

**Princeton University
Woodrow Wilson School of Public and International Affairs**

COURSE SYLLABUS

SPRING 2009

EPIDEMIOLOGY (WWS 598)

Professor Ron Brookmeyer

(rbrookme@princeton.edu)

Class Time Mondays and Wednesdays 2:40 PM -4:10PM

Course Objective

The objective of this course is to provide students with a broad overview of the field of epidemiology. We will introduce the fundamental principles and methods of epidemiological investigation. The course will be applicable to both infectious and noninfectious diseases. The emphasis is on interpreting and understanding the strengths and weaknesses of epidemiological data and studies for drawing reliable inferences about the cause of disease and disease control strategies. Specific topics include the design and analysis of epidemiological studies such as randomized controlled trials, cohort studies, and case-control studies. The role of screening for disease in public health will be considered. We will discuss how epidemiology is used in public policy settings for improving the health of populations.

Preceptor

Kevin O'Neil

(koneil@princeton.edu)

EPIDEMIOLOGY

Course Topics

1. Introductory Concepts

- What is Epidemiology?
- Understanding Disease Transmission
- Outbreak Investigation
- Epidemiological Surveillance
- Incidence, Prevalence and Disease Natural History
- Issues in Measuring Morbidity and Mortality
- Age Standardization and Adjustment

2. Epidemiological Study Designs

- Strengths and Weaknesses of Major Study Designs
 - Randomized Controlled Trial
 - Cohort Study
 - Case- Control Study
 - Cross-Sectional Study
- Measures of Disease Risks: Odds Ratio, Relative Risk, Attributable Risk
- Concepts of Statistical Significance
- Methods of Analysis
- Sample Size Considerations
- Sources of Bias

3. Is an Epidemiological Association Causal?

- Simpson's Paradox and Confounding
- Stratification
- Matching in Epidemiology
- Interaction and Effect Modification
- Regression Methods;
 - Logistic Regression: Assumptions and Interpretation
- Concepts of Causation
- Attributable Fraction and its interpretation

4. Survival (Time to event) Analyses of Cohort Studies

- Kaplan-Meier and Life Tables
- Person-Time Analyses
- Underlying Assumptions and Sources of Bias
- The Standardized Mortality Ratio

5. Screening for Disease

- Sensitivity and specificity
- Evaluating Screening policy
- Sources of Bias: Lead time, Length Biased Sampling

6. Epidemiology and Public Policy

- Ethical Issues in Epidemiology
- Meta-analyses: Summarizing epidemiological knowledge
- Communicating Epidemiology to the Public
- Societal Implications of Epidemiology
- The Future of Epidemiology

7. Selected Topics

REQUIREMENTS

There will be 5 problem sets, a project, a midterm and a final exam

GRADES

Problem Sets 35%, Final exam 30%, Midterm 20%, Project 10 %, Class participation 5%

COURSE READINGS

REQUIRED TEXTBOOK:

Epidemiology, 4th Edition
by Leon Gordis. Saunders Elsevier, 2008

SOME SUPPLEMENTAL TEXTBOOK REFERENCES:

Epidemiology: Beyond the Basics
Szklo M and Nieto FJ. Jones & Bartlett, 2003.

Practical Statistics for Medical Research
Altman DG. Chapman and Hall, 1991.

A Study Guide to Epidemiology and Biostatistics, 6th edition.
Hebel JR and McCarter RJ. Jones and Bartlett, 2006.

Modern Epidemiology, 2nd edition
Rothman KJH and Greenland SA . Lippincott, Williams and Wilkins, 1998.

Epidemiologic Methods: Studying the Occurrence of Illness
TD Koepsell and NS Weiss. Oxford University Press, 2003.

Control of Communicable Diseases Manual, 18th edition
Heymann Daniel L, editor. American Public Health Association, 2004.

SOME ADDITIONAL COURSE READINGS:

In addition to reading the textbook *Epidemiology* by Leon Gordis, we will also read a number of articles during the semester including the following:

Foege WH, Millar D, Lane JM. Selective Epidemiologic Control in Smallpox Eradication. *American Journal of Epidemiology*, 1971; 94:311-315.

Fontham E, Correa P, Reynolds P. Environmental Tobacco Smoke and Lung Cancer in Nonsmoking Women. *JAMA*, 1994; 27:1752-1759.

Hill AB. The Environment and Disease: Association or Causation. *Proceedings of the Royal Society of Medicine*, 1965; 58: 295-300.

Pamuk E. Cautiously Adjusting to the New Millennium: Changing to the 2000 Population Standard. *American Journal of Public Health*, 2001; 1174-5

Phillips CV, Goodman KJ. The Missed lessons of Sir Austin Bradford Hill. *Epidemiologic Perspectives and Innovation*, 2004; 1:3.

Susser E and Bresnahan M. Origins of Epidemiology, *Annals of the New York Academy of Sciences*, 2001; 954:6-18.

Taubes G, Do we Really Know What Makes Us Healthy?, *New York Times Magazine*, September 16 2007, pp57-79.

Taubes G, "Epidemiology Faces its Limits" *Science*, 1995; 269:164-169

Thacker S, and Stroup D, "Future Directions for Comprehensive Public Health Surveillance and Health Information Systems in the United States, *American Journal of Epidemiology*, 1994, 140: 383-397.