

BIostatistics 600 - Principles of Statistical Inference

Fall 2013

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Course Description:

Bios 600 is an introductory course in probability and statistical inference in public health. 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 public health 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 Sakai. This *Self-Test* contains math review questions and resources for math review. The answer key is also available in Sakai.
- Students must be familiar with a basic calculator.
- Students are not required to have experience in MS Excel, however familiarity with MS Excel is helpful. Excel tutorials will be provided. Coursework may be completed using other statistical software (such as SAS 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, McCabe and Craig, ****7th**** edition. All of these versions of the 7th edition are acceptable: hard-back, paper-back, cloth version, extended, standard versions.

[Very Optional: Study Guide with Solutions Manual for Moore and McCabe’s Introduction to the Practice of Statistics]

The textbook is available at the UNC Bookstore, www.store.unc.edu, and may be shipped. The book is also available at most online bookstores like amazon.com. Students are responsible for obtaining the textbook within the first week of class.

(This textbook requirement is for Fall 2013 only. The textbook/edition requirement may change in future semesters.)

FALL 2013 SCHEDULE							
Unit	Book Chapter- 7 th edition	# Lessons Required (# Lessons Optional)	Topic	Graded Assignment Format (Unit Covered)	Point Value	Graded Assignment Available Online (NOON Eastern Time)	Graded Assignment Due Date (8 AM Eastern Time)
1	Chapter 3/ supplements	6	SAMPLING and SURVEYS	Short Test (1)	50	Thurs Aug 29	Wed Sep 4
2	Chapter 1	5	DESCRIPTIVE STATISTICS	Midterm (1,2)	200	Thurs Sep 12	Tues Sep 17
3	Chapter 4	3	PROBABILITY and RANDOM VARIABLES	Short Test (3)	50	Thurs Sep 26	Tues Oct 1
4	Chapter 3/ supplements	4	STUDY DESIGN and ETHICS	Short Test (4,5)	50	Thurs Oct 10	Tues Oct 15
5	Chapter 5	2	BINOMIAL DISTRIBUTION / SAMPLE MEAN DISTRIBUTION				
6	Chapters 6 and 7	4 (1)	INFERENCE, Part 1 (t-tests and binomial distribution)	Midterm (Comprehensive with focus on 3,4,5,6)	300	Thurs Oct 31	Tues Nov 5
7	Chapters 8 and 9 and 2.5	3 (2)	INFERENCE II (2-way tables and chi-square distribution)	Short Test (7)	50	Thurs Nov 21	Tues Nov 26
8	Chapters 2 and 10	4	LINEAR REGRESSION and CORRELATION	Final Exam (Comprehensive with focus on 7,8)	300	Thurs Dec 5	Wed Dec 11
				TOTAL	1000		

The timing of each graded assignment provides some weekday time and some weekend time for completion across different weeks. Therefore minimal scheduling accommodations should be needed.

Short Tests (50 points each) are comparable to “in-class timed multiple choice or short answer quizzes”. They focus on specific unit(s) indicated.

Two Midterms and **Final Exam** are comparable to “take home tests” and are more comprehensive - covering more than one Unit.

STUDENT HONOR CODE:

Tests must be completed without the assistance of any other person. Students must not consult any other person (taking this course or not taking this course, other than the instructor) about any test material or graded assignment. Students must not consult tests from previous semesters. Any suspicion of violation of the Honor Code is serious and will be taken to the Honor Court.

Honor Court sanctions for academic misconduct can include receiving a zero for the assignment, failing the course and/or suspension from the University. Students in this course in previous semesters have been suspected of academic misconduct and have been prosecuted by the Honor Court on many occasions. Students have been found guilty of academic misconduct in this instructor's sections of this online course, and serious penalties have been imposed for that misconduct.

If a student has any question about whether their actions could be considered a violation of the Honor Code, the student should contact the instructor before engaging in the behavior. Students will be required to sign an Honor Code statement on each test indicating that the student has neither given nor received unauthorized help.

