ECON 83A – STATISTICS AND ECONOMIC ANALYSIS
TENTATIVE

Course Overview: This course is designed to provide a working knowledge of the analytical tools of probability and statistics used in economic analysis. Some of the topics that we will cover include descriptive statistics, probability theory, the Central Limit Theorem, confidence intervals and hypothesis testing. The course will conclude with an introduction to regression analysis using the bivariate model involving a derivation of the ordinary least squares estimators, inference, and goodness of fit.

Course Goals: By the end of this class you should be able to both calculate and interpret basic descriptive statistics; perform hypothesis testing; and understand the underlying concepts of bivariate regression analysis.

Course Meeting Times: T/F 8:00 a.m. - 9:20 a.m.
Recitation: TBA
Office Hours: T/F 11:00 a.m. - noon or by appointment

Textbook: You have a choice between two textbooks for this course. YOU ONLY NEED ONE. One is more “economics” oriented, but less rigorous. The other is a science/engineering one which will appeal to those of you who are more math oriented.


Course Requirements: Mandatory attendance at lectures and recitation (attendance will be taken and recorded), the completion of course assignments, two midterms, a data project, and a final exam. Grading in the course will be as follows:

1 Assignments (10% of grade) – I will assign 8 assignments over the course of the semester. You are required to turn in all of these exercises. You must do these exercises on your own. Assignments will be due in class (due dates are given in the syllabus). NO late assignments will be accepted.

2 Midterm exams (50%) - There will be 2 midterm exams given during the semester, each worth 25%.

3 Final exam (40%) to be held during the final exam period.

Please note that there will be NO make-up exams given. Absence from an exam will be excused only for a serious illness or bereavement (which must be documented). A student
who is unable to take the final exam for a legitimate reason MUST obtain advance authorization from the Office of Undergraduate Academic Affairs. There are NO EXCEPTIONS to these rules.

Special Accommodations: If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see me immediately. Please keep in mind that reasonable accommodations are not provided retroactively.

Academic Honesty: You are expected to be honest in all of your academic work. Please consult Brandeis University Rights and Responsibilities for all policies and procedures related to academic integrity. Students may be required to submit work to TurnItIn.com software to verify originality. Allegations of alleged academic dishonesty will be forwarded to the Director of Academic Integrity. Sanctions for academic dishonesty can include failing grades and/or suspension from the university. Citation and research assistance can be found at LTS - Library guides.

ADDITIONAL REQUIREMENTS

You will be required to purchase a NON-PROGRAMMABLE calculator for this class. This will be the ONLY calculator that will be allowed for use in the exams. There will be no exceptions to this rule. This means that you may NOT bring in a programmable graphing calculator (whether or not you can show that there are no stored programs). Your calculator should be able to perform square roots, but nothing more complicated will be necessary. If your calculator does not meet these specifications, you will have to do without a calculator for the exam. You may not use your cell-phone or any other device as a calculator.
DATES TO REMEMBER

Oct 8: Midterm 1, in class.
Oct 15: Brandeis Monday, No Class.
Nov 12: Midterm 2, in class.
Nov 27 - 29: Thanksgiving Break. No scheduled classes.
Dec 10: Last day of classes.

ASSIGNMENT DUE DATES

Sept 10: Assignment #1
Sept 17: Assignment #2
Sept 24: Assignment #3
Oct 18: Assignment #4
Oct 29: Assignment #5
Nov 5: Assignment #6
Nov 19: Assignment #7
Dec 6: Assignment #8

Note: All assignments will be posted on Latte.
OUTLINE

Please note: I highly recommend that you do the readings BEFORE lecture. Course assignments and additional handouts will be available on Latte. Be sure to check Latte REGULARLY for course information and updates. Success in this four-credit course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class.

1. AUG 30: FRI  
   Introduction: The role of probability and statistics in economic analysis, descriptive
statistics. Overview of the course. Introduction to the notion of “population” versus “sample.” Discussion on types of data: nominal, ordinal, interval, ratio. Describing data in a meaningful way through descriptive statistics: frequencies, relative frequencies, percentiles, measures of central tendencies. Introduction to descriptive statistics.

