HBEH 760: Research Methods with Health Behavior Applications I  
Fall 2018  
Department of Health Behavior  
Gillings School of Global Public Health  
Tuesday and Thursday, 11-12:15, 1303 McGavran-Greenberg  
Course Website: Accessible through Sakai, at http://sakai.unc.edu/

Teaching Team  
Susan Ennett, sennett@email.unc.edu  
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Office Hours: By Appointment

Course Description  
Advanced Research Methods, HBEH 760, is part of the required methods training sequence for doctoral students in the Department of Health Behavior. The course is organized by modules and team-taught by department faculty. Emphasis in the first semester (HBEH 760) is on issues related to the research process, study design, and sampling while emphasis in the later semesters (HBEH 761, 762, 850) is on selected analytic topics, including generalized linear modeling, mediation and moderation analysis, modeling grouped data (hierarchical and longitudinal), and psychometric methods. Modules covered in the first semester are: Conceptualizing Research Questions and Hypotheses; Testing Hypotheses: SAS and Data Fundamentals; Intervention Study Designs; Nonintervention Study Designs; and Sampling.

Course Learning Objectives  
At the completion of the course, students will be able to:
- L1. Construct research questions, hypotheses, and conceptual models that are informed by theory and empirical evidence
- L2. Identify units of analysis in different research scenarios and discuss the ecological fallacy
- L3. Explain why measurement is important in health behavior research and identify and define different types of reliability and validity
- L4. Distinguish between main effects, mediation, moderation, and confounding in conceptual hypotheses and understand basic analytic steps for testing these types of hypotheses
- L5. Use SAS to perform data management tasks including dataset and variable manipulation
- L6. Select appropriate bivariate analytic methods for testing conceptual hypotheses
- L7. Use SAS to conduct bivariate analyses and correctly interpret findings
- L8. Identify study designs appropriate to address intervention and nonintervention research questions
- L9. Explain aspects of evidence that should be considered when drawing conclusions about causal relations between variables
- L10. Explain the strengths and weaknesses of different study designs for establishing internal and external validity
- L11. Describe different methods used in survey sampling
- L12. Evaluate the merits and weaknesses of various sampling designs as applied to a specific research question
- L13. Identify the different considerations that go into determining sample size for hypothesis testing
Grading and Assignments
The quality of the course depends on your preparation for and participation in discussion and assignments. You are expected to read the assigned readings before class and come to class prepared to contribute to the discussion. In several sessions, students will lead discussion of journal articles. Other assignments include graded exercises assigned as homework, a midterm exam, and a final exam. Written assignments will be submitted to instructors using the drop box feature in Sakai and are due prior to the start of class on the day they are due. Grades will be based on: graded homework exercises (30%), midterm exam (30%), final exam (30%), and contribution to class discussion, including leading and contributing to discussion of journal articles (10%).

All grades will be determined using the following scale:

<table>
<thead>
<tr>
<th>Graduate Permanent Grade</th>
<th>UNC Graduate School Grading Description</th>
<th>Points Range</th>
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<tbody>
<tr>
<td>H</td>
<td>High Pass – Clear Excellence</td>
<td>&gt; 93</td>
</tr>
<tr>
<td>P</td>
<td>Pass – Entirely Satisfactory Graduate Work</td>
<td>&gt; 80</td>
</tr>
<tr>
<td>L</td>
<td>Low Pass – Inadequate Graduate Work</td>
<td>&gt; 70</td>
</tr>
<tr>
<td>F</td>
<td>Fail</td>
<td>&lt; 70</td>
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Honor Code
Students must observe the Honor Code in all course assignments. You are expected to produce your own work, except where group work is specifically allowed. In all written assignments, you must not plagiarize the work of others. The instrument defining the Honor Code defines plagiarism as "deliberate or reckless representation of another’s words, thoughts, or ideas as one's own without attribution in connection with submission of academic work, whether graded or otherwise." If you have questions about your responsibility under the Honor Code, please bring them to one of the instructors or consult with the office of the Dean of Students or the Instrument of Student Judicial Governance. This document, adopted by the Chancellor, the Faculty Council, and the Student Congress, contains all policies and procedures pertaining to the student honor system.

Please include the following pledge on all written assignments: “On my honor, I have neither given nor received unauthorized aid on this assignment.”

Diversity and Inclusion Statement
In support of the University and the Gillings School of Global Public Health’s diversity and inclusion goals, the Health Behavior department embraces diversity as an ethical and societal value. We broadly define diversity to include race, gender, national origin, ethnicity, religion, social class, age, sexual orientation, and physical and learning ability. Promoting and valuing diversity in the classroom enriches learning and broadens everyone’s perspectives and are key elements for the success of any enterprise.

This class will follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity.

Some useful links:
- Diversity and Inclusion at the Gillings School of Global Public Health: [http://sph.unc.edu/resource-pages/diversity/](http://sph.unc.edu/resource-pages/diversity/)
Course Evaluations
Student evaluations are critical to course development and improvement. Students are asked to complete the official on-line departmental/school evaluation at the close of the course; time will be set aside in the last class for students to complete the evaluation. Informal feedback is welcomed at any time.

Required Readings


Other readings (see Course Schedule) are available electronically on the Sakai website. Both texts are on reserve at the Health Sciences Library and copies are available in the doctoral student library

Course Schedule

**Module 1: Conceptualizing Research Questions and Hypotheses (Luz McNaughton Reyes)**

Aug. 21  Units of Analysis, Variables, and Levels of Variables


Aug. 23  Relationships among Variables: Mediation, Confounding, and Moderation


*Ungraded homework exercise handed out (Finish by Aug 28, discuss answers Aug 30)*

Aug. 28  Writing Research Questions and Hypotheses


Aug. 30  Role of Theory and Conceptual Models in Research


Sept. 4  In Class Exercise on Developing Theoretically Informed Conceptual Models

Graded Homework 1 handed out (Due September 20)

Sept. 6  Operationalizing Theoretical Constructs: Measurement (part I)


Sept. 11  Operationalizing Theoretical Constructs: Measurement (part II)

Module 2: Testing Hypotheses: SAS and Data Fundamentals (Luz McNaughton Reyes)
Sept. 13  Data Management: SAS Basics
Little SAS book:

Chapter 1, Sections 1.1-1.4, 1.6-1.9
- 1.1 The SAS language
- 1.2 SAS data sets
- 1.3 DATA and PROC steps
- 1.4 The DATA step’s built in loop
- 1.6 Windows and commands in the SAS windowing environment
- 1.7 Submitting a program in the SAS windowing environment
- 1.8 Reading the SAS log
- 1.9 Viewing your results
Chapter 2, Sections 2.1, 2.18, 2.19
- 2.1 Methods for getting your data into SAS
- 2.18 Temporary vs. permanent data sets
- 2.19 Using permanent SAS datasets with LIBNAME statements

Sept. 18  Data Management: Using SAS to Manipulate, Examine, and Summarize your Data
Little SAS book:
Chapter 3, Sections 3.1, 3.2, 3.4-3.6)
- 3.1 Creating and redefining variables
- 3.2 Using SAS functions
- 3.4 Selected SAS numeric functions
- 3.5 Using IF-THEN statements
- 3.6 Grouping observations with IF-THEN/ELSE statements
- 3.11 Simplifying programs with arrays
Chapter 4, Sections 4.1-4.3, 4.5, 4.10, 4.12
- 4.1 Using SAS procedures
- 4.2 Subsetting in procedures with the WHERE statement
- 4.3 Sorting your data using PROC SORT
- 4.5 Printing your data using PROC PRINT
- 4.10 Summarizing your data using PROC MEANS
- 4.12 Counting your data using PROC FREQ
Chapter 9, Sections 9.1, 9.3, 9.6
- 9.1 Examining the distribution of data with PROC UNIVARIATE
- 9.3 Producing statistics with PROC MEANS
- 9.6 Testing categorical data with PROC FREQ
- 9.9 Examining correlations with PROC CORR

Homework 2 handed out (Due on October 4)

Sept. 20  Hypothesis Testing: Bivariate Analysis with SAS
Videos on Confidence Intervals 1-4:
- https://www.youtube.com/watch?v=LTkM_s9Xrzw
- https://www.youtube.com/watch?v=JjoPXqXLwbc
- https://www.youtube.com/watch?v=SX0ntoKKJok
- https://www.youtube.com/watch?v=wdsDz_2cEzw

https://stats.idre.ucla.edu/other/mult-pkg/whatstat/
http://www.ats.ucla.edu/stat/mult_pkg/whatstat/choosestat.html

Homework 1 Due
Sept. 25  Hypothesis Testing: Bivariate Analysis with SAS

In Class SAS Exercise

Sept. 27  Hypothesis Testing: Bivariate Analysis with SAS

In Class SAS Exercise

Module 3: Intervention Study Designs (Susan Ennett)

Oct. 2  Fundamentals of Intervention Evaluation Research and Validity Typology


SCC, Chapter 2: Validity, pp. 34-42.


*Also assigned on 8/23; please review.

Oct. 4  Pre-Experimental Designs


SCC, Chapter 4: Quasi-experimental designs that lack either a control group or lack pretest observations on the outcome, pp. 103-111 and pp. 115-122.


Oct. 9  Quasi-Experimental Designs

SCC, Chapter 5: Quasi-experimental designs that use both control groups and pretests, pp. 135-161.


**TAKE-HOME MIDTERM AVAILABLE OCT 10 AT 8 AM, DUE OCTOBER 12 BY 5 PM.**
Oct. 11  Randomization and Experimental Designs

SCC, Chapter 8: Randomized experiments: Rationale, designs, and conditions conducive to doing them, pp. 246-263 and pp. 266-278.


Oct. 16  Factorial Designs

SCC, Chapter 8: Randomized experiments: Rationale, designs, and conditions conducive to doing them, pp. 263-266.


Oct. 18  NO CLASS FALL BREAK

Oct. 23  In-Class Exercise on Factorial Designs

*Ungraded exercise handed out – Design Tables Part I (due on Nov 1)*

*Homework 3 handed out (due on Nov 8)*

Oct. 25  Interrupted Time-Series, Multiple Baseline, and Stepped Wedge Designs


Oct. 30

**Difference-in-Differences, Regression Discontinuity, and Propensity Score Matching Designs**


Module 4: Nonintervention Study Designs (Susan Ennett & Luz Reyes)

Nov. 1 **Cross-Sectional and Repeated Cross-sectional Designs**


**Ungraded exercise handed out – Design Tables Part 2 (due on November 13)**

**Design Tables Part 1 Due**

Nov. 6 **Longitudinal Designs**


Nov. 8  Multilevel Designs


MacIntyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: how can we conceptualize, operationalize and measure them? Social Science & Medicine, 55, 125-139.


Homework 3 Due

Homework 4 handed out (due on November 27)

Nov. 13  In Class Exercise on Selecting Study Designs (Intervention and Nonintervention)

Design Tables Part 2 Due

Module 5: Sampling (Derrick Matthews)

Nov. 15  Foundations of Survey Sampling:


*Note: Focus on pages 1-6, and Practical Sampling Design Framework (pg 16-29).


Homework 5 handed out (due December 4)

Nov. 20  Simple and Stratified Random Sampling


Nov. 22  NO CLASS THANKSGIVING
Nov. 27  Cluster Sampling, Weighting, and Poststratification


*Note: Focus on Chapters 1, 2, and section on MEFF (pg 4.1). Briefly review the rest of the manual


**Ungraded homework exercise handed out (discuss answers 12/4)**

**Homework 4 Due**

Nov. 29  Sample Size and Power


Dec. 4  In-Class Exercise on Sample Size


*Note: Review pages 32-49.

Review ungraded assignment

**Homework 5 Due**

**TAKE HOME FINAL EXAM AVAILABLE DEC. 7 AT 8 AM, DUE DECEMBER 10 BY 5 PM**