PUB HLTH 437
PRACTICUM ON EPIDEMIOLOGIC RESEARCH DESIGN AND DATA ANALYSIS – 1.0 CREDIT
Summer Quarter 2012

Time/Date: Mondays and Wednesdays, 6:30 – 9:00 pm July 2 – Aug 22, 2012 (there will be no class July 4th-11th) for a total of 30 classroom hours

Location:
McGaw Williams Auditorium (July 2, 16, 18, 23, 25, 30, August 1, 6, 8)
Galter Library LRC Lab (August 13, 15, 20, 22)

Course instructor: Suzanne E. Belinson, Ph.D., MPH
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Northwestern University

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Office Hours: By appointment
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Course Description

This course is designed to provide hands-on experience in the design and analysis of epidemiologic studies, with emphasis on applying epidemiology and biostatistics methodology to address current clinical and population science questions of interest. Through independent projects and class exercises, students will learn the practical aspects of conducting research, ranging from defining a statistically testable hypothesis to generating results from applied data analyses. The overarching goal of this course is for students to develop the basic skills and to have a tangible analytic approach to conduct independent empirical research involving statistical data analysis. A brief review of biostatistical methods will be provided in the context of appropriate statistical tests to address given statistical questions; however, the focus of the course is not on biostatistical methodology as students are expected to have adequate preparation.

The centerpiece of the course is the individual project. **MPH students MUST bring ideas for their Culminating Experience to the course so that they can further develop and refine their research plan. MSCI, postdoctoral fellows, and all other students MUST bring ideas for studies that they would like to conduct.** The emphasis of the course is in developing the skills necessary to conduct an independent research project in a range of settings (e.g., academia, industry, public health agencies). During this process, students will be guided in the use of current technology to refine research hypotheses and to conduct data analyses. The target audience for this course is advanced MPH and MSCI students and postdoctoral fellows who plan to conduct independent research.

Prerequisite

Intro to Biostatistics and Intro to Epidemiology

Course Objectives

1. Define a study question in response to an identified need in the current literature and develop a statistically testable hypothesis
2. Choose suitable study populations and measurements for the research question under study
3. Demonstrate some basic understanding of questionnaire formation, data collection process, and
database development
4. Develop an analytic plan to describe the study population, outcomes, and test the statistical hypotheses
   of interest in the study

Using a dataset that I will distribute, students will:
5. Prepare a dataset for analysis by “cleaning” and “checking” data for errors
6. Conduct statistical analyses and preparing written responses to a series of questions that I will distribute
to the class.

Teaching Format

The objectives of this course will be met through a combination of exercises that the student performs on a
study question of his/her choosing (“individual project”) and through a dataset that I will distribute to the class
(“class project,” with individual choices of study hypotheses and variables within the framework of the dataset).

In-class instruction will include a combination of lectures to introduce concepts and practical examples and
exercises to stimulate discussion. Most sessions on the individual projects will include class discussion on a topic
central to the completion of the individual project. Students are strongly encouraged to actively participate in
these discussions in order to: 1) improve oral communication skills; 2) revise and strengthen their individual
projects through feedbacks from the instructor and their peers; 3) benefit from an exposure and contribution to
other topics their peers are conducting. The sessions on the class project will be conducted in the computer lab.
Step-by-step instructions using STATA will be provided in the lab to facilitate completion of the class project.

Student Evaluation

Individual Project (40%):
- Regular take-home assignments will focus on learning how to complete Objectives 1 through 4. Each
  objective will be divided into smaller, focused segments and students will be asked to demonstrate their
  progress on these intermediate steps through assignments to be discussed in class or handed in.
- In addition to homework exercises to practice these concepts, students will be required to demonstrate
  mastery of these concepts by generating researched, well-written products. Two of which will be
  graded on (1-page research proposal – 10% and data analysis plan - 20%).
- Each student will be asked to give an oral presentation with PPT on their individual project. This
  presentation -- about 5-10 minutes (followed by a short discussion) -- will account for 10% of the total
  score.

Class Project (40%):
- To meet Objectives 5 and 6, students will complete assignments based on the dataset I will distribute
  (i.e., class project). Because this is not a statistical computing course, example coding will be provided
  for STATA only – the required software for the MPH program, though other appropriate packages may
  be used (e.g., SAS, SPSS). Microsoft Excel may NOT be used for data analysis in this course.

For both individual and class projects, clarity of written expression will be evaluated. Due dates are clearly
specified in this syllabus (see course sessions table on pages 4 and 5). Late assignments will be penalized: up
to 1 week late, 10% reduction; up to 2 weeks late, 20% reduction; longer than 2 weeks, 30%.

Attendance and Participation (20%):
- Because in-class exercises and discussions will be a central opportunity for students to explore research
  challenges and introduce new concepts, attendance and active participation are crucial. Attendance and
  participation will each account for 10% of the grade. Attendance will be 0 for those missing more than
  2 sessions.
There will be no exams in this course. The University has a deadline of **Aug. 28th** to provide grades for all summer courses.

**Course Evaluation**
The MPH Program administers 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.

**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](http://www.tgs.northwestern.edu/academics/academic-services/integrity/index.html)

Academic misconduct includes, but is not limited to
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](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](http://www.it.northwestern.edu/education/course-management/support/assessments/safeassignment.html)

**Textbooks**

**Required (a good reference for applied epidemiological research; available in the library if you do not want to purchase the book):**


**Recommended:**


In addition to the required textbook, readings will occasionally be distributed in class.