For more information on the UNC Honor Code and the Honor Court see honor.unc.edu.

SCHEDULING ISSUES /LATE TESTS:

If at all possible, students should complete assignments when they are due. Because each assignment includes weekday and weekend time across two different weeks, most scheduling conflicts can and should be avoided. If a student can't complete the assignment during the time period that it is assigned because of an unavoidable conflict (such as a documented death in the immediate family or hospitalization), arrange with the instructor to complete the assignment 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 assignments late without permission. A 20% deduction will be imposed for each day (or portion of a day) that the assignment is late, up to two days. After two days, the score will be zero. For example, if a test is due Tuesday at 8 AM, if the student turns in the test Tuesday at 8:05 AM, the score will have a 20% deduction. If the test is turned in Wednesday at 8:05 AM, the score will have a 40% deduction. If the test is turned in Thursday at 8:05 AM, the score is 0.

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 for special permission for an extension BEFORE the assignment becomes available. Informing the instructor after the assignment due date is unacceptable except for a situation like a serious emergency or sudden serious illness. If a student will be without internet access (such as traveling) for more than a week, the student is encouraged to enroll in the course during a different semester when they have reliable, timely internet access.

ASSIGNMENT OF COURSE LETTER GRADES:

Graduate	95-100	H
Students:	80-94.9	P
	75-79.9	L
	<74.9	F

While the cut-off point between an “H” and “P” may appear high, in past semesters at least one third of students had course averages > 95. The high averages in this course are likely explained by the tests being straightforward and open book, and the students being motivated. Students can calculate their course average at any time (as “Total Points Earned”/“Total Points Possible”). Students will also be given the distribution of the class scores after each test so the student knows where their grade falls in relation to the entire class.

No undergraduate scale is given because this course should not have any undergraduate students enrolled.

Students are urged to drop the course instead of receiving an “F” or “L”. Students are requested to contact the instructor if their average drops below a 75 (starting after the First Midterm following Unit 2) in order to discuss a plan for improvement or the option of dropping the course. The course material does get harder as the course progresses so passing grades at the beginning of the semester are not a guarantee of passing the course.

INCOMPLETE GRADE:

To be eligible for an Incomplete grade, a student needs to successfully complete 60% 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. The student has the responsibility to contact the instructor to make up the work. If a student misses the drop deadline and has completed less than 60% of the course, the student will not be eligible for an Incomplete and will receive an "F" for the course.

REUSE OF MATERIALS:

The materials in this course website 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 or electronic copies of tutorials should not be retained after the course is completed. Please don't transmit or post materials from this course; materials are for student personal use only during one semester. Please don't share materials (such as tests and homework) 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.

COURSE EVALUATIONS:

The course evaluations are enormously important, and students are expected to complete the online course evaluation at the end of the semester. Because the evaluations are anonymous, enforcing this requirement is not possible. However, students are reminded of the importance of completing the course evaluation.

LEARNING MATERIALS:

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 to facilitate taking notes on the slides. Feel free to repeat or pause slides as needed.

Online 'self-quizzes' are provided in Sakai immediately after many of the tutorials to reinforce the main ideas from the tutorial. These self-quizzes are *not graded*; rather, they simply provide immediate feedback of understanding of the lecture material. **IMPORTANT:** Students are **REQUIRED** to listen to the tutorial, not just read the slides and transcript. The transcript is provided, but **does not eliminate** the need for actively listening to the tutorial.

Reading: (Required) Most readings are in the textbook Introduction to the Practice of Statistics ****7th**** edition by Moore, McCabe and Craig. Both the readings and the online tutorials are important for student understanding, and they work together. 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.

Homework Exercises: (Required) Assigned homework exercises from the textbook and Global Activities handouts are *not graded and not collected*, but are enormously important. Odd answers are provided in the back of the textbook. Many even answers with solutions are provided on the assignment sheet or available through the TA. Some solutions appear in the supplementary Study Guide with Solutions Manual. (Students 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 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 for students with questions. Solutions to the Global Activities handouts will be posted.

