UNIVERSITY OF MINNESOTA

School of Public Health

Course Syllabus

PubH 6450
Biostatistics I
Fall 2012

Credits:	**4**
Meeting Days:	**Tuesday & Thursday**
Meeting Time:	**1:25p.m. – 3:20p.m.**
Meeting Place:	Moos Tower, room 2-530
Instructors:	**Andy Mugglin & Lynn Eberly**
Office Address:	Andy: A-454-1, Mayo Building, Division of Biostatistics Lynn: A-465, Mayo Building, Division of Biostatistics
	Biostatistics Main Office: A-460, Mayo Building, generally open Mon-Fri, 8:00am - 4:30pm
Office Phone:	Andy: 612-625-7292 (to leave messages); 612-626-3784 (during office hours only) Lynn: 612-624-1436
Fax:	**612-626-0660**
E-mail:	**ph6450@biostat.umn.edu**
Web page:	**moodle2.umn.edu**
Office Hours:	**Lynn: Thursdays 12:00-1:00p.m.** (or by Appointment)
	Andy: Tuesdays 3:30-4:30p.m. (or by Appointment)
	Information for online chat office hours will be kept current on the course web page.

Teaching Assistants:	**To be determined (see class web page)**
TA Office Hours:	**To be determined (see class web page)**

I. Course Description

Descriptive statistics. Gaussian probability models, point/interval estimation for means/proportions. Hypothesis testing, including t, chi-square, and nonparametric tests. Simple regression/correlation. ANOVA. Health science applications using output from statistical packages. Effective: Fall 2005

II. Course Prerequisites

Math 1031, health science grad student, or #

III. Course Goals and Objectives

By the end of the course, students should have a basic understanding of the fundamentals of biostatistical methods. This includes:

- Numerical Summary Measures
- Gaussian Probability Models
- Point/Interval Estimation for Means and Proportions
- Hypothesis testing for Means and Proportions
- Contingency Tables: Odds Ratios, Relative Risk, Chi-Square
- Simple Linear Regression, Correlation
- ANOVA
- Non-parametric group comparisons
- Basic SAS and/or R programming language skills

IV. Methods of Instruction and Work Expectations

- 24 lectures – two per week (except weeks with University Holidays or exam days)
- 14 computer lab sessions – one per week (except first week of class). Lab assignments will be available in the statistical software packages SAS and R. Students may use one or both of those packages, or are welcome to use any other statistical software of their choosing. Course staff will not be able to support any other software except SAS and R.
- Two midterm exams – during class time
- One final exam – University assigned date and time
- 12 homework assignments – due approximately weekly

Announcements

- Course-related announcements (changes to the schedule or due dates, topics covered on exams, etc.), will be made in class and also distributed via the class web site. It is your responsibility to be aware of any announcements made.

Course Web Page

- The course web page is available through Moodle: moodle2.umn.edu Click “Login” in the upper right hand corner and log in using your X500. You should see a link for this class.

V. Course Text and Readings

Required:

***Introduction to the Practice of Statistics*, by David S. Moore, George P. McCabe and Bruce Craig, W. H. Freeman & Co., New York, Sixth edition, 2007.**

Since homework problems and readings will be assigned out of the sixth edition, students with alternate editions of the book (e.g., fifth or seventh) are responsible for obtaining the homework problems and readings from the sixth edition (numbering of problems and page numbers change across editions). A copy of the textbook is on reserve in the Bio-Med Library, Diehl Hall. We do not recommend using any edition older than the fifth.

You do NOT have to have the CD that comes with the textbook; the chapters on the CD can alternatively be obtained from the publisher web site. Website http://bcs.whfreeman.com/ips6e/

Optional books:

The Little SAS Book, by L. Delwiche & S. Slaughter, SAS Institute. ISBN 978-1599947259

Applied Statistics and SAS Programming Language, by R. Cody & J. Smith. Prentice-Hall Inc. ISBN 978-0131465329

A Handbook of Statistical Analyses Using R, by Brian S. Everitt and Torsten Hothorn. Chapman & Hall/CRC. ISBN 978-1-4200-7933-3

SAS and R: Data Management,Statistical Analysis, and Graphics, by Ken Kleinman and Nicholas J. Horton. Chapman & Hall/CRC. ISBN 978-1-4200-7057-6

Recommended alternative sources:

Principles of Biostatistics, by M. Pagano and K. Gauvreau. Duxbury.