**Communications**
All registered students have been added to the course management system ("blackboard") (https://www.courses.northwestern.edu/webapps/login). Blackboard will be the main means of communication for this course.

**Course Sessions**

See next page. Readings should be completed prior to class; handouts after the class.

There will be 13 sessions. The first 8 meet at McGaw Williams Auditorium. The last 4 (in August) labeled with "computer lab session" on the next page) will meet at the Galter library Learning Resources Center lab ("teaching space"). It is located on the 1st floor of the Galter Library in the Ward building. Ask the front desk if needed.
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<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Class Activities and Handouts</th>
<th>Readings or Handouts</th>
<th>Assignments Due (and Notes)</th>
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<tbody>
<tr>
<td>7/2</td>
<td>Course overview; Introduction to research question, study design, study population</td>
<td>Introduction; Course Overview; Review of study designs; Criteria for defining a study question; <em>Handouts</em>: class discussion assignment 1; CE excerpt (online)</td>
<td>Hulley Chapters 1-2; Chapters 7 – 12 (as applicable)</td>
<td>In-class mini-survey of research experiences, interests, and course expectations</td>
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<td>7/4</td>
<td>No Class 4th of July</td>
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<td>7/9</td>
<td>No Class</td>
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<td>Please spend this time making sure you have the pieces together for your CE or other project. The course will be more fulfilling with a specific project to focus on.</td>
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<td>7/11</td>
<td>No Class</td>
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<td>7/16</td>
<td>Hypothesis development; Measurement assessment</td>
<td>Discuss research questions and design; Lecture on hypothesis development; Defining the exposure and outcome; Reducing error and bias; <em>Handout</em>: class discussion assignment 2</td>
<td>Hulley Chapters 3-4</td>
<td>In-class discussion of your research question, study design and population</td>
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<td>7/18</td>
<td>From Design to Data – the Long Journey in Between; Human Subjects/Institutional Review Board</td>
<td>Discussion of hypotheses and measurements; Brief overview of manual of operations, data collection and database management; Human Subjects/IRB discussion; <em>Handouts</em>: 1-page written proposal instructions; Rules for better data collection (online)</td>
<td>Hulley Chapter 14-17;</td>
<td>In-class discussion of research hypotheses and measurements, and other practical issues in carrying out your research project</td>
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<td>7/23</td>
<td>Statistical analysis review; Generating an analysis plan; Sample size calculations</td>
<td>Brief review of applied statistical analysis; Example of an analysis plan; Overview of sample size calculations; <em>Handout</em>: class discussion assignment 3; stat. test guide</td>
<td>Hulley Chapters 5-6;</td>
<td>1-page written draft describing the proposed study DUE (Graded)</td>
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<td>7/25 Wed.</td>
<td>Secondary data analysis (research using existing data)</td>
<td>Discuss statistical analysis plans; secondary data analysis; introduction to available data sources at NUPM and beyond; <strong>Handout:</strong> data analysis plan example (scoring guide)</td>
<td>Hulley Chapter 13</td>
<td>In-class discussion of independent project statistical analysis plans.</td>
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<td>7/30 Mon.</td>
<td>How to read, review apply the medical literature</td>
<td>Discuss how to examine the literature. examples in the published literature and the</td>
<td>Read the papers on Blackboard</td>
<td>In-class discussion of these papers.</td>
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<td>8/1 Wed</td>
<td>Introduction to Microsoft ACCESS;</td>
<td>ACCESS as database management tool <strong>Handout:</strong> presentation scoring guide; proposal assignment instruction;</td>
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<td>Guest Speaker: Daniel B. Garside <strong>Data Analysis Plan DUE (graded);</strong></td>
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<td>8/6 Mon.</td>
<td>The Fundamentals of Questionnaire Design</td>
<td>Lecture and in-class exercises on questionnaire design</td>
<td>Hulley Chapter 15</td>
<td>Guest Speaker(s): Elizabeth Hahn <strong>Bring your own questionnaire or issues related to questionnaire design to class (optional)</strong></td>
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<td>8/8 Wed.</td>
<td>Presentation of individual projects; Introduction/overview of new dataset</td>
<td>5 to 10-minute presentations by each individual on proposed project with time for Q&amp;A and feedback; <strong>Handout:</strong> class data analysis project example</td>
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<td>Individual presentation with PPT (graded)</td>
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<td>8/13 Mon.</td>
<td>Computer lab session: Outcome, exposure, and covariates measurement, preliminary analyses and Examining basic associations;</td>
<td>Data cleaning and checking; Review the distribution of variables of interest and generate plots; Conduct preliminary analyses.</td>
<td>Handout on STATA</td>
<td>A study hypothesis based on the dataset should have been formulated before class: Be ready to start the initial data analysis</td>
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<td>8/15 Wed.</td>
<td>Computer lab session: Confounding and interactions; Multivariable model building</td>
<td>Hands-on session on using STATA to examine ways to deal with confounding and interaction; Conduct multivariable analyses.</td>
<td>In-lab completion of relevant sections of the class project</td>
<td>Analysis and written interpretation of findings from class project, Part I DUE (graded)</td>
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<td>8/20</td>
<td>Computer lab session to complete project analyses</td>
<td>Supervised data analysis lab session to complete analysis for project;</td>
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<td>Required Course evaluation DUE (without which no grade for the course can be given)</td>
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<td>Wed.</td>
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<td>8/22</td>
<td>No class—final assignments due at 10pm</td>
<td>Late assignments will be penalized.</td>
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<td>Analysis and written interpretation of findings from class project, Part II DUE (graded)</td>
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