

BIOS 600: Principles of Statistical Inference

Fall 2010

Instructor: Elena Bordonali

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Office Hours: Thursday 10:45-11:45 am, Rosenau 133, and by appointment.

Teaching

Assistants: Guanhua Chen (gchen@bios.unc.edu)

Office Hours: Tuesday 10:45-11:45 am, Rosenau 133, and by appointment.

Eric Daza (edaza@bios.unc.edu)

Office Hours: Wednesday 2-3 pm, McG-G 1305, and by appointment.

Graders: Jennifer Clark, Beth Horton, Annie Green Howard.

Lecture: 9:30-10:45 am TR, Rosenau 133. Attendance is not mandatory but is strongly recommended!

Recitation: 8:30 am - 10:20 am or 12:10 pm - 1:50 pm M, Rosenau 201A. In lab, we will be teaching statistical programming via statistical software packages. Specifically, we will be covering SAS and Excel. The TA, graders and I will rotate weekly as lab instructors, covering material corresponding to what we are currently learning in class. Lab is NOT required for this course, although it will be useful for homework assignments which may be computationally intensive.

Course Description: This is an introductory course in probability and statistical inference. This course introduces the collection, summarization, analysis and presentation of data. Topics include sampling, measurement, descriptive statistics, correlation, probability, normal distribution, confidence intervals, tests of hypotheses, 2-way tables, chi-square distribution and 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.

Textbook (Required): Basic Biostatistics: Statistics for Public Health Practice, B. Burt Gerstman. Available at the UNC Health Affairs Bookstore (www.store.unc.edu/hab).

Prerequisites: Knowledge of basic algebra and arithmetic. A basic calculator will be necessary for exams and homework. Access to a computer with statistical software will be useful for homework.

Homework: Problem sets will be assigned regularly throughout the course in order to assess students' understanding of the material. These problems will usually (but not always) come from the book. I anticipate having eight (8) homeworks, though that number may fluctuate slightly depending on our progress.

Exams: There will be two in-class exams, one each at the end of section II and section III. There will also be a final exam, which will be held at the time scheduled by the University. The concepts learned at the beginning of this course carry through to the end of the course, differing only in application. Therefore, exams will essentially be cumulative.

Grading: The following grading scheme (left) and letter grade breakdown (right) will be used to compute and assign each student's final grade.

Assessment	Weight	Graduate	Undergraduate	Grade (%)
Exam 1	15%	H	A	92 - 100
Exam 2	20%	P	B+	88 - 91.4
Final Exam	25%		B	80 - 87.4
Homework	40%		C+	77 - 79.4
Total	100%		C	70 - 76.4
		L	D+	66 - 79.4
			D	60 - 65.4
		F	F	< 60

Homework will be graded by the TA and graders. All homework grades are considered final. **If, and only if, you strongly suspect that a mistake has been made**, email me. I will require strong proof of a grading mistake before I will give back points on an assignment. Office hours will NOT be wasted on haggling over a couple points.

Late Policy: Homework is due by 12 pm in my mailbox, or may be turned in at the end of class. Homework handed in after 12 pm (noon) on the due date will receive a 10 point deduction for each day that it is late. This will be strictly enforced - 12:05 pm on the due date is late! Make-up exams will not be given except in **VERY** extreme circumstances.

Important Dates:

- Tuesday August 24 – First day of class
- Thursday September 30 – Exam 1** (tentative)
- Tuesday October 12 – Class cancelled (University Day)
- Thursday October 21 – No class (Fall Break)
- Thursday November 4 – Exam 2** (tentative)
- Thursday November 25 – No class (Thanksgiving)
- Tuesday December 7 – Last day of class
- Friday December 17 – Final Exam**

Academic Honesty: Exams must be completed individually without assistance from other students. Collaboration with others on homework assignments is permitted, however each student must write up his/her own assignment separately to be submitted for grading. Copying another student's completed assignment is forbidden, as is the use of homework solutions from previous years. Violations of this policy *WILL* be presented to the UNC Honor Court. For more information on the UNC Honor Code and Honor Court, please see <http://honor.unc.edu>.

Global Topics: In Biostatistics 600, 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.”¹ Within many units, questions from “Global Health Activities” will be used to highlight important statistical concepts using examples and journal articles centered on global health

topics. Watch for the symbol  to indicate that global content is being incorporated into the homework and lectures.

Getting Help: Use office hours wisely! If you are stuck on a problem or confused about the material, come to us ASAP. Don't wait to get help with an issue!

In order for us to help you efficiently, please make some attempt to tackle problems on your own before office hours and appointments. You should also try to pinpoint exactly where you are getting stuck. We are happy to help students who make an effort, but if you come to us with a vague ‘I don't understand anything’, then we can't help you.

If you have a schedule conflict with office hours, you may contact me or the TA. While we are available by appointment, please treat it as a last resort and remember that we also have other commitments. If this is being abused, we may restrict further appointments.

¹Source: Institute of Medicine, Americas Vital Interest in Global Health, Washington DC, National Academies Press, 1997.

Course Outline: The course will be divided into four general sections as follows. Please refer to the course schedule (posted on Blackboard) for more date-specific information.

I. General Concepts and Techniques – Ch. 1-4

- Measurement, Data, Types of Studies
- Frequency Distributions, Descriptive Statistics

II. Introduction to Probability and Statistical Inference – Ch. 5, 7-10

- Basic Probability Concepts
- Normal Distribution - theory; finding probabilities
- Basic Inference, Sampling Behaviors
- Hypothesis Testing - null, alternative hypotheses; test statistics; p -values; Z -tests, T -tests
- Estimation, Confidence Intervals - relationship to hypothesis tests
- Sample Size, Power Calculations

III. Quantitative Response Variable – Ch. 11-15

- Tests About Means - 1-Sample, 2-Sample, 3 or more-Sample
- Correlation
- Simple Linear Regression, Multiple Linear Regression
- Sample Size, Power Calculations

IV. Categorical Response Variable – Ch. 6, 16-19

- Tests About Proportions - 1-Sample, 2-Sample
- Study Sampling Types
- 2-Way Tables - tests of association and trend
- Stratified 2-Way Tables - confounding, interaction
- Sample Size, Power Calculations

***** *I reserve the right to make changes to this document over the course of the semester.*