

Statistics 104 – Introduction to Quantitative Methods

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Office Hours: Tuesday 2:30 – 3:30, Friday 1 – 2,
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Web site: <http://www.courses.fas.harvard.edu/~stat104/>

Objectives and Prerequisites

The objectives of this course are:

- to develop an understanding of the basic concepts of probability and statistics,
- to help students to be informed and critical readers of quantitative arguments,
- to provide sufficient skills to enable students to apply simple statistical techniques with the aid of a computer.

Some familiarity with elementary algebraic notation at the high school level will be useful. Graduate students who wish to tailor the course to relate to their research are also invited to discuss this with the instructor.

Statistics 104 is one of three courses (Statistics 100, 101, and 104) that correspond to previous years' Stat 100. For information on the differences between these courses and how to choose among them, see the discussion about the differences between these courses at http://www.stat.harvard.edu/Academics/Undergraduate_Program_Information.html. (Note: it should be easy to switch between Stat 100, Stat 101 and Stat 104 up to add/drop day.)

Lectures

Monday, Wednesday, and Friday 11:00 – 12:00 in the Science Center Lecture Hall A.

Sections

One hour weekly section meetings will begin the third week of the semester. Go to <http://www.section.fas.harvard.edu/> to section – you should do this by Monday, September 27 by 3:00 p.m. All sections are open to all students and cover essentially the same statistical material.

In addition to section meetings, each Teaching Fellow will have office hours at a time and location to be announced. The Teaching Fellow's office will be staffed (during hours to be announced) and you may go there to ask questions of any Teaching Fellow. Of course, your own section leader will know you best and may best be able to help you.

Textbooks and References

Required Text:

Introduction to the Practice of Statistics, 4th ed., by D. Moore and G. McCabe. The text is on sale at the Coop. A limited number of copies of this book are available at a lower price than the Coop at < <http://RedlineTextbooks.com/> >. There are copies on reserve at Cabot Science Library.

Other References:

Statistics, by D. Freedman, R. Pisani, and R. Purves (less mathematical, more verbal explanation)
Statistics: The Exploration and Analysis of Data, by J. Devore and R. Peck
Statistics: A Guide to the Unknown, by J. Tanur, et al. (full of examples).

These books are at Cabot Science Library and other libraries.

The videotape series, *Against All Odds: Inside Statistics* is on reserve at Cabot Science Library. This series is loosely keyed to the textbook and you may view the tapes as a supplement to the lectures. You may borrow one tape at a time at the reserve desk for viewing in the video rooms upstairs in the library.

Syllabus

The following is a rough schedule of lectures and the corresponding readings in Moore and McCabe. The schedule is subject to change. (“AAO #” refers to program numbers in the *Against All Odds* videotape series.)

Lectures 1 – 7	Describing Data Sections 1.1 & 1.2 & chapter 2 AAO: # 1 – 4, 6, 7 – 10
Lectures 8 – 16	Probability and Distributions Chapters 4, 5, & section 1.3 AAO: #15 – 17, 4, 5
Lectures 17 – 19	Producing Data: Surveys, Designed Experiments, & Observational Studies Chapter 3, AAO: # 11 – 14
Lectures 20 – 26	Statistical Analysis with One Sample Chapter 6 & sections 7.1 & 8.1 AAO: # 19 – 21
Lectures 27 – 28	Statistical Analysis with Two Samples Sections 7.2 & 8.2, AAO: # 22, 23
Lectures 29 – 34	Topics in Inference Chapters 9 – 12, AAO: # 24, 25

Exams

The exam dates are tentative; watch announcements for confirmation.

- First midterm – Monday, October 25, in lecture
- Second midterm – Wednesday, December 1, in lecture
- Final Exam – Wednesday, January 19 (Tentative – Exam group 4 scheduled for this day currently)

The exams will be closed book. You may bring a formula sheet for reference during these exams. A hand calculator is strongly recommended for all exams.

Homework

Homework and other handouts will be distributed at lectures, or may be downloaded from the course web site.

There will be weekly homework assignments usually distributed on Wednesday and due the following Wednesday, except when announced otherwise. The first assignment will be distributed by Friday, September 24 and due Friday, October 1. Homework is due **IN CLASS** on the due date.

You may discuss homework problems with other students but should write them up independently. Please show your work.

Many assignments will include one or more “Challenge Problems”. These extra problems go beyond the basic requirements of the course, and doing them is completely voluntary. They may involve a bit more mathematics or computers skills than the regular homework, but otherwise they are self contained, i.e., they do not assume a high preparation in probability or statistics. Challenge problems will be counted for a modest number of extra credit points, roughly equivalent to one or two regular problems. More important, they should give you a glimpse of more advanced concepts and techniques in probability and statistics.

THE OFFICIAL COURSE POLICY IS: NO LATE HOMEWORK WILL BE ACCEPTED.

In cases with extenuating circumstances your section leader may agree to accept late work. You should be aware that if your teaching fellow does not agree to accept and grade a late assignment, then you will receive a grade of zero on that assignment.

In return for your timely submission of homework, we will make every effort to return graded homework and examinations promptly. This rapid feedback should help you be aware of any problems in your understanding of the material.

Computer Work

Homework will include computer assignments to be done using Stata. Please do not hand in piles of computer paper with your homework; cut out the relevant pieces and paste them up in place in your written assignments (or incorporate them using your word processor), just as tables and graphs will be included in an article.

No prior computing experience is needed. You will be taught everything that you need to know. A handout describing how to use the computer and Stata will be forthcoming. Stata is quite simple to learn, but it is sufficiently powerful and versatile to be useful for real projects that you might carry out in the class or later.

Stata is available on the dorm network and in the Science Center computer labs. Harvard also has a site license for Stata and it can be downloaded from

< <http://www.fas.harvard.edu/cgi-bin/software/download.pl> >

To use Stata on your home machine, you must be able to connect to the FAS network as Stata is a keyserved application. Stata is available for Macintosh and Windows.

Project

A reading period project is required. It should be a brief (5 pages) paper on anything statistical which interests you. Some ideas: analysis of an application of statistics to your field (collections of articles will be mentioned), description and application of a statistical idea we won't discuss, analysis of a statistical data set. A handout with more ideas and guidelines will be distributed in November. Any project should be discussed with your section leader or the instructor; you will be asked to submit a proposal in early December. The project is due Friday, January 14, 2004 at 4 PM.

Grading

Course grades will be determined by these components, with approximate weights as shown:

Homework*	20%
Midterm Exams	30%
Term Project	15%
Final Exam	35%

* Lowest homework grade will be dropped when computing final grades

Notices and E-mail

You should check your e-mail regularly for course notices. E-mail is also useful for communicating questions on course content or administrative issues.