Biostatistics: A Methodology For the Health Sciences, by van Belle, Heagerty, Fisher, and Lumley. John Wiley and Sons

SAS tutorials at UCLA: http://www.ats.ucla.edu/stat/sas/

R tutorials at UCLA: http://www.ats.ucla.edu/stat/r/

Introduction to R: http://cran.r-project.org/doc/manuals/R-intro.pdf

VI. Course Outline/Weekly Schedule

Week	Dates	Text (6th edition)	Homeworks and Labs	Topics
1	9/4, 9/6	Chapter 1: pages 1-57 Chapter 2: pages 83-94	Homework 1 (Due: 9/13) No lab sessions held this week.	• ***Part 1:*** Introduction, Types of Data, Bar Charts, Pie – Charts, Stem-Plots, Histograms and Intro to SAS • ***Part 2:*** Exploratory Data Analysis for Univariate Data: Measures of Central Tendency, Measures of Dispersion, Box-plots, Exploratory Data Analysis for Multivariate Data: Scatterplots.
2	9/11, 9/13	Chapter 1: pages 58-72 Chapter 3: pages 171-232	Homework 2 (Due: 9/20) Lab 1	• ***Part 3:*** Probability Distributions for Discrete Random Variables, Probability Distributions for Continuous Random Variables • ***Part 4:*** Overview of Study Cycle and Sampling and Study Design
3	9/18, 9/20	Chapter 4: pages 237-302 Chapter 5: pages 311-330	Homework 3 (Due: 9/27) Lab 2	• ***Part 5:*** Probability and Random Variables • ***Part 6:*** Binomial Distribution, Sampling Distribution of the Binomial Mean
4	9/25, 9/27	Chapter 5: pages 335-368 Chapter 6: pages 353-368	Homework 4 *(Due: **10/9**) * note the date Lab 3	• ***Part 7:*** One-sample: Moving from Point Estimates to Interval Estimates • Catch up and Review
5	10/2, 10/4	Chapter 7: pages 417-427	(nothing due) Lab 4	• ***TUESDAY, OCTOBER 2: EXAM I*** • ***Part 8:*** Confidence Intervals When Sigma is Unknown, Student's T Distribution
6	10/9, 10/11	Chapter 6: pages 372-389 Chapter 6: pages 394-409	Homework 5 (Due: 10/18) Lab 5	• ***Part 9:*** Introduction to Hypothesis Testing When Sigma is Known and When Sigma is Unknown • ***Part 10:*** Type I and II Errors and Power for Hypothesis Testing
7	10/16, 10/18	Chapter 7: pages 428-439 Chapter 7: pages 447-478 Chapter 8: pages 487-500	Homework 6 (Due: 10/25) Lab 6	• ***Part 11:*** Linking Confidence Intervals and Hypothesis Testing; Matched Pairs t-test • ***Part 12:*** Two - Sample t-tests and Two- Sample Confidence Intervals • ***Part 13:*** Confidence Intervals and Hypothesis Testing for One Proportion
8	10/23, 10/25	Chapter 8: pages 505-515 Part 15: Not in the book	Homework 7 (Due: 11/1) Lab 7	• ***Part 14:*** 2 by 2 Tables: Confidence Intervals and Hypothesis Testing for the Difference in Two Proportions • ***Part 15:*** 2 by 2 Tables: Confidence Intervals and Hypothesis Testing for Odds Ratios and Relative Risks
9	10/30, 11/1	Chapter 2: pages 142-151 Chapter 9: pages 525-547 Part 17: Not in the book	Homework 8 *(Due: **11/13**) * note the date Lab 8	• ***Part 16:*** Contingency Tables: Simpson's Paradox; Chi-Square Test • ***Part 17:*** 2 by 2 Tables: McNemar's Test for Matched Pairs in the Binomial Setting
10	11/6, 11/8		(nothing due) Lab 9	• Catch up and Review • ***THURSDAY, NOVEMBER 8: EXAM II***

