COURSE INFORMATION

STATISTICAL METHODS IN PUBLIC HEALTH I (140.621)
FIRST TERM

August 25 - October 18, 2011

(continued)

Course Policies:

- Attendance is required for quizzes and exams and expected for lectures and labs.

- Laptops and iPads may be used during lecture for class-related purposes. Common courtesy should be followed.

- Please email your faculty lecturer regarding extenuating circumstances or conflicts regarding course deadlines.

- Availability for course questions: after lecture, during labs, TA office hours, and Stata office hours.

- Course Grade based on:
    20% completion of 4 problem sets (points deducted if turned in late)
    5% quiz 1 (in class)
    5% quiz 2 (in class)
    35% midterm examination (in class)
    35% final examination (in class)

- Quizzes and examinations are individual work for which a student must work by himself or herself.

- Problem sets may be worked on together and discussed. However, each student must write up the problem set individually using his or her own words. Copying work is not allowed.

- Disability Support Services
  If you are a student with a documented disability who requires an academic accommodation, please contact Betty H. Addison in the Office of Career Services and Disability Support: dss@jhsph.edu, 410-955-3034, or Room E-1140.

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- **Academic Ethics Code**
  The code, discussed in the Policy and Procedure Memorandum for
  Students, March 31, 2002, will be adhered to in this class
  (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/Policy
  ProcedureMemoranda/Students_01_Academic_Ethics.pdf)

- **Students enrolled in the Bloomberg School of Public Health of The
  Johns Hopkins University assume an obligation to conduct themselves
  in a manner appropriate to the University's mission as an institution of
  higher education. A student is obligated to refrain from acts which he
  or she knows, or under the circumstances has reason to know, impair
  the academic integrity of the University.**

Course Objectives:
Students who successfully master this course will be able to:

1. Use statistical reasoning to formulate public health questions in quantitative terms:

   (a) Understand the role of statistical reasoning within the scientific model.

   (b) Understand and apply the counterfactual definition of cause in public health research.

   (c) Distinguish between continuous, categorical, binary and time-to-event data.

   (d) Understand that evidence for establishing an association between a risk factor and health outcome is generated by comparing the distribution of the outcome in otherwise similar populations with different levels of the risk factor.

   (e) Use stratification in design and analysis to minimize confounding and identify risk modification

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(continued)

2. Design and interpret graphical and tabular displays of statistical information:

   (a) Create by hand and interpret stem and leaf plots, boxplots, Q-Q plots and frequency tables.

   (b) Use the statistical analysis package Stata to make basic statistical computations and graphical displays.

   (c) Graphically compare two groups of observations of otherwise similar units (e.g. people or treatments) and interpret the display.

   (d) Characterize the distribution of a variable using the concepts of typical value, variability, and shape.

   (e) Use a variable transformation, such as the logarithm, to study a right skewed distribution such as hospital costs.

   (f) Analyze survey information and identify sources of error in variables.

   (g) Explore study results for associations among multiple variables and interpret the findings.

3. Use probability models to describe trends and random variation in public health data

   (a) Use the statistical analysis package Stata to make basic statistical computations and graphical displays.

   (b) Use the concepts of probability to describe the effect of a treatment on a health outcome in a randomized trial.

   (c) Use the binomial distribution and the Poisson approximation to the binomial to calculate probabilities of events.

   (d) Use the Gaussian or normal probability model to approximate the distribution of a continuous public health measure and to assess the quality of this approximation;

   (e) Use a quantile-quantile (Q-Q) plot to compare the shape of an empirical with a theoretical distribution.

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(continued)

4. Use statistical methods for inference, including tests and confidence intervals, to draw public health inferences from data:

   (a) Generate random numbers and appreciate variation among multiple observations of a random process.

   (b) Explain the implications of the Central Limit Theorem in determining the sampling distribution of the mean of n observations.

   (c) Use bootstrapping to determine confidence intervals.

   (d) Use sampling distribution theory for the mean and for differences between two means to create confidence intervals and hypothesis tests.

   (e) Use stratification to eliminate the influence of a possible confounding variable in a study of the association of a risk factor and outcome.

   (f) Use the appropriate two-sample t-test and confidence interval to assess whether average outcome is different between two groups and draw inferences.

   (g) Use the paired-sample t-test and confidence intervals to assess if the average change is different from zero.

   (h) Examine the consequence of using an inappropriate unpaired (two-sample) analysis when a paired analysis is appropriate.

   (i) Define and apply the term effect modification or equivalently interaction in a randomized trial.

   The course is designed to enable students to develop their data analysis skills. Four important datasets will be analyzed by the students using the statistical package Stata throughout the 621-624 course sequence.