Columbia University
MAILMAN SCHOOL
OF PUBLIC HEALTH

P6103 - Introduction to Biostatistics

COURSE DESCRIPTION

Biostatistics is essential to ensuring that findings and practices in public health and biomedicine are supported by reliable evidence. This course covers the basic tools for the collection, analysis, and presentation of data in all areas of public health. Central to these skills is assessing the impact of chance and variability on the interpretation of research findings and subsequent recommendations for public health practice and policy. Topics covered include: general principles of study design; hypothesis testing; review of methods for comparison of discrete and continuous data including ANOVA, t-test, correlation, and regression.

This course is part of the core course requirement for the MPH and is a prerequisite for other courses in the Department of Biostatistics and throughout the Mailman School of Public Health.

COURSE LEARNING OBJECTIVES

Students who successfully complete this course will be able to:

- Describe the roles biostatistics serves in public health and biomedical research;
- Explain general principles of study design and its implications for valid inference when, for example, identifying risk factors for disease, isolating targets for prevention, and assessing the effectiveness of one or more interventions;
- Assess data sources and data quality for the purpose of selecting appropriate data for specific research questions;
- Translate research objectives into clear, testable statistical hypotheses;
- Describe basic principles and the practical importance of key concepts from probability and inference, inductive versus deductive reasoning, including random variation, systematic error, sampling error, measurement error, hypothesis testing, type I and type II errors, and confidence bounds;
- Apply numerical, tabular, and graphical descriptive techniques commonly used to characterize and summarize public health data;
- Identify appropriate statistical methods to be applied in a given research setting, apply these methods, and acknowledge the limitations of those methods;
- Evaluate computer output containing statistical procedures and graphics and interpret it in a public health context; and
- Differentiate between quantitative problems that can be addressed with standard, commonly used statistical methods and those requiring input from a professional biostatistician.

Course useful websites:

- http://courseworks.columbia.edu/
- http://twitter.com/#!/search/realtime/%23P6103F12 (To every tweet, attach hash tag #P6103F12)
- http://twitter.com/Prof_P6103 (To send me a direct tweet, start with @Prof_P6103)

INSTRUCTOR

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Office hours by appointment

CLASS MEETING

Lecture: Mondays and Wednesdays: 5:30pm - 6:50pm
room: Hammer building, 3rd floor, rm 301 (HSC 301)
Recitation: Mondays and Wednesdays: 7pm - 7:50pm
room: Hammer building, 3rd floor (HSC 304, 306, 310, 316)

TEACHING ASSISTANTS

Teaching assistants are important members of the teaching team for this course and meet weekly with the course instructor to discuss student progress and pedagogical strategies. Students are assigned to one TA and his/her recitation section. During office hours, all TA's are available to you to provide guidance during your preparation for exams and for clarification of key concepts from lectures and readings. Assistance can also be sought via email or by setting up an appointment to meet for office hours. You are strongly encouraged to leave ample time before an exam when seeking assistance.

By Tuesday evening, 09/11/12, the class will be divided into separate recitation sections (see in CourseWorks), each led by one TA. Students must attend the recitation section in the classroom which they have selected. Crossovers cannot be accommodated and will not be tolerated.

RECOMMENDED TEXTS

Principles of Biostatistics, 2nd edition (BIO)
ISBN: 0534229026
Publisher: Brooks/Cole Cengage Learning
Author(s): Marcello Pagano, Kimberlee Gauvreau
Publication Date: 2000

The Cartoon Guide to Statistics (CGS)
ISBN: 0062731025
Publisher: Collins; 1st HarperPerennial Ed
Author(s): Larry Gonick, Woollcott Smith
Publication Date: February 25, 1994

ASSESSMENT OF LEARNING

Exam……..……10%
Midterm Exam 1…….20%
Midterm Exam 2…….20%
Final Exam…….…….…..30%
Homeworks ….....…….…….....20%

Late homeworks will not be accepted under any circumstances! There will be no make up exams.
If there is a valid reason for missing an exam or midterm exam (with documented proof), you must notify the instructor one week prior to the exam and a 40% or 50% weighting will be given to the final exam.