11	11/13, 11/15	Chapter 2: pages 101-136	Homework 9 *(Due: **11/20**) *note the date Lab 10	• ***Part 18:*** Relationships Between Quantitative Variables: Correlation • ***Part 19:*** Linear Regression, Residuals, and Cautions
12	11/20	Chapter 10: pages 559-593	Homework 10 *(Due: **11/27**) * note the date Lab 11	• ***Part 20:*** Linear Regression: Inference, Predictions, and Diagnostics
	11/22			• ***THANKSGIVING HOLIDAY – ENJOY!!!!!***
13	11/27, 11/29	Chapter 12: pages 637-669	Homework 11 * (Due: **12/4**) * note the date Lab 12	• ***Part 21:*** ANOVA
14	12/4, 12/6	Chapter 15: pages 15-1 to 15-25 Chapter 16: pages 16-1 to 16-19 and 16-41 to 16-52	Homework 12 *(Due: **12/11**) *note the date Lab 13	• ***Part 22:*** Non-parametrics: Rank-based procedures • ***Part 23:*** Non-parametrics: Sampling-based procedures Chapters 15 and 16 are on the CD-ROM that came with your book or at the publisher web site www.whfreeman.com/ips6e
15	12/11		(nothing due) Lab 14	• Catch-up and review
	12/17			• ***FINAL EXAM: Monday 17 December, 10:30am – 12:30pm***

VII.Evaluation and Grading

Homework

- There will be 12 homework assignments each worth 10 points. *We will drop your two worst scores before computing your homework total for the semester*.
- Homework is IN GENERAL posted on the class web site on or before Thursday and due the following Thursday **in class, printed and stapled together with your name (no student ID) on the front page**. Note in the course schedule above that there are a few exceptions to a Thursday due date. If a change is made in a due date, an announcement will be made in class and also emailed to all students.
- Homework should not be emailed to the instructors; this class is much too big for us to receive and print out homework in this way. Homework may be dropped off in class or at the Biostatistics Main Office (Mayo A-460); please do not slip homework under the instructors' doors.
- Most homework assignments will be made up of textbook questions from Moore/McCabe/Craig AND questions that require learning and using statistical software. Similar problems may be covered step-by-step in the lab in the week before the assignment is due. You are NOT required to use SAS or R to do the problems that require statistical software; you may use another statistical software package of your choosing. However, course staff cannot offer assistance with any other package besides SAS and R.

- We encourage you to work together in computing and discussing the problems. However, **each student is expected to independently write up the submitted assignment using her or his own computing and giving explanations in her or his own words.** All assignments will involve computing; please attach only relevant computer output to what you turn in.
- Each homework will be graded on a scale of 0 to 10 points. Each week 2 problems will be selected for grading in detail, worth 2 points each. The remaining problems will be checked for meaningful work, worth 6 points total.
- **Late homework will lose 3 points per day**, unless arrangements have been made with the instructor for an extension.

Exams

- Exam 1: early October, in class (see the Weekly Schedule above)
- Exam 2: mid November, in class (see the Weekly Schedule above)
- Final Exam: as determined by the University final exam schedule (see the Weekly Schedule above)

You may bring all of the following to use during the exams: **class books, lecture notes and any other lecture materials** (e.g., personal class notes, lecture worksheets, homework and their solutions, labs). **A calculator capable of natural log transformations is required** ("ln" button) for all of the exams. Sharing of books, notes, worksheets, homework/solutions, labs, calculators, or verbal comments is **not** permitted during the exams. Computers and any kind of internet connection are **not** permitted during the exams. **Be prepared to present a valid University student ID card to the instructor during any exam.**

