

ECONOMICS 162A: INTRODUCTION TO PROBABILITY AND STATISTICS

FALL 2001

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TIME: Tuesday and Thursday 9:00-10:15am

OFFICE HOURS: Mondays 3:00 - 4:30pm and by appointment

TEACHING ASSISTANT: Xia Li (E-Mail: xia.li@yale.edu)

REQUIRED TEXTBOOK (available at Yale Book Store)

- Robert Hogg and Elliot Tanis, *Probability and Statistical Inference*, 6th edition, Prentice-Hall. Irwin/McGraw-Hill, 2001.

Other texts (not required) that cover the same material include:

- Amemiya, T., *Introduction to Statistics and Econometrics* [More brief than Hogg and Tanis]
- DeGroot, M. H., *Probability and Statistics* [A good book at a higher level than Hogg and Tanis]
- Hogg, R. and A. Craig, *Introduction to Mathematical Statistics* [Also a good book at a higher level than Hogg and Tanis]
- Wonnacott, T. H. and R. J. Wonnacott, *Introductory Statistics for Business Economics* [Lower level than Hogg and Tanis]

COURSE DESCRIPTION:

This course provides an introduction to probability and statistics for economics majors. It is followed by a course on econometrics, Econ 163b, in the Winter/Spring semester. Students are responsible for weekly reading and problem assignments (listed below). The problem sets will be discussed in the discussion section with the TA. The grade for the course will be based on the problem assignments (25%), a mid-term exam (25%), and a final exam (50%). A word of advice: do the reading and problem assignments diligently. The subject matter of this course is learned sequentially.

WEEKLY READING AND PROBLEM ASSIGNMENT

Thursday, September 6: Fundamentals of probability theory: set theory, probability axioms.

- Readings: §1.1, §A.1, §2.1
- Problems: §1.1: 2, 7; §2.1: 1, 9,12, 14
- Due: Tuesday, Sept. 18

Week of September 11: Methods of enumeration, conditional probability, independent events, Bayes' formula.

- Readings: §2.2-2.5
- Problems: §2.2: 2, 6, 8; §2.3: 2, 4, 5; §2.4: 3, 4, 11, 12; §2.5: 2, 6
- Due: Tuesday, Sept. 25

Week of September 18: Discrete distributions: random variables, probability mass function, expectation, mean, variance, standard deviation, Bernoulli distribution, binomial distribution, Poisson distribution

- Readings: §1.2, §1.7, §3.1-3.3, §3.5
- Problems: §3.1: 3, 6, 8; §3.2: 4, 7, 8, 10; § 3.3: 3, 7, 9; §3.5: 8, 10
- Due: Tuesday, Oct. 2

Week of September 25: Continuous distributions: Random variables, density function, distribution function, expectation, uniform distribution, exponential distribution, chi-square distribution, normal distribution, mixed discrete and continuous distributions

- Readings: §3.4, §4.1-4.4, §4.6
- Problems: §3.4: 2; §4.1: 2, 4, 10, 15; §4.2: 3, 6, 11; §4.3: 10, 11; §4.4: 2, 4, 7; §4.6: 2,4
- Due: Tuesday, Oct. 9

Week of October 2: multivariate distributions: correlation coefficient, conditional distributions, bivariate normal distribution, transformation of random variables

- Readings: §4.5, §5.1-5.5
- Problems: §5.1: 1, 4, 8; §5.2: 1, 7, 10(a,b).
- Due: Tuesday, Oct. 16

Week of October 9: Sample theory, sums of independent random variables, laws of large numbers, central limit theorem.

- Readings: §1.2, §6.1-6.4
- Problems: §6.1: 2; §6.2: 2,4; §6.3: 3, 9, 12; §6.4: 1, 4, 8
- Due: Tuesday, Oct. 23

Week of October 16: Estimation of confidence intervals: maximum likelihood estimators, properties of estimators, confidence intervals for means

- Readings: §7.1-7.3
- Problems: §7.1: 2, 3, 5, 10, 12; §7.2: 6, 9, 12, 16; §7.3: 3, 6
- Due: Tuesday, Oct. 30

Week of October 23: Mid-term exam, Thursday October 25

- Readings: None
- Problems: None
- Lecture on October 23 will be used as a review session or a catch-up session

Week of October 30: Confidence intervals for variance and proportions

- Readings: §7.4-7.5
- Problems: §7.4: 1, 2, 11; §7.5: 2, 4, 10, 12
- Due: Tuesday: Nov. 13

Week of November 6: Hypothesis testing: Null and alternative hypothesis, type I error, type II error, significance level, power, p -value, tests of one mean and variance

- Readings: §8.1-8.3
- Problems: §8.1: 3, 8, 11, 18; §8.2: 4, 5, 9; §8.3: 2, 6, 12
- Due: Friday, November 16

Week of November 13: Hypothesis testing (continued): test of equality of two means, Neyman-Pearson Lemma, uniformly most powerful tests, likelihood ratio tests

- Readings: §9.1-9.4

- Problems: §9.1: 2, 4; §0.2: 2, 4, 10; §9.3: 2, 4, 5; §9.4: 2, 4, 6
- Due: Thursday, November 29.

Week of November 20: Happy Thanksgiving!

- Readings: None
- Problems: None

Week of November 27: Linear Models: equality of several means, simple regression

- Readings: §7.8-7.9, §8.6-8.8
- Problems: §8.6: 1, 5; §7.8: 2, 4
- Due: Tuesday, Dec. 6

Week of December 4: Review.

Final Exam: Thursday, December 20th