INTERMEDIATE EPIDEMIOLOGY
Public Health 422
1.0 Credit

Winter 2015 (January 7 – March 18, 2014)

Time: Wednesday 6:00 – 9:00 pm
Location: 633 N. St. Clair Street

Course Instructor (office hours by appointment):
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Course Themes

• Disease causation is multifactorial.
• Assessments of potential causes and their effects must be in the context of time.
• Causal inference requires understanding the counterfactual paradigm, using proper study
designs and methods to limit biases, and applying appropriate mathematical analyses (i.e.,
linking statistical analyses to the study design) to validly estimate effects of exposures.
• Conceptual and mathematical modeling is used to understand and explain complex relations
among causes and outcomes.

I. Course Description

This course is designed to provide students with an intermediate depth of knowledge in general
epidemiologic theory and methods. Specifically, this course provides students with the following: (1)
advanced understanding of epidemiologic and clinical study designs; (2) knowledge of classical methods
of statistical analyses of epidemiologic studies; (3) an introduction to multivariate regression modeling
for epidemiologic and clinical studies; and (4) a foundation for statistical and causal inference. The
material presented in this course will build upon the information presented in Introduction to
Epidemiology and prepare the student for Advanced Epidemiology.

This course will focus on the design, conduct, and interpretation of observational epidemiologic and
clinical studies in human populations with a focus on analytic cohort, case-control, and cross-sectional
studies. Comparisons with randomized controlled trials (RCTs) will be made with discussion of the
advantages and disadvantages of the different study designs for specific epidemiologic and clinical
research questions.
This course will also address key validity issues related to the selection of study subjects (i.e., selection bias), accuracy of measures of exposure and disease (i.e., misclassification bias), and sources of potential errors in interpreting epidemiologic studies (i.e., confounding).

In addition, the course will address the use of statistical methods for epidemiologic studies, including stratified and regression analyses for the assessment of effect modification and adjustment of confounding. Specifically, the course will emphasize strategies for the selection of regression model structural forms and specific covariates. Lastly, the course will introduce advanced and novel methods of epidemiologic analyses.

II. Prerequisites

a) Introduction to Epidemiology  
b) Introduction to Biostatistics (Intermediate Biostatistics is highly recommended)  
c) Students MUST receive permission to enroll from Professor Kyriacou if the two courses listed above have not been completed.

III. Course Objectives

After completion of the course, students should be able to:

a) Describe concepts of causation of diseases or other health-related events.  
b) Define specific research questions for epidemiologic studies based on present state of knowledge.  
c) Describe the major types of observational epidemiologic study designs compare with RCTs.  
d) Select the most appropriate study design for specific research question or hypothesis based on the advantages and disadvantage of each design.  
e) Define exposure variables, outcome variables, and covariates.  
f) Evaluate accuracy of exposure and outcome measurement instruments.  
g) Define appropriate target, source, and study populations for observational studies.  
h) Compute and interpret risk, rate, hazard, and odds ratios, their confidence intervals and tests of significance using classical methods of analysis.  
i) Describe the concepts of selection, misclassification, and confounding biases.  
j) Describe the differences between confounding and effect modification and apply these concepts to describe the role of variables as potential confounders or effect modifiers.  
k) Describe and utilize appropriate methods of stratified analyses to account for the effects of confounding or effect modification.  
l) Conduct standard forms of regression modeling methods for epidemiologic and clinical studies.  
m) Read and interpret literature using epidemiologic and statistical methods.  
n) Design randomized controlled trials and observational studies that assess the measures of association between specific exposures and disease outcomes.  
o) Describe advanced and novel epidemiologic research methods.  
p) Evaluate associations based on causal and statistical inference.

