The course is designed for students entering the PhD program in Epidemiology. However, students from other graduate groups are welcome, as long as they meet the prerequisites; such students are welcome during any year of study.

After completing this course, students will be able to:

- Describe the science of epidemiology;
- Demonstrate ability to develop a variety of observational and analytic study designs;
- Discuss in detail the quantitative foundations of epidemiologic theory and methods;
- Describe current approaches to epidemiologic research;
- Identify sources of bias and ways to address them;
- Critically assess epidemiologic literature; and
- Formulate study designs to address specific problems in population health

2. General Course Information

Directors: Adam Naj, PhD* (adamnaj@pennmedicine.upenn.edu)

Kelly Getz, PhD, MPH* (kgetz@pennmedicine.upenn.edu)

Lecturers: Ricardo Castillo-Neyra, PhD, DVM, MSPH (cricardo@upenn.edu)

Michael Harhay, PhD, MPH (mharhay@pennmedicine.upenn.edu)

John Holmes, PhD (jhholmes@pennmedicine.upenn.edu)

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Enrique Schisterman, PhD, MA (enrique.schisterman@pennmedicine.upenn.edu)

* These faculty also serve as Course Module Directors

Location: Blockley 840 and/or online via Zoom (lecture information to be posted on Canvas)

Credits: 1.0 course unit

Prerequisites: Permission of course directors. Students enrolling in this class are expected to have: prior biostatistics experience or training and knowledge of and/or experience in working in biomedical research or a clinical domain.

Materials: Except for textbooks, all materials will be posted on Canvas.

Texts

- Lash, VanDerWeele, Haneuse, and Rothman: Modern Epidemiology, 4th
- Weiss and Koepsell: Epidemiologic Methods: Studying the Occurrence of Illness, 2nd
- *Recommended:* Morabia: A History of Epidemiologic Methods and Concepts.
- Selected readings are provided in the *Files* folder on Canvas, in the subfolder for each class session

Assignments and Other Materials

- Problem set assignments are located in the *Files* | *Problem Sets* folder on Canvas, along with a helpful tips and tricks document for attacking the sets
- The most updated version of this syllabus is located in *Files* | *Syllabus*, along with a grading rubric for the reading journal.

Format: The class will meet weekly on Mondays for up to 3 hours (10:15 am - 1:15 pm ET).

Lecture: Class sessions will generally consist of a lecture of approximately 60-90 minutes in length. A brief discussion/question-and-answer session will generally follow each lecture. Required and recommended readings will be finalized and posted one week prior to each session. Lecture slides will be posted the morning of each session, yet will remain available for the duration of the semester.

Critical Appraisal/Discussion: The remaining portion of the class session will consist of a student-led critical appraisal of the reading(s) selected and a discussion among students with input from the session's lecturer. Students will be asked to sign up by Thursday of the first week of class (9/16) to lead three (3) critical appraisals, and for the sessions they have selected, they will provide an overview of the reading with an emphasis on synthesizing core epidemiology concepts related to the reading(s).

Discussion of Problem Set

Introduction to the Next Topic

Assignments: Several types of assignments will be given for work in and out of class.

Problem Sets: Problem Sets will be assigned every other week starting the second week of class, and will be due the second Thursday after their assignment, for a total of six (6) assignments in the semester. Grades will be out of 10 points, and the lowest grade will be dropped in tabulating the final grade. Group collaboration on these assignments is highly encouraged, but assignments must be submitted by each student separately written in their own words (no plagiarism). In addition to responding to any questions you have about the assignment over email, an office hour will be scheduled to discuss any questions about the assignment you may have.

Note: Problem sets are due in Canvas (Assignments folder) no later than 12 p.m. the second Thursday after the assignment is distributed.

Reading Journal: The journal will consist of a brief (1-2 page) "reaction paper" for each reading that demonstrates your understanding of the article's content and its place in the epidemiologic literature. We will review your journal prior to class. The reading journal is not an abstract, but your own synthesis of the issues that the article addresses or attempts to address. The format of journal entries (one for each required reading in a week) is as follows; please follow this format with the section headings provided here:

- *Citation:* Bibliographic citation of the paper you are describing
- *Summary:* Provide a brief summary of the paper in your own words. (4-5 sentences)
- *Critical review:* Identify the key positive and negative points raised in the paper. (1-2 paragraphs)
- *Opinion:* Provide your opinion of the value of the work to the field of epidemiology and in the context of current knowledge. (1 paragraph)
- *Discussion question (optional):* 1-2 questions about the article for the class discussion.

Note: Reading journals are due in Canvas (Assignments folder) no later than 12 p.m. Thursday the week before the paper(s) is (are) discussed

Final Project: By week 8 of the course, each student should identify a scientific question around which to propose a study. The study proposal will be submitted in a written report which includes these sections:

- Description of the problem domain
- Background/prior work
- Formulation of a research question
- Specific aims for a project to address the research question
- Outline of methods to address the research question

- Study design
- Target population

- Data source(s)
- Sampling methods (if needed)
- Analysis plan

Each student will deliver a 15-minute slide presentation on the last day of class (12/6) summarizing their study proposal report, followed by a 5-minute question and answer session. Students will then have additional time to incorporate the feedback. The final project will be due by 11:59 pm on Canvas by Wednesday, 12/22.

Group projects are allowed and encouraged, but the work must reflect the effort of all students in the group, and individually written reports must be submitted. Extra time will be allotted for the presentation, proportional to the number of students in a group.

Note: Final Project presentations will be held in lieu of a Critical Appraisal and discussion during class on Monday, 12/6. Final Project reports will be due at 11:59 pm on Wednesday, 12/22.

Evaluation: 1) Problem Sets (60%), 2) Reading Journal Entries/Discussion Participation (20%), 3) Final project (20%).