

Statistics for Economists

Lectures: Tue. and Thu., 11:30am – 1:00pm, B844 East Hall
Instructor: Yoonseok Lee (365C Lorch Hall, 615-0177, yoollee@umich.edu)
Office Hours: Fri. 10:00am – 12:00pm or by appointment
GSI: Joel Wesley (joelrw@umich.edu; Office Hours TBA)
Discussion Sessions: Fri. 11:00am–12:00pm, 2427 MH [DIS 101]
Fri. 12:00pm–1:00pm, 232 DENN [DIS 102]

Course Description

This course provides basic knowledge of probability, statistics and regression analysis for undergraduate economics majors. Upon completion of this course, students can carry out their own economic data analysis. No prior knowledge of statistics is assumed, though basic calculus will be useful. I expect students have completed the math requirement. If necessary, however, the required calculus will be reviewed in discussion sessions.

In order to give students hands-on experience of economic data analysis, computer-based exercises are integrated as an essential part of the course. If you are already familiar with a statistical software package such as EXCEL, MINITAB, STATA, EVIEWS, SAS, RATS, GAUSS, MATLAB, etc., you are welcome to use it. For those who are not yet, the textbook has step-by-step instructions for EXCEL and MINITAB. The GSI is familiar with EXCEL, STATA and MATLAB, and students also can get help from him.

The GSI will hold weekly office hours and discussion sessions. He will go over problem sets and answer questions about materials covered in the class. The discussion session starts in the *second* week.

The class web page is available at <http://ctools.umich.edu>. Announcements and problem sets will be posted there, so make sure to visit the site frequently. Hard copies of these materials will *not* be distributed.

If you believe you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities to help us determine appropriate accommodations. I will treat any information you provide as private and confidential.

Textbooks

The required textbook for the course is:

Keller, G. (2005). *Statistics for Management and Economics*, 7th ed., Thomson - Brooks/Cole.

It is available at Ulrich's Books, Michigan Book and Supply, and the Michigan Union Bookstore. Other books that are recommended, though not required, are:¹

[1] Newbold, P., W.L. Carlson and B. Throne (2006). *Statistics for Business and Economics*, 6th ed., Prentice-Hall.

[2] Hogg, R.V. and E.A. Tanis (2005). *Probability and Statistical Inference*, 7th ed., Prentice-Hall.

[3] Stock, J.H. and M.W. Watson (2007). *Introduction to Econometrics*, 2nd ed., Addison-Wesley.

[4] Wooldridge, J. (2006). *Introductory Econometrics: A Modern Approach*, 3rd ed., South-Western.

All these books are on reserve at the Shapiro Undergraduate Library.

Organization and Evaluation

Grades will be decided based on weekly problem sets, two midterms and the final. The grading breakdown is as follows:

Homework 25%; 1st Midterm 20%; 2nd Midterm 20%; Final Exam 35%.

The problem sets will be posted on the class web every Thursday and they are due on the following Thursday, by the end of the class. No late submission will be accepted. Students are encouraged to form study groups and collaborate with other students to work on problem sets. You have to, however, write up and submit your own solutions.²

The exams are scheduled as follows (in the normal classroom space):

Midterm 1: 11:30am – 1:00pm, Tuesday, October 3 (in class)

Midterm 2: 11:30am – 1:00pm, Thursday, November 9 (in class)

Final Exam: 1:30pm – 3:30pm, Wednesday, December 20

¹[1] covers more material with a similar technical level of Keller (2005). For those who desire more complete treatment (with more mathematical formulae) of the topics covered in the course, [2] is a good alternative. [3] and [4] are more about regressions and estimations in depth.

²A word of advice: when you write the solution, provide the major steps of your calculation as you are taking exams. It is a good training for organizing and explaining your idea. When you are taking the midterms and the final exam, you will not be able to get the full credit if you simply write down the final answers without providing details.

All exams are closed-book. A basic³ hand-held calculator is allowed in the exams. The final exam will cover materials taught throughout the course, though more emphasis will be put on topics discussed after the midterms. Makeup exams will not be given without a Dean's excuse. An early final exam will not be given. Note that end of term travel plans are never allowed as valid excuse.

Course Outline

I. Probability and Statistics

1. Introduction and Descriptive Statistics (Keller Ch. 1 - 4)
2. Probability (Keller Ch. 6)
3. Random Variables and Distribution Theory (Keller Ch. 7.1 - 7.3)
4. Important Distributions (Keller Ch. 7.4 - 7.5 & 8)

Midterm Exam 1

II. Statistical Inference

1. Sampling Distribution (Keller Ch. 5 & 9)
2. Point Estimation (Keller Ch. 10.1)
3. Interval Estimation (Keller Ch. 9, 10, 12, 13)
4. Hypothesis Testing (Keller Ch. 11 - 14)

Midterm Exam 2

III. Regression Analysis

1. Simple Regression (Keller Ch. 17)
2. Multiple Regression (Keller Ch. 18)
3. Additional Topics in Regression Analysis (Keller Ch. 19 - 20)^{*as time permits}

Final Exam

³Calculators that perform functions beyond basic math (+, -, ×, ÷, and $\sqrt{\quad}$) will *not* be allowed.

Reading Guide for Part II

Please follow the reading guideline below to match the text book materials with the lecture note. Overall, the coverage for Part II is Ch 5 (basic concepts); Ch 9; Ch 10; Ch 11; Ch 12.1 & 12.3; Ch 13.1 & 13.2 & 13.3 & 13.5; Ch 14 (summary chapter).

1. Sampling Distribution

- 1.1. Basic Concepts: Ch 5; Ch 9.1
- 1.2. Sampling Distribution of \bar{X} : Ch 9.1; Ch 9.4

2. Point Estimation

- 2.1. Point Estimator: Ch 10.1
- 2.2. Properties of Good Estimators: Ch 10.1 (*There is no enough material in the text book. You should read our lecture note and be able to solve the related question in the problem sets.*)

3. Interval Estimation (*Read the chapters in Hypothesis Testing together*)

- 3.1. Interval Estimator: Ch 9.1; Ch 10.1
- 3.2. CI for normal μ (known σ^2): Ch 10.2; Ch 10.3
- 3.3. CI for normal μ (unknown σ^2): Ch 12.1
- 3.4. CI for proportion: Ch 9.2 (*Carefully read about the normal approximation and the continuity correction factor*); Ch 12.3
- 3.5. CI for difference in μ 's: Ch 9.3; Ch 13.1; Ch 13.2; Ch 13.3
- 3.6. CI for difference in proportions: Ch 13.5

4. Hypothesis Testing

- 4.1. Basic Concepts: Ch 11.1; Ch 11.4
Calculating the Power: Ch 11.3
- 4.2. Testing normal μ (known σ^2): Ch 11.2 \Rightarrow *also see readings in part 3.2.*
- 4.3. Testing normal μ (unknown σ^2): Ch 12.1 \Rightarrow *same as readings in part 3.3.*
- 4.4. Testing proportion: Ch 12.3 \Rightarrow *same as readings in part 3.4.*
- 4.5. Testing difference in μ 's: Ch 13.1 \Rightarrow *also see readings in part 3.5.*
- 4.6. Testing difference in proportions: Ch 13.5 \Rightarrow *same as readings in part 3.6.*