BIOSTATISTICS 600 - PRINCIPLES OF STATISTICAL INFERENCE
Fall 2009

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Course Description:
Bios 600 is an introductory course in probability and statistical inference. This course serves as an introduction to the collection, summarization, analysis and presentation of data. Topics include sampling, experimentation, measurement, descriptive statistics, correlation, probability, confidence intervals, tests of hypotheses, 2-way tables, chi-square distribution and a simple linear regression. Upon completion, students will have an understanding of some of the main areas of probability and statistics including a working knowledge of basic summary statistics, graphs, simple statistical tests for hypothesis testing, analysis of categorical data and regression analysis. Students will be able to evaluate straight-forward statistical usage in everyday life and their own discipline, especially in relevant research publications, and interact knowledgeably with statisticians in planning, conducting, analyzing and reporting research projects.

Prerequisites:
Students are required to have a basic understanding of algebra and arithmetic. This math competency can usually be demonstrated by a college-level algebra course or precalculus course. More information about math competency is available in the *"Quantitative Self-Test"* in the course documents in Blackboard. This document contains math review questions and resources for math review.
Students must be familiar with a basic calculator. Students are not required to have experience in Excel, however familiarity with Excel is helpful. Excel tutorials will be provided. Coursework may be completed using other statistical software (such as SAS, Splus, or R) if the student already has experience with this other software. No previous course work in probability and statistics is required.

Textbook:
Required: Introduction to the Practice of Statistics, Moore and McCabe, **** 6th ****edition. This edition has a orange/yellow cover. ACCEPTABLE: hard-back, paper-back, or cloth version, extended or standard edition. [For example, ISBN 1-4292-1621-2 or 1-4292-1622-0]
(Very Optional: Study Guide with Solutions Manual for Moore and McCabe's Introduction to the Practice of Statistics, 6th edition)
The textbook (standard/ paperback edition) is available at the UNC Health Affairs Bookstore (www.store.unc.edu/hab) and may be shipped. The books are also available at most online bookstores (like amazon.com). Students are responsible for obtaining the textbook within the first week of class.

FALL 2009 SCHEDULE				
Unit/ (Chapter)	**Format/ Topic**	**% Course Grade**	**Available Online**	**Due Date**
Unit 1 (Chapter 3/ supplements)	1: Short Test SAMPLING and SURVEYS	5	Thursday Sept 3	Tuesday Sept 8, 10 AM EDT
Unit 2 (Chapter 1)	2: Long Test DESCRIPTIVE STATISTICS	20	Thursday Sept 17	Monday Sept 21
Unit 3 (Chapter 4)	3: Short Test PROBABILITY and RANDOM VARIABLES	10	Thursday Oct 1	Monday Oct 5
Unit 4 (Chapter 3/ supplements)	4: Small Group Discussion Forum STUDY DESIGN and ETHICS	5	Thursday Oct 15	Tuesday Oct 20
Unit 5 (Chapter 5)	5: Short Test BINOMIAL DISTRIBUTION and SAMPLE MEAN DISTRIBUTION	10	Thursday Oct 29	Monday Nov 2
Unit 6 (Chapters 6 and 7)	6: Long Test INFERENCE, Part 1 (t-tests and binomial distribution)	20	Thursday Nov 12	Monday Nov 16
Unit 7 (Chapters 8 and 9 and 2.5)	7: Small Group Discussion Forum INFERENCE II (2-way tables and chi-square distribution)	5	Thursday Nov 26	Tuesday Dec 1
Unit 8 (Chapters 2 and 10)	8: Long Test (Final Exam) LINEAR REGRESSION and CORRELATION	25	Thursday Dec 10	Tuesday Dec 15
	TOTAL	100		

The course has eight units. A graded assignment follows each unit : either a short test, a long test, <u>or</u> a small group discussion forum. The timing of each graded assignment will provide you with some weekday time and some weekend time for completion.

GRADED ASSIGNMENTS:

Short Tests: The short tests are multiple-choice tests following Units 1,3 and 5. 'Short tests' are completed in two parts: some multiple-choice questions are completed off-line (with the answers submitted within Blackboard) and some questions must be answered while on-line. On the day listed in the Schedule, the test paper with some of the test questions will be posted in Blackboard. Download the test paper and print it out. Complete the problems on the test paper off-line, any time before the due date. After completing the problems on the test paper, submit those answers within Blackboard test facility by the due date/time. When you log into the Blackboard test facility to submit your answers, some additional questions will be available that you must complete while online.

