



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://search.twitter.com/search?q=#P6103F11> (To every tweet, attach hash tag #P6103F11)
- http://twitter.com/Prof_P6103 (To send me a direct tweet, start with @Prof_P6103)

INSTRUCTOR**Martina Pavlicova**Biostatistics Department, 722 W 168th Street, 6th floor, rm 635**Email:** mp2370@columbia.edu or pavlicov@gmail.com**Phone:** (212) 305-9405 (I prefer the use of email)**Fax:** (212) 305-9408**Office hours by appointment****CLASS MEETING**

Lecture: Mondays and Wednesdays
 room: Mailman School Auditorium, 8th floor (Section 1, 2, and 3)
 room: Hammer building rm. 301 (Section 4)

Recitation: Tuesdays and Thursdays
 room: TBA

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, TA's are available 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 Monday evening, 09/13/10, 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 TEXT**Biostatistics for the Biological and Health Sciences (BIO)****ISBN:** 0321194365**Publisher:** Pearson, Addison Wesley**Author(s):** Marc Triola, Mario Triola**Publication Date:** 2006**REQUIRED TEXT****The Cartoon Guide to Statistics (CGS)****ISBN:** 0062731025**Publisher:** Collins; 1st HarperPerennial Ed**Author(s):** Larry Gonick, Woolcott Smith**Publication Date:** February 25, 1994**ASSESSMENT OF LEARNING**

Exam 1.....	24%
Exam 2.....	25%
Final Exam.....	30%
Homeworks (6)	21%

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 (with documented proof), you must notify the instructor one week prior to the exam and a 54% or 55% 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	
9/7/2011	Introduction to Introduction to Biostatistics Data, Sampling, and Study Design: Chapter 1 (BIO), Chapter 1, 10 (CGS)
WEEK 2	
9/12/2011	Descriptive Statistics and Graphical Displays 1 Chapter 2 (BIO), Chapter 2 (CGS)
9/14/2011	Descriptive Statistics and Graphical Displays 2 Chapter 2 (BIO), Chapter 2 (CGS)
WEEK 3	
9/19/2011	Descriptive Statistics and Graphical Displays 3 Chapter 2 (BIO), Chapter 2 (CGS)
9/21/2011	Probability 1 Chapter 3 (BIO), Chapter 3 (CGS)
WEEK 4	
9/26/2011	Probability 2 Chapter 3 (BIO), Chapter 3 (CGS)
9/28/2011	Discrete Probability Distributions Chapter 4 (BIO), Chapter 5 (CGS)
WEEK 5	
10/3/2011	Normal Probability Distributions 1 Chapter 5 (BIO), Chapter 4, 5 (CGS)
10/5/2011	Normal Probability Distributions 2 Chapter 5 (BIO), Chapter 4, 5 (CGS)
WEEK 6	
10/10/2011	Sampling Distributions and Estimators Chapter 5 (BIO), Chapter 4, 5 (CGS)
10/12/2011	Review
WEEK 7	
10/17/2011	Exam I
10/19/2011	One Group: Point Estimates, Confidence Intervals 1 Chapter 6 (BIO), Chapter 6,7 (CGS)
WEEK 8	
10/24/2011	One Group: Point Estimates, Confidence Intervals 2 Chapter 6 (BIO), Chapter 6,7 (CGS)

10/26/2011	Philosophy on Hypothesis Testing Chapter 7 (BIO), Chapter 8 (CGS)
WEEK 9	
10/31/2011	One Group: Hypothesis Testing 1 Chapter 7 (BIO), Chapter 5-8 (CGS)
11/2/2011	One Group: Hypothesis Testing 2 Chapter 7 (BIO), Chapter 5-8 (CGS)
WEEK 10	
11/7/2011	Two Groups: Hypothesis Testing 1 Chapter 8 (BIO), Chapter 9 (CGS)
11/9/2011	Two Groups: Hypothesis Testing 2 Chapter 8 (BIO), Chapter 9 (CGS)
WEEK 11	
11/14/2011	Review
11/16/2011	Exam II
WEEK 12	
	Correlation Chapter 9 (BIO), Chapter 11 (CGS)
11/23/2011	Correlation, “Why do we love Biostatistics” Chapter 9 (BIO), Chapter 11 (CGS)
WEEK 13	
11/28/2011	Regression 1 Chapter 9 (BIO), Chapter 11 (CGS)
11/30/2011	Regression 2 Chapter 9 (BIO), Chapter 11 (CGS)
WEEK 14	
12/5/2011	Contingency Tables Chapter 10 (BIO)
12/7/2011	ANOVA 1 Chapter 11 (BIO)
WEEK 15	
12/12/2011	ANOVA 2 Chapter 11 (BIO)
12/14/2011	Study day
WEEK 15	
12/19/2011	Final Exam