IV. Teaching Format

New material will be presented in the weekly lecture sessions. Homework assignments will also be reviewed in class. Because time in class is limited, students are expected to review and read the assigned textbook chapters and be prepared to participate in the lecture sessions. Students will also be asked to participate through discussion and presentation of homework assignments.
V. Student Evaluation

a) Homework and class participation – There are several homework assignments that will be discussed in class on the Wednesday following their assignment. Students are expected to come to class prepared to take part in the discussions as they will be called up randomly to describe their answers to the homework assignments. Homework assignments and related class discussions will count towards 25% of your grade.

b) Examinations - there will be a midterm examination (25%) and a comprehensive final examination (50%). Make up examinations must be arranged in advance, and will only be permitted under extenuating circumstances.

VI. Textbooks

Required: Szklo M and Nieto FJ. Epidemiology, Beyond the Basics (3rd Edition). Jones & Bartlett, 2012. This is an outstanding intermediate epidemiology textbook which covers almost all of the information and concepts that I will present during this course. I strongly recommend completing the assigned reading either before or after the concurrent lecture session.

Optional: Rothman KJ. Epidemiology, An Introduction (2nd Edition). Oxford University Press, 2012. This is a superb introductory text that covers much of the information I will discuss in class and a few of the important concepts that are not covered in Szklo and Nieto.

Optional: Kirkwood BR and Sterne JAC. Essential Medical Statistics (2nd Edition). Blackwell Science, 2003. This is an exceptional textbook that readily explains statistical concepts for most aspects of epidemiologic and clinical research. It is an excellent resource for basic to intermediate biostatistics.

VII. Journal Article Readings

Journal article readings are optional but will augment information from the textbooks and will provide the student with in-depth information regarding concepts that will be discussed during the lectures. These articles are carefully selected to provide the student with intermediate to advanced level of understanding of epidemiologic theory and methods.

In addition, original research articles will be reviewed and critiqued by the students as part of their homework assignments. The sophistication of the discussion should advance as we progress in the class. The objective of this class discussion component is to teach students to critically read and evaluate the literature. The extent to which the students participate in the discussion will be evaluated under “class participation.”

VIII. Blackboard

The course management system, Blackboard, will be used to transmit and share all course materials including the syllabus, assignments, journal articles, and lecture presentations.

IX. Course Evaluation

The Programs in Public Health administer web-based course evaluations to students for each course near the end of the quarter. Your completion of both the unit (course) and faculty evaluation components is
required; failure to complete either of the evaluations will result in an incomplete grade until the evaluations are submitted. You will be sent the web link and instructions via email later in the quarter. You will have about two weeks time to complete the evaluations before grades are submitted.

X. Academic Integrity

Every Northwestern faculty member and student belongs to a community of scholars where academic integrity is a fundamental commitment. The Program in Public Health abides by the standards of academic conduct, procedures, and sanctions as set forth by The Graduate School at Northwestern University. Students and faculty are responsible for knowledge of the information provided by The Graduate School on their Web page at http://www.tgs.northwestern.edu/academics/academic-services/integrity/index.html.

Academic misconduct includes, but is not limited to the following:

1. Receiving or giving unauthorized aid on examinations or homework
2. Plagiarism
3. Fabrication
4. Falsification or manipulation of academic records
5. Aiding or abetting any of the above

The PPH follows The Graduate School’s procedure for evaluating alleged academic misconduct, as outlined on the TGS website. http://www.tgs.northwestern.edu/academics/academic-services/integrity/dishonesty/index.html

Faculty reserve the right to use the “Safe Assignment: Plagiarism Detection Tool” that is part of the Course Management System to evaluate student assignments. Information about this tool can be found at http://www.it.northwestern.edu/education/course-management/support/assessments/safeassignment.html
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<tr>
<th>Date</th>
<th>Topics</th>
<th>Szklo Chapter (pp)</th>
<th>Rothman Chapter</th>
<th>Kirkwood Chapter</th>
<th>Journal Article Readings</th>
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<tr>
<td>Feb 11</td>
<td>Midterm review (5 to 6 pm Optional) and Midterm Exam (6 to 7:20 pm)</td>
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<td>Mar 18</td>
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Journal Article Readings:


