

College of Public Health & Health Professions
Course Syllabus

PHC 6937: Bias in Observational Research
Spring 2009
Tuesdays 9:35am - 12:35pm, HPNP G210
Course Website: lss.at.ufl.edu

Instructor Information

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Course Overview

The purpose of this course is to provide a foundation for identifying and addressing sources of bias in statistical analyses of observational research. Sources of bias to be considered include confounding, misclassification, measurement error, selection bias, ecologic bias, bias due to censored or missing data, overmatching, recall bias, and tacit assumptions of homogeneity. Statistical methods for remediation of bias will be examined in theory and in practice. Students will use the statistical programming language SAS to analyze observational data with and without bias adjustments.

Prerequisites

PHC 6000, 6011, STA 6166, and a graduate level regression course or the equivalent. Students are required to have applied SAS in their regression course. Students must have access to a laptop with Microsoft Windows and SAS for in-class use. Other general requirements for the public health program for computing requirements are found at <http://www.mph.ufl.edu/students/onlinecomputer.htm>. This class assumes an advanced competency with epidemiologic principles and vocabulary.

Course Objectives and/or Goals

Upon successful completion of the course, students should be able to:

- Understand and explain sources of bias to which statistical analyses of observational data are prone.

- Identify likely sources of bias in published studies.
- Communicate issues of bias in terms of violations of statistical modeling assumptions.
- Remediate sources of bias using appropriate statistical methodology and software to analyze and reanalyze data.
- Understand and communicate the statistical modeling assumptions underlying methods for bias remediation.
- Interpret statistical analyses designed to mitigate bias, while remaining aware of further limitations.

Course Materials

Required text: *Modern Epidemiology*, Third Edition (2008). Kenneth J. Rothman, Sander Greenland, and Timothy L. Lash. Philadelphia: Lippincott, Williams, and Williams. ISBN-13: 978-0-7817-5564-1.

Course Requirements/Evaluation/Grading

Students are responsible for all course material, including reading required materials prior to each class. Failure to complete assignments will result in a failing grade.

The assessment will include class discussion of the readings and lectures, six assignments (selecting a research question, building a dataset for analysis, and conducting unadjusted and adjusted analyses) and a final presentation and report using data from the Multicenter AIDS Cohort Study. Class participation will include weekly attendance and participation in discussions.

Class participation: 20%

Assignments: 60%

Final presentation and report: 20%

Due dates:

Final presentations: Apr 14, 21

Final report: Apr 21

The *grading scale* for this course consists of the scale:

90% - 100% = A

85% - 89.9% = B+

80% - 84.9% = B

75% - 79.9% = C+

70% - 74.9% = C

Below 70% = E

Topical Outline

Actual timing may vary substantially.

Jan 6. IRB issues. Introduction to the Multicenter AIDS Cohort Study (MACS). Selecting a research question and building a dataset for analysis.

Jan 13. Resolution of IRB issues. More discussion of building a dataset for analysis. Causal inference (text chapters 2, 4, and article by Paul Holland), including potential outcomes framework and measures of effect versus association.

Jan 20. Various measures of effect and association in two-by-two tables. Causal diagrams (text Ch 12). Building the final dataset for analysis.

Jan 27. Causal diagrams continued (text Ch 12). Heterogeneity versus confounding, assessment of confounding, stratum-specific estimates, and standardization (text Ch15 pp259-269). Regression models, model-based standardization, scoring methods, including propensity scores and inverse weighting (text Ch20). The bootstrap.

Feb 3. SAS laboratory: regression analyses and model-based standardization analyses, including use of scoring methods. Use of the bootstrap for standard errors.

Feb 10. Missing data (selected articles and lecture notes). Multiple imputation (articles and lecture notes).

Feb 17. Missing data continued. Use of instrumental variables methods.

Feb 24. SAS laboratory. Adjusting logistic regression and previous analyses for missing data.

Mar 3. R laboratory. Using R for regression, standardization, multiple imputation, and the bootstrap.

Mar 10. R laboratory continued.

Mar 17. Holiday no class (Spring Break).

Mar 24. Misclassification and measurement error (text ch19). Probabilistic bias analysis.

Mar 31. SAS laboratory. Adjusting analyses for misclassification or measurement error. Probabilistic bias analysis.

Apr 7. Time-dependent exposures and confounders. Adjusting for bias due to time-dependent confounding. (articles and lecture notes).

Apr 14. SAS laboratory. Adjusting analyses for time-dependent confounding.

Apr 21. Last day of class. Final presentations. Final report due.

Statement of University's Honesty Policy (cheating and use of copyrighted materials)

Academic Integrity – Students are expected to act in accordance with the University of Florida policy on academic integrity (see Student Conduct Code, the Graduate Student Handbook or this

web site for more details:

www.dso.ufl.edu/judicial/procedures/academicguide.php).

Cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

*We, the members of the University of Florida community,
pledge to hold ourselves and our peers to the
highest standards of honesty and integrity.*

Policy Related to Class Attendance and Late or Missed Assignments:

Attendance of all fifteen three-hour class sessions is required. Failure to attend any one of these classes may result in a failing grade or an incomplete. Please see the instructor as early as possible regarding possible absences. All assignments need to be handed in on time. Grading will penalize late assignments. Missed assignments will receive a zero score. Personal issues with respect to class attendance or fulfillment of course requirements (assignments, final presentation, class discussion) will be handled on an individual basis.

Accommodations for Students with Disabilities

If you require classroom accommodation because of a disability, you must first register with the Dean of Students Office (<http://oss.ufl.edu/>). The Dean of Students Office will provide documentation to you, which you then give to the instructor when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework. We all learn differently: however, if you have experienced problems in university classes with writing, in-class exams, understanding or concentrating in class; please talk to us or access a learning or education testing resource at the University or in another professional setting.

Counseling and Student Health

Students may occasionally have personal issues that arise in the course of pursuing higher education or that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the University of Florida Counseling Center, 352-392-1575, or Student Mental Health Services, 352-392-1171. Visit their web sites for more information: <http://www.counsel.ufl.edu/> or <http://www.health.ufl.edu/shcc/smhs/index.htm#urgent>

The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services, including primary care, women's health care, immunizations, mental health care, and pharmacy services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: www.health.ufl.edu/shcc

Crisis intervention is always available 24/7 from:
Alachua County Crisis Center: (352) 264-6789.

BUT – Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Class Demeanor Expected by the Professor (late to class, cell phones) :

Students are expected to show up for class prepared and on time. Cell phones are to be silenced during class unless there is an emergency, in which case please inform the instructor.