Read: W&W 1.1-1.3, 2.1, 2.3, 2.5-2.7
Ross 1.1-1.5

2. SEPT 3: TUES

More on descriptive statistics and an introduction to probability theory. Different measures of “central” tendencies (means, modes, medians). Various measures of dispersion. The effect of scale on measures of the mean and the variance. What is a “sample space?” What is an “event?” Manipulating the event space: intersections and unions of events. Compliments and mutually exclusive sets. Relationship between relative frequencies and probabilities.

Read: W&W 3.1-3.3
Ross 2.1-2.3, 2.5 (2.4 is optional)

3. SEPT 6: FRI


Read: W&W 3.4-3.7
Ross 3.1-3.8

4. SEPT 10: TUES


Read: W&W 4.1-4.3
Ross 4.1-4.3, 5.1

Assignment #1 due in class

5. SEPT 13: FRI

6. **SEPT 17: TUES**  

Read: W&W 4.4-4.5  
Ross 5.5

7. **SEPT 20: FRI**  
*Functions of Several Random Variables.* Creating new random variables that are functions of several random variables. Constructing the probability distribution function for the new variable.

Read: W&W 5.1-5.2

8. **SEPT 24: TUES**  
*Covariance and Correlation.* Variance measures for functions of random variables. Measures of covariance and correlation between random variables. Interpretation of these measures.

Read: W&W 5.3-5.4

Assignment #3 due in class.

9. **SEPT 27: FRI**  
*Properties of Good Estimators.* Discussion of unbiasedness, efficiency and consistency. How do you determine if an estimator has these properties?

Read: W&W 7.1 - 7.4  
Ross 7.1

10. **OCT 4: FRI**  
*Review*

11. **OCT 8: TUES**  
*Midterm #1, in class*

12. **OCT 11: FRI**  
*The Central Limit Theorem and Sampling Properties.* Probability distribution for the sample mean. Discussion of sampling issues. Revisiting populations vs. random samples. Measuring the sample mean and sample variance. Small samples vs. large samples: why might this matter?

13. **OCT 18: FRI**  
(Return exams, and go over in class.)
Read:  W&W 6.1 - 6.3  
   Ross 6.1-6.5

Assignment #4 due in class.

14. **OCT 22: TUES**  
   *Confidence Intervals.* What is a confidence interval and what can it be used for? Constructing confidence intervals (two-sided). Setting the confidence level. Using the Z distribution. Small-sample variation: the Student t-distribution.

   Read:  W&W 8.1- 8.3.  
   Ross 7.1, 7.3-7.5

15. **OCT 25: FRI**  
   *Confidence Intervals,* cont’d. One-sided intervals. Comparing populations: independent samples, paired samples.

   Read:  W&W 8.3 - 8.4.

16. **OCT 29: TUES**  
   *Hypothesis Testing.* Designing a statistical test. The null and alternative hypothesis. Constructing a two-sided test using the confidence interval approach.

   Read:  W&W 9.1 - 9.3, 9.6  
   Ross 8.1-8.5

Assignment #5 due in class.

17. **NOV 1: FRI**  
   *Hypothesis Testing.* One sided tests. P-values. (Comparing populations, again.) More examples.

18. **NOV 5: TUES**  
   *Type I and Type II Errors.* What is the significance of Type I and II errors? Determining which one you might be committing. Calculating Type I and Type II errors.

   Read:  W&W 9.3 - 9.5

Assignment #6 due in class.

19. **NOV 8: FRI**  
   *Review for midterm 2*

20. **NOV 12: TUES**  
   *Midterm #2, in class*

21. **NOV 15: FRI**  
   *(Return exams, and go over in class.)*
Introduction to Regression Analysis. The Bivariate Model. What is econometrics? What can we do with it? Deriving the Ordinary Least Squares (OLS) estimators for the bivariate model.

Read: Handout on Regression Analysis (Based on Wooldridge, Introductory Econometrics: A Modern Approach 2E)

Assignment #7 due in class.

Derivation of the OLS estimators, cont’d. Discussion of the Gauss-Markov Assumptions.

Introduction to R. A quick introduction to get you started on using R, a free statistical package that is very powerful and commonly used in the workplace

Thanksgiving Break. No classes

So now that we know some basic statistics, how can we use it in practice? An example with R. (In class work.)

So now that we know some basic statistics, how can we use it in practice? An example with R, cont’d. (In class work.)

Assignment #8 due in class.

Review for final exam.