LECTURES AND EXAM SCHEDULE

This schedule of lectures is only tentative. See Courseworks for updated information on lecture topics, assigned readings, and homework assignments.

WEEK 1	
9/5/2012	**L1: Introduction to Introduction to Biostatistics** Data, Sampling, and Study Design: Chapter 1 (BIO), Chapter 1, 10 (CGS)
WEEK 2	
9/10/2012	**L2: Descriptive Statistics and Graphical Displays 1** Chapter 2 (BIO), Chapter 2 (CGS)
9/12/2012	**L3: Descriptive Statistics and Graphical Displays 2** Chapter 3 (BIO), Chapter 2 (CGS)
WEEK 3	
9/17/2012	**L4: Probability 1** Chapter 6 (BIO), Chapter 3 (CGS)
9/19/2012	**L5: Probability 2** Chapter 6 (BIO), Chapter 3 (CGS)
WEEK 4	
9/24/2012	**L6: Discrete Probability Distributions** Chapter 7 (BIO), Chapter 5 (CGS)
9/26/2012	**L7: Normal Probability Distributions 1** Chapter 7 (BIO), Chapter 4, 5 (CGS)
WEEK 5	
10/1/2012	**L8: Exam in Lecture, Recitations as scheduled** **L1-L7**
10/3/2012	**L9: Normal Probability Distributions 2** Chapter 7 (BIO), Chapter 4, 5 (CGS)
WEEK 6	
10/08/2012	**L10: CLT, Sampling Distributions and Estimators** Chapter 8 (BIO), Chapter 4, 5 (CGS)
10/12/2012	**L11: One Group: Point Estimates, Confidence Intervals 1** Chapter 9, 14 (BIO), Chapter 6,7 (CGS)
WEEK 7	
10/15/2012	**L12: One Group: Point Estimates, Confidence Intervals 2** Chapter 9, 14 (BIO), Chapter 6,7 (CGS)
10/17/2012	**L13: Review for Midterm Exam 1**
WEEK 8	
10/22/2012	**L14: Midterm Exam 1 during lecture and recitation time** **L1-L13**
10/24/2012	**L15: Philosophy on Hypothesis Testing** Chapter 10, 14 (BIO), Chapter 8 (CGS)

WEEK 9	
10/29/2012	**L16: One Group: Hypothesis Testing 1** Chapter 10, 14 (BIO), Chapter 5-8 (CGS)
10/31/2012	**L17: One Group: Hypothesis Testing 2** Chapter 10, 14 (BIO), Chapter 5-8 (CGS)
WEEK 10	
11/5/2012	**L18: Two Groups: Hypothesis Testing 1** Chapter 11, 14 (BIO), Chapter 9 (CGS)
11/7/2012	**L19: Two Groups: Hypothesis Testing 2** Chapter 11, 14 (BIO), Chapter 9 (CGS)
WEEK 11	
11/12/2012	**L20: ANOVA 1** Chapter 12 (BIO)
11/14/2012	**L21: ANOVA 2-Review for Midterm Exam II** Chapter 12 (BIO)
WEEK 12	
11/19/2012	**L22: Midterm Exam II during lecture and recitation times.** **L15-L22**
11/21/2012	**L23: The Duke Saga + discussion**
WEEK 13	
11/26/2012	**L24: Correlation** Chapter 17 (BIO), Chapter 11 (CGS)
11/28/2012	**L25: Regression 1** Chapter 18 (BIO), Chapter 11 (CGS)
WEEK 14	
12/3/2012	**L26: Regression 2** Chapter 19 (BIO), Chapter 11 (CGS)
12/5/2012	**L27: Contingency Tables** Chapter 15 (BIO)
WEEK 15	
12/10/2011	**Review of all material**
12/12/2011	**Study day**
WEEK 16	
12/17/2012	**Final Exam**