Stat 104: Introduction to Quantitative Methods for Economics

Syllabus for Spring Semester 2012

This syllabus is required reading for the course. You will be expected to understand the policies and assignments discussed in the syllabus.

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Course website: http://isites.harvard.edu/k85335

Required text: *Basic Business Statistics (12th edition)* by Berenson, Levin, and Krehbiel (ISBN-10: 0132168383). This book is available at the Harvard COOP or from various internet retailers. At least one copy of the text will also be available at the Cabot Science Library.

Class meetings: There will be **two lecture groups**: MWF 11:00 am – noon in Science Center C, and MWF 12:00 – 1:00 pm in Science Center C. Students may attend either lecture. Weekly sections will be used to discuss homework, do extra problems and review concepts. Sections are optional, although strongly recommended. Instructions for signing up for a section through the Harvard online scheduler at www.section.fas.harvard.edu will be explained at the end of the first week of class.

Computing: The course will use Stata and Excel. Stata is available free of charge from Harvard University's Instructional Computing Group. You will also need a hand-held calculator with log, exponential and square-root functions.

Grading: **Homework (25%).** Eleven homeworks (approximately) will be assigned. Homework will be due Fridays at 4:00 pm in the cabinet outside the entrance to Science Center Room 300. Homework assignments may be downloaded from the course website. Late homework will not be accepted.

Homework assignments will be graded on a scale from 1 to 5. Homeworks are graded in large part on the clarity of your presentation of the solutions, not just their correctness. Homeworks that are generally clear and correct will earn scores of 4 or 5; those less so will earn a 3. Sloppy and/or incomplete homeworks will receive a 1 or 2. All homeworks will count toward your course grade – we will not drop any homework grades.

Grading: **Midterm (20%).** There will be one **"evening"** midterm open book/open notes exam.

Final (30%). The final exam is a 3-hour exam that will cover material from the entire course. The final exam will be open book/open notes.

Group regression report (25%). A report of a multiple linear regression analysis will be prepared by each student group. Each group will select their own topic using data from available databases (see regression report instructions). The groups may consist of 2-3 students. Anyone wishing to work alone or with a slightly larger group must obtain the consent of the instructor. Details of this project will be handed out towards the middle of the course.

Collaboration: You may discuss homework problems with other students (and with the instructor and TFs, of course), but you must write your final answer yourself, in your own words. Solutions prepared "in committee" or by copying or paraphrasing someone else's work are not acceptable. All computer output you submit must come from work that you have done yourself.

Regrading: Clerical errors will be corrected without any hassle. Other regrade requests must be submitted **in writing** within a week of the items return. To discourage "grade grubbing," the **entire** item will be subject to regrading (even if the regrade request is not honored).

Course Description

Consider the following recent findings about bread:

- More than 98 percent of convicted felons are bread users.
- Fully HALF of all children who grow up in bread-consuming households score below average on standardized tests.
- Bread is made from a substance called "dough." It has been proven that as little as one pound of dough can be used to suffocate a mouse. The average American eats more bread than that in one month!
- Newborn babies can choke on bread.
- Bread has been proven to be addictive. Subjects deprived of bread and given only water begged for bread after as little as two days.
- Bread is often a "gateway" food item, leading the user to "harder" items such as butter, jelly, peanut butter, and even cold cuts.
- In the 18th century, when virtually all bread was baked in the home, the average life expectancy was less than 50 years; infant mortality rates were unacceptably high; many women died in childbirth; and diseases such as typhoid, yellow fever, and influenza ravaged whole nations.
- More than 90 percent of violent crimes are committed within 24 hours of eating bread.
- Bread is baked at temperatures as high as 400 degrees Fahrenheit! That kind of heat can kill an adult in less than one minute.
- Many bread eaters are utterly unable to distinguish between significant scientific fact and meaningless statistical babbling.

