CEE-CH-154: Fundamentals of Epidemiology
Spring 2017, Instructor: Mark A. Woodin

Email (best way to reach me): markwoodin9@gmail.com. Tufts phone: 617-627-3640; Cell (best number): 781-454-7625. Note: Phone calls should be reserved for emergencies. Always try email first as my cell phone is frequently off and I am often not sitting in my office. Office Hours: Monday, 1:30-3:00 and Tuesday, 3:00-4:00.

Teaching Assistant: Laura Corlin. Laura's email is laura.corlin@tufts.edu. Laura will hold an optional recitation every Friday afternoon from 1:30-3:00 in Anderson 210.

Course description: Epidemiology is the lynchpin science of public health. In combination with biostatistics, it is used to examine many different types of issues such as whether a new drug is more effective than an old one, what the risk factors are for a given outcome, whether a new screening test is likely to be useful and, if so, in which population, what levels and types of air and water pollution should be of most concern, and many, many others. To accomplish its varied objectives, epidemiology uses many different kinds of measures, study designs, and data analytic techniques. In this course, we will:

Understand the basic structure of public health, its goals, and where epidemiology fits into the structure;
Know how to calculate and interpret important rates and measures used in epidemiology and public health;
Understand, in general, the design, strengths, weaknesses, and ethical issues of the major types of epidemiologic studies;
Identify the three major causes of erroneous conclusions in epidemiologic research and how each one can be adjusted for or avoided;
Understand how to identify and handle confounding;
Recognize effect modification (also called interaction) in data;
Be able to interpret several statistical techniques commonly used in epidemiology;
Learn how screening is employed in public health, including the basic measurements used to evaluate screening tests and the biases that can affect the accuracy of reported screening efficacy.

Required textbook: *Epidemiology* by Leon Gordis, 5th Edition, Elsevier.

Course Grading: There are three parts to the final grade:

1. **Two midterm examinations.** Worth 100 points each. Each examination will have an in-class component (50 points) and take-home component (50 points). Bring a scientific calculator to the in-class examinations.
2. **Final examination**. This examination will also have an in-class component (100 points) and a take-home component (50 points). The in-class component will be given in the block assigned to H classes (see syllabus schedule). This examination is two hours long and is cumulative. Bring a scientific calculator.

For take-home components of the examinations, you may work in groups of 2-3 students or you may work individually. If you work in a group, turn in ONE assignment for your whole group. Neither the Teaching Assistant nor I can answer any questions on these assignments.

There are a total of 350 points and all points count the same.

Tentative schedule:

1/19:
Introduction and discussion of course requirements and objectives. What is epidemiology? Where does it fit in the public health structure? Basic public health disciplines. Public health triangle and circle. Reading: Gordis 1

1/24:
Levels of prevention. Causation and association. Necessary, contributing, and sufficient causes. Hill's causal criteria. Snow and Whitehead's cholera investigation. Other early epidemiologic investigations.

1/26-1/31:
Basic rates and measures of occurrence in epidemiology. Surveillance. Incidence and prevalence measures. Concept of person-time incidence. Period versus point prevalence. Relationships between incidence, risk, and prevalence. Problems accurately ascertaining measures of occurrence. Cohort effects. Measuring the impact of disease burden. Mortality rates, survival, and case-fatality. Reading: Gordis 3, 4, and 6.

2/2-2/7:
Measuring associations in epidemiology. The risk and incidence ratios. Odds ratios. Estimating prevention of harm. The attributable risk and population attributable risk. The AR% and PAR%. Reading: Gordis 11 and 12.

2/9:
Confidence intervals, precision, accuracy, and other statistical concepts as applied to epidemiology.

2/14-2/16:
The dynamics of disease transmission. Epidemic curves. Modes of transmission. The disease iceberg model. Herd immunity. Incubation periods. Outbreak investigations and the attack rate. Reading: Gordis 2

2/21:
In-class examination #1 on material through attributable measures. Bring a scientific calculator. Take-home portion due before the beginning of class.

2/23:
No Class. Substitute Monday's schedule.

2/28-3/7:
Screening in public health. Measuring screening tests. Sensitivity, specificity, PV+, and PV-. Relationship between prevalence of a condition and PV+ and PV- values. Biases in screening. Sequential and simultaneous screening.
Reading: Gordis 5

3/9-3/16:
Confounding and directed acyclic graphs (DAGs).

3/28:
Effect modification. Catch-up and review.
Reading: Gordis 14 and 15.

3/30:
In-class examination #2 on material through effect modification. Bring a scientific calculator. Take-home portion due before the beginning of class.

4/4-4/11:
Cohort studies. Reading: Gordis 9.

4/13-4/20
Case-control studies and cross-sectional studies. Reading: Gordis 10 and 13

4/25:
Randomized studies. Reading: Gordis 7 and 8.

4/27:
Catch-up and review.

5/5:
Final examination from 3:30-5:30 (H block). Take-home portion due before the beginning of class.