Labs

- There will be 14 lab sessions, one per week starting the second week of class, led by a Teaching Assistant (TA). **Lab exercises will be posted to the class web site; if you want to have a paper copy of the lab exercises with you during lab, you should print it out before coming to lab.** The TA will help you and the other students work through the exercises using a computer in the SPH Computer Lab (Mayo C-381).
- By completing the lab exercises, you will learn how to program your own statistical data summaries and analyses using the SAS statistical package (www.sas.com) or the R statistical package (www.r-project.org). **Students may use SAS and/or R, or are welcome to use any other statistical software. Course staff will not be able to support any other software except SAS and R.** Only SAS and R are installed for this course in the SPH Computer Lab.
- The lab exercises will NOT be graded. You do NOT need to turn them in. Attendance at the labs will NOT be recorded.
- Occasionally part of a homework assignment will be included in a lab exercise; in this case, computer code and output relevant for the homework assignment should be turned in with your homework.

Grading

- Exams 1 and 2: 25% each.
- Final Exam: 30%.
- Homework Total: 20%.
- The grading scale based on the *total* percentage is the following:
  - 93-100 A
  - 90-92 A-
  - 85-89 B+
  - 75-84 B
  - 70-74 B-
  - 65-69 C+
  - 55-64 C
  - 50-54 C-

Course Evaluation
Beginning in fall 2008, the SPH will collect student course evaluations electronically using a software system called CoursEval: www.sph.umn.edu/courseval. The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades just as soon as the faculty member renders the grade in SPHGrades: www.sph.umn.edu/grades. All students will have access to their final grades through OneStop two weeks after the last day of the semester regardless of whether they completed their course evaluation or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of the courses for which you are registered.

Incomplete Contracts
A grade of incomplete "I" shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an "I" requires that a contract be initiated and completed by the student before the last official day of class, and signed by both the student and instructor. If an incomplete is deemed appropriate by the instructor, the student in consultation with the instructor, will specify the time and manner in which the student will complete course requirements. Extension for completion of the work will not exceed one year (or earlier if designated by the student's college). For more information and to initiate an incomplete contract, students should go to SPHGrades at: www.sph.umn.edu/grades.

University of Minnesota Uniform Grading and Transcript Policy
A link to the policy can be found at onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)
For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can be found at onestop.umn.edu.

Course Withdrawal
Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Student Services Center at sph-ssc@umn.edu for further information.

Student Conduct, Scholastic Dishonesty and Sexual Harassment Policies
Students are responsible for knowing the University of Minnesota, Board of Regents' policy on Student Conduct and Sexual Harassment found at www.umn.edu/regents/polindex.html.

Students are responsible for maintaining scholastic honesty in their work at all times. Students engaged in scholastic dishonesty will be penalized, and offenses will be reported to the SPH Associate Dean for Academic Affairs who may file a report with the University's Academic Integrity Officer.

The University's Student Conduct Code defines scholastic dishonesty as "plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis."

Plagiarism is an important element of this policy. It is defined as the presentation of another's writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism, please consult University policies and procedures regarding academic integrity: http://writing.umn.edu/tww/plagiarism/.

Students are urged to be careful that they properly attribute and cite others' work in their own writing. For guidelines for correctly citing sources, go to http://tutorial.lib.umn.edu/ and click on "Citing Sources".

In addition, original work is expected in this course. Unless the instructor has specified otherwise, all assignments, papers, reports, etc. should be the work of the individual student. It is unacceptable to hand in assignments for this course for which you receive credit in another course unless by prior agreement with the instructor. Building on a line of work begun in another course or leading to a thesis, dissertation, or final project is acceptable.

Disability Statement

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have a documented disability (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services to have a confidential discussion of their individual needs for accommodations. Disability Services is located in Suite180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612/626-1333 (voice or TTY).

Mental Health Services:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via www.mentalhealth.umn.edu