As you probably already know (from this article and also from watching TV and reading magazines and newspapers), statistics can be dangerous. They can be used to manipulate public opinion, sell you products or services you don't need, change policy decisions, and significantly affect our lives. Therefore, it is important that we have a good understanding of where they come from (in addition to the subject matter they supposedly represent). Many Americans probably feel that statistics are nothing more than fancy lies (so goes the saying "Lies, damned lies, and statistics!") and statisticians are the wily spin doctors. Conversely, others feel that if data can be put into statistical form, it must be true. "Numbers don't lie!" Whatever your feelings or experiences with statistics, it is important to view statistical claims with a critical and knowledgeable eye. That means we need to understand enough about statistics (what they mean, how they are generated, and what their limitations are) to know when they are appropriate and when they are not.

This course will provide you with the necessary skills to generate, analyze, interpret, and present data. It is **not a math course**, and you do not need to worry about having the latest in calculators and/or computer skills. The course will provide students with a working knowledge of the computer-based statistics programs Excel and Stata (put it on your resume!). One goal of this course is to get you comfortable running the software (and understanding the results).

This course does not employ the "Las Vegas Effect"-what happens in this class should not stay in this class (unless I say something really stupid). The skills you learn in this class will be invaluable to your success in other Harvard classes and in your future employment. We don't want to teach you just what you need to know-you'll be obsolete in five years! We want you to come away with understanding how to think objectively about information, knowing how to summarize and communicate that information as well as use it effectively in making sound economic decisions.

Tentative Course Schedule

Class	Day	Topic	Due
1	Monday, January 23	Course Introduction	
2	Wednesday, January 25	Getting (good?) Data	
3	Friday, January 27	Graphs and Summarizing Data: Measures of Center	
4	Monday, January 30	Summarizing Data: Measures of Dispersion	
5	Wednesday, February 1	Correlation and Covariance	
6	Friday, February 3	Portfolios	HW 1
7	Monday, Febuary 6	Regression, A First Look	
8	Wednesday, Febrary 8	Introduction to Probability-Part I	
9	Friday, February 10	Introduction to Probability-Part II	HW 2
10	Monday, Febuary 13	Introduction to Probability-Part III	
11	Wednesday, Febrary 15	Random Variables- Part I	
12	Friday, February 17	Random Variables- Part II	HW 3
	Monday, Febuary 20	**No Class-President's Day**	
13	Wednesday, Febrary 22	Important Discrete Probability Distributions	
14	Friday, February 24	Continuous Probability Distributions	HW 4
15	Monday, Febuary 27	Sampling and the Central Limit Theorem	
16	Wednesday, February 29	Confidence Intervals- One Sample Mean	
17	Friday, March 2	Confidence Intervals- One Sample Proportion	HW 5
18	Monday, March 5	Summary so far/Exam Review	
19	Wednesday, March 7	**No Class-Midterm Exam at Night**	EXAM
	Friday, March 9	**No Class- Spring Recess (extra day off)**	
	Monday, March 12	**No Class- Spring Recess**	
	Wednesday, March 14	**No Class- Spring Recess**	
	Friday, March 16	**No Class- Spring Recess**	
20	Monday, March 19	Confidence Intervals- Two Samples	
21	Wednesday, March 21	Hypothesis Testing- Part I (verbage)	
22	Friday, March 23	Hypothesis Testing- Part II (traditional method)	HW 6
23	Monday, March 26	Hypothesis Testing - Part III (p-values)	
24	Wednesday, March 28	Computer Examples for Hypothesis Testing	Project Released
25	Friday, March 30	Discuss Project/Chi-Square Tests	HW 7
26	Monday, April 2	Least Squares (Regression) Redux	
27	Wednesday, April 4	Regression Output	
28	Friday, April 6	Regression Hypothesis Testing	HW 8
29	Monday, April 9	Prediction with Regression	
30	Wednesday, April 11	Multiple Regression Analysis	Status Report Due
31	Friday, April 13	Dummy Variables	HW 9
32	Monday, April 16	Introduction to Regression Diagnostics	
33	Wednesday, April 18	Multicollinearity and Heteroskedasticity	
34	Friday, April 20	Model Building and Variable Selection	HW 10
35	Monday, April 23	Logistic Regression	
36	Wednesday, April 25	Course Review (last class)	
	Friday, April 27		HW 11
	Monday, April 30		
	Wednesday, May 2		Project Due