You should study for the test before attempting any test problems just as you would an in-class test. Taking a short test, including completing the test and submitting the answers, should take less than an hour. These tests are open book/ open notes but no help from other individuals.

Long Tests: The long tests are MS Word documents for you to complete and email back. The question format will be varied: discussion, graphs, short answer, multiple choice, etc. Many of the questions may be associated with a journal article that you will be asked to read. There are three long tests; the last long test is the final exam. The long tests follow Units 2, 6 and 8.

A link button for a long test will appear within Blackboard in the appropriate unit on the date noted in the Schedule. You can spend as much or as little time on the test as you want during the designated period. However, the test must be turned in (emailed) by the due date and time. Long tests are open-book, open-note, but you may **not** discuss the test in any way with other individuals. The long tests are graded *by the instructor* and returned to students with comments. An extensive answer key will be provided.

Suggestion: Although it is not required, I feel that the best way to complete the long tests is to study for them as you would an in-class, timed exam. Then, work on the exam in a closed book fashion. After attempting the entire exam, you could then open notes, text, etc. to complete the exam. Again, this method is not required, but I feel it provides greater understanding.
[A "short test" is like a quiz in a residential class, and a "long test" is like a take-home test in a residential class.]

Small Group Discussion Forums: Two graded small group discussion forums (following Units 4 and 7) are required. The students will be divided up into small groups of about 5-6 students. An ungraded small group discussion forum for introductions will be conducted during the first few weeks of class.

On the dates indicated in the Schedule, the small group discussion forum questions will be posted on the website. You'll be notified via email the expectations for participation in the small group discussion forum. Each small group will be given a scenario or a public health journal article. Several questions will be posed by the instructor to be discussed by members of the small group during the period of about six days.

The discussion forum is not 'live' or 'instant message'; students post comments at different times during the week as their schedule permits. Group members can then read other members' comments and respond to them when it is convenient. It is more of a 'bulletin board' rather than a 'live chat'. Each student is required to post comments several times during the discussion period. Exact instructions and expectations will be distributed before the first graded discussion forum.

ASSIGNMENT OF COURSE LETTER GRADES:
A student's letter grade will be determined based on the entire class performance, which is, in part determined by the difficulty of the exams for a particular semester. In other words, there is no strict numeric cutoff between an "H" and a "P" grade predetermined at the beginning of the semester. The cutoff will be determined after the final exam by examining the student's performance compared to other students' performances. In order for the grade "H" to be meaningful, the "H" letter grade will not be given to more than 30-35% of the students. Because previous classes have been quite motivated and the graded assignments are straightforward, the cutoff score (between H and P) has tended to be high, usually in the mid 90's. After each graded assignment, students will be given a distribution of the scores for the entire class. Students will know at all times their course average and where their individual scores fall in relation to the entire class.

Course averages below 80 may receive an "L". Course averages below 75 may receive an "F". Please contact the instructor if your average during the course drops below a 75. Students are urged to drop the course instead of receiving an "F" or "L".

INCOMPLETE GRADE:
To be eligible for an Incomplete grade, a student needs to successfully complete 50% or more of the course. An Incomplete will only be given if the student is unable to complete the work due to a qualifying event (severe illness, death of close family member, …) . Before the grade of "IN" will be assigned, the student and the instructor must develop a plan/time line for the successful completion of the required work. Students have a maximum of one year to complete the course after receiving an "IN" grade. If a student misses the drop deadline and has completed less than 50% of the course, the student will not be eligible for an Incomplete and will receive an "F" for the course.

SCHEDULING ISSUES /LATE TESTS:
If at all possible, please try to complete assignments when they are due. Because each assignment includes weekday and weekend time across two different weeks, most scheduling conflicts should be avoided. If you can't complete the assignment during the time period that it is assigned, arrange with the instructor to take the test early, if possible. Making special arrangements may be possible for students *who are otherwise keeping up with the course*.

