

Bios 600: Principles of Statistical Inference

Fall 2013, 3 credits

Location and Time:

Class: 9:30-10:45 Tuesday and Thursday 133 Rosenau Hall

Instructor: Diana Lam

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Email: ldiana@live.unc.edu *

Office hours: Tues 10:45-11:45

*Assume that I only check emails once a day, and not at all during weekends.

About the Course:

Bios 600 is an introductory course in probability theory and statistical inference with strong emphasis on applications in public health and medical research. Topics include descriptive statistics, construction of confidence intervals, hypothesis testing, power and sample size calculations, and diagnostic tests and their properties. Students will use statistical software or statistical packages to conduct analysis.

Labs:

Attendance at lab section is optional. You may attend any of the lab sections offered. Labs are a good opportunity to ask the TA's questions about material, homework, or computing help. Note, that TA's will only be required to help you with SAS computing, and will not be required to be knowledgeable about other computing packages.

Prerequisites:

- Basic understanding of algebra and arithmetic at the college level
- Access to SAS or Excel Statistical Add-In (Analysis Toolpak)

Class Etiquette:

- At all times use common courtesy and respectful behavior.
- Attendance at lectures is expected. The lecture notes will occasionally contain blanks where the definition or answer is worked out in class. The answers will not be provided later on Sakai, although definitions and examples can be found in the book.
- Use of electronic device, which includes both phones and lap tops, should be limited to viewing course notes. If I see devices not being used for BIOS 600 activities, the first offense results in a warning, and the second offense results in confiscation of the device.
- Occasionally due to pacing concerns I may be required to defer a question to office hours after class. Please be understanding in this case. It does not mean I think your question is bad, but it could be that the answer is involved or we are running behind.

Required Texts:

- B. Burt Gerstman, Basic Biostatistics Statistics for Public Health Practice

Software:

Initially, SAS can be difficult to learn and use, and for this reason, the use of Excel’s Statistical Add-In is acceptable. However, if you plan on using advanced statistics, taking BIOS 545 or BIOS 665, I highly encourage you to put in the time to learn SAS. See the handout on SAS options for more details and options about using SAS.

- Option 1: Use SAS via UNC ITS Virtual Lab at <http://virtuallab.unc.edu>
- Option 2: Download SAS onto your own computer by requesting a copy through <http://software.sites.unc.edu/software-category/science-and-statistics/>
- Option 3: Download the Excel Statistical Package Add-In <http://office.microsoft.com/en-us/excel-help/load-the-analysis-toolpak-HP010021569.aspx>

Grading and Assessments:

- **Honor Code:** Bios 600 students are expected to abide by the UNC Honor Code at all times, and particularly when completing homework and exams. All suspected Honor Code violations will be reported to the Honor System. <http://studentconduct.unc.edu/faculty/honor-syllabus>
- **Homework:** Homework is assigned approximately weekly and is required. Much of the homework will be completed online in Sakai. You will be allowed to resubmit your homework up to 2 times (for a total of 3 attempts), and the latest submission will be graded. There will be no possibility of making up missed homework assignments; however, the lowest 2 grades will be dropped. You are welcome to discuss strategies of problem solving with each other, the TA’s, and/or myself, but the work you submit must be your own. Copying answers will be considered a violation of the UNC Honor Code.
- **Exams:** There will be 2 midterms during the semester, and 1 cumulative final exam at the end. All exams are in-class. No electronic devices are permitted during exams. You will be allowed a 1-sided 8x11 page of notes for the midterms and 1 2-sided 8x11 page of notes for the final.

I understand that life is not always predictable and that examinations may need to be rescheduled. Please make every effort to contact me by email as early as possible if this is the case. Make up exams are not guaranteed if I am not contacted in advance (of course, if you are in the emergency room, I will understand).

Assignment of Grades:

Each student’s numeric grade will be 20% homework, 25% exam 1, 25% project, and 30% final exam, based on the grading scale below where the bracket is inclusive and the parenthesis is non-inclusive:

Numerical Grade	Undergraduate Letter Grade	Graduate Letter Grade
[92.5,100]	A	H

[90,92.5)	A-	P
[87.5,90)	B+	P
[82.5,87.5)	B	P
[80,82.5)	B-	P
[77.5,90)	C+	P
[72.5,77.5)	C	P
[70,72.5)	C-	P
[67.5,90)	D+	L
[62.5,67.5)	D	L
[60,62.5)	D-	L
[0,60)	F	F

I reserve the right to curve grades using more generous cut points. Class participation may modify the association between the numeric grade and letter grade in exceptional cases.

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. 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.

Course Evaluations:

Students are expected to complete the online course evaluation at the end of the semester. The course evaluations are enormously important.

CEPH Competencies:

This course meets the CEPH (Council on Education for Public Health) Competencies:

- Describe the roles biostatistics serves in the discipline of public health.
- Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
- Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
- Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
- Apply descriptive techniques commonly used to summarize public health data.
- Apply common statistical methods for inference.
- Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
- 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.

- Interpret results of statistical analyses found in public health studies.
- Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences.

Schedule of Lectures, subject to change

Date	Topic	Chapters
8/20	Syllabus, Types of Data and Studies	1,2
8/22	Descriptive summaries	3,4
8/27	Elementary probability	5
8/29	Discrete distributions (binomial, poisson)	6
9/3	Continuous distributions (normal, chi-square)	7
9/5	Review	
9/10	Sampling means and standard deviations	8
9/12	Confidence intervals	10
9/17	Hypothesis testing	9
9/19	1 sample Z-test	9
9/24	Power and sample size calculations	9
9/26	Review	
10/1	Exam 1	
10/3	Inference about a Mean	11
10/8	Comparing Independent Means	12
10/10	1-way ANOVA	13
10/15	Non-parametric ANOVA	13
10/17	Fall Break, no class	
10/22	Correlation	14
10/24	Linear regression	14
10/29	Multiple regression	15
10/31	Review	
11/5	Exam 2	
11/7	Multiplicity	
11/12	Analysis of proportions	16
11/14	Cross-tabulated Counts	18
11/19	Analysis of proportions	
11/21	Logistic regression	
11/26	Survival analysis	
11/28	Thanksgiving Recess, no class	
12/3	Review	
12/10	Final Exam 8-11 am	