OPTIONAL MATERIALS:

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

Textbook Webpage: (Not required) The publisher/textbook's webpage is available for some solutions to exercises in the text as well as additional quizzes, examples, and other information. The URL is www.whfreeman.com/ips7e. Feel free to explore the website including the online quizzes which provide good explanations of why an answer is right or wrong. The "Statistical Applets" will help to further test students' knowledge and then to gain further knowledge through interactive activities.

GETTING HELP: (also see FAQ # 5)

Instructor and TA: For questions about the course, email the instructor or TA depending on the type of question:

- ***Our TA primarily handles questions about homework and straightforward statistical concepts. The TA should be the first point of contact for many issues. The TA is to be announced .***
- ***The instructor primarily handles questions not related to homework – such as scheduling, grading and more advanced statistical concepts.***

We will make every attempt to respond to email within 36 hours. If the matter is not urgent and/or during the weekend, that return email may simply acknowledge receipt and describe when to expect resolution.

If a student's 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/announcements, so that all may benefit from the answer. Students are also welcome to meet with the TA or instructor in person if the student is near campus. (Email the instructor or TA to set up a phone conference or a meeting.) Other methods to communicate with students are available such as webcam online sessions, faxing or emailing pdf files with hand-written explanations. The instructor and TA will work with the student preferences and technologic capabilities to help.

Other important contacts: For questions about ONYENs, general computer problems or Sakai, please contact help.unc.edu. For registration questions, please contact your student services manager. For questions where you don't know where to start, contact the instructor or TA.

Online Problem Sessions: Online live problem sessions/office hours will be available. Dates and times will be announced in the second week of class. The online office hours will be used to facilitate live discussions to answer homework or other questions. These live discussions are not required. They 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 after the course begins.

Group Work: Small groups will be assigned after the first week of class. These small groups will be available to discuss homework, concepts, or biostatistics in the news. Students are encouraged to participate in their small group if they find that interaction helpful. Some students will choose not to participate in their small group – or only participate to a limited extent as their schedule allows. The groups are there for your help if needed. Explicit details about this option will be available in separate documentation when the small groups are announced.

Frequently Asked Questions: The amount of information about the administration of this course far exceeds the space available in a Syllabus. Therefore an enormous amount of information about the course is available in the detailed FAQ document in Sakai including: software and operating system compatibility, pacing of the lessons, suggestions for success, logistics, instructions for rounding calculations, and expectations for the different graded assignments.

CLOSING:

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 an excellent experience in the course and learn a great deal of biostatistics. Please don't hesitate to contact me, Ryan McBride, at ryanjmcb@live.unc 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.

Other “terms of use” information for UNC courses:

1. By enrolling as a student in this course, you agree to abide by the University of North Carolina at Chapel Hill policies related to the Acceptable Use of online resources. Please consult the Acceptable Use Policy (<http://help.unc.edu/1672>) on topics such as copyright, net-etiquette and privacy protection.
2. As part of this course you may be asked to participate in online discussions or other online activities that may include personal information about you or other students in the course. Please be respectful of the rights and protection of other participants under the UNC Chapel Hill Information Security Policies (http://its.unc.edu/ITS/about_its/its_policies/index.htm) when participating in online classes.
3. When using online resources offered by organizations not affiliated with UNC Chapel Hill, such as Google or Youtube, please note that the Terms and Conditions of these companies and not the University’s Terms and Conditions apply. These third parties may offer different degrees of privacy protection and access rights to online content. You should be well aware of this when posting content to sites not managed by UNC Chapel Hill.
4. When links to sites outside of the unc.edu domain are inserted in class discussions, please be mindful that clicking on sites not affiliated with UNC-Chapel Hill may pose a risk for your computer due to the possible presence of malware on such sites.

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