There is a penalty for turning in exams late. After 24 hours, the grade is 0 if the student has not contacted the instructor. If a student has significant lingering technical problems, or will be out of town on business for an extended time, that student should ask the professor by email or telephone for special permission for an extension BEFORE the exam becomes available. Informing the

instructor after the exam due date is unacceptable except for a situation like an emergency or sudden serious illness.

STUDENT HONOR CODE:
Tests must be completed without the assistance of any other person. Do not consult any other person (taking this course or not taking this course) about any graded material. You may contact the instructor if you have questions. **Do not consult tests from previous semesters. Take this seriously!! Any suspicion of violation of the honor code <u>will</u> be taken to the Honor Court.**

Honor Court sanctions can include receiving a zero for the assignment, failing the course and/or suspension from the university. Students <u>in this course</u> in previous semesters have been suspected of academic misconduct and prosecuted by the Honor Court on several of occasions. Students have been found <u>guilty</u> of academic misconduct <u>in my sections of this online course</u> and serious penalties have been imposed for that conduct. For more information on the UNC Honor Code and the Honor Court see honor.unc.edu.

REUSE OF MATERIALS:
The materials on this course Web site are only for the use of students currently enrolled in the course for purposes associated with this course. Materials should not be retained or further disseminated. For example, journal articles and electronic copies of tutorials should not be retained after the course is completed. Please don't transmit or post materials from this course – they are for your personal use only during this semester. Please don't share materials (such as tests and quizzes) with any other individuals including students who may take the course in the future.

GLOBAL TOPICS:
As part of their study of biostatistics, students will be exposed to a variety of global public health topics. In effort to enrich students' understanding of global public health issues, global content will be incorporated in a variety of ways, including "Global Health Activities", readings, lecture examples and test examples.
For the purposes of this course, global content will be defined as "health problems that transcend national boundaries, that may be influenced by circumstances or experiences in other countries, and that are best addressed by cooperative actions, and solutions," whether they occur in developing countries, countries in advanced transition, or industrialized countries. *Source: Institute of Medicine, America's Vital Interest in Global Health, Washington DC, National Academies Press, 1997.*
Within many units, Global Health Activities will be used to highlight important statistical concepts using examples and journal articles centered on global health topics. Watch for this symbol,

,to indicate that global content is being incorporated.

LEARNING MATERIALS:

Reading: (Required) Most readings are in your textbook Introduction to the Practice of Statistics ** **6th** **edition by D. S. Moore, G. P. McCabe and Craig. Both the readings and tutorials are important to your understanding and work together. I suggest doing the reading first, followed by the tutorials. The timing (reading before tutorial vs. tutorial before reading) is not as important as just doing both. Other readings, such as journal articles, will appear in some units.

Tutorials: (Required) The tutorials are a series of narrated PowerPoint slides. Print out the tutorial slides and transcript (under a button labeled "Transcript") at the beginning of each tutorial so that you can take notes on the slides.
Some tutorials will go slower or faster than you may like. Feel free to repeat or pause slides as needed. Online 'self-quizzes' are provided in Blackboard immediately after many of the lessons to reinforce the main ideas from the tutorial. These self-quizzes are *not graded*; rather, they are for your information only to provide immediate feedback of understanding of the lecture material.
IMPORTANT: You are **REQUIRED** to listen to the tutorial, not just read the slides and transcript. The transcript is provided for your information, but **does not eliminate** the need for actively listening to the tutorial.

Homework Exercises: (Required) Assigned homework exercises from the textbook and Global Activities handouts are *not graded*, but are enormously important. Odd answers are provided in the back of the textbook. Even answers are provided on the assignment sheet. Some solutions appear in the supplementary Study Guide with Solutions Manual. (You are not required to buy this study guide.). Some answers are available on the textbook website (see below). The study guide includes detailed/worked out answers to some assigned exercises, and they are a bit more in depth than the webpage's answers. Within many units, the instructor and TA will post solutions to the most important homework problems, after students have a chance to attempt the homework on their own. The teaching assistant can also provide worked solutions with explanations via email. Solutions to the Global Activities handouts will be posted.

OPTIONAL MATERIALS:
CD: (Not required but helpful) The CD provided with your textbook contains additional examples, quizzes and other information. Please feel free to utilize the CD on your own as you have time. The CD contains the data sets that are referenced in the textbook as Excel files for many homework problems, so *you don't need to type in the homework data sets*.

Textbook Webpage: (Not required) For more examples and worked out answers go to the publisher/textbook's webpage for worked out answers to problems from the textbook as well as additional quizzes, answers and other information. The URL is www.whfreeman.com/ips6e. Feel free to try "Supplementary Exercises" and the "Online Quizzes" (they give good explanations of why your answer is right or wrong). The "Statistical Applets" will help to further test your knowledge and then to gain further knowledge through interactive activities.

Videos: (Not required- just if you want more examples, etc. For the really eager student!) If more examples and explanation of the material presented in each unit is desired, on campus students can view videos that parallel the material covered in each unit. David Moore, the author of the course textbook, created these videos. The videos are very creative and present many examples of how statistics are used in real life. These videos can be seen at the UNC-CH undergraduate library and also at Duke University. You will not be at a disadvantage if you don't have access to them.

GETTING HELP:

Instructor and TA: If you have questions about the course, email course instructor Jane Monaco, bios600w@bios.unc.edu or TA Joe Rigdon, jrigdon@email.unc.edu. We will make every attempt to return email within one day.

- ***Our TA primarily handles questions about homework and straightforward statistical concepts.***
- ***The instructor primarily handles questions not related to homework – such as scheduling, grading and more advanced statistical concepts.***

If your questions are not answered sufficiently by the TA, then the instructor will be happy to answer any questions or elaborate on explanations. Unless a student specifically requests that the question and answer not be shared, any questions to the instructor/TA may be sent to all students through email, so that all may benefit from the answer. You are also welcome to meet with the TA or instructor in person if you are near campus. Phone conferences may often be beneficial. (Email the instructor or TA to set up a phone conference or a meeting.) We have used other methods to communicate with students such as webcam online sessions, faxing or emailing pdf files with explanations. We will work with your preferences and technologic capabilities to help you. Tests are graded by the instructor with comments about your answers, if needed.

Also see **FAQ #6.**

Other important contacts: If you have questions about your ONYEN, or general computer problems or Blackboard questions - please contact 962-HELP or help.unc.edu. For more information about the status of Blackboard (sometimes it goes down) or frequently asked questions about Blackboard, visit its.unc.edu/bbnews. If you don't know where to start with your questions, contact your instructor at bios600w@bios.unc.edu.

Online Problem Sessions: We will have live online problem sessions/office hours. Dates and times will be announced in the second week of class (usually Tuesday evenings during weeks before graded assignments). Adobe Connect will be used to facilitate live discussions to answer homework or other questions. These live discussions are not required and will be recorded so that they may be replayed for students who are unable to participate. More information about these problem sessions will be provided when the course begins.

Frequently Asked Questions: More information about the administration of this course is available in the FAQ document in Blackboard. Please refer to the FAQ's document in Blackboard for many topics of interest including: software and operating system compatibility, configuring your account to receive email from Blackboard, pacing of the lessons, and using previous edition of the textbook.

SUMMARY:
I am glad you are in the course! In the beginning, there is a lot of administration to get familiar with how the course is set up, but there is plenty of help available. I am eager for you to have a good experience in the course. Please don't hesitate to contact me, Jane Monaco, at bios600w@bios.unc.edu if you have questions.

Biostatistics 600 meets the CEPH (Council on Education for Public Health) Competencies:

A. BIOSTATISTICS

Biostatistics is the development and application of statistical reasoning and methods in addressing, analyzing and solving problems in public health; health care; and biomedical, clinical and population-based research.

Competencies: Upon graduation a student with an MPH should be able to…

A. 1.	Describe the roles biostatistics serves in the discipline of public health.
A. 2.	Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
A. 3.	Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
A. 4.	Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
A. 5.	Apply descriptive techniques commonly used to summarize public health data.
A. 6.	Apply common statistical methods for inference.
A. 7.	Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
A. 8.	Apply basic informatics techniques with vital statistics and public health records in the description of public health characteristics and in public health research and evaluation.
A. 9.	Interpret results of statistical analyses found in public health studies.
A. 10.	Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences.

UPDATED: August 22th, 2009