

Statistics for Economists

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Office Hours: Monday 3-4pm and Wednesday 9-10am or by appointment

Class Website: I will use the T-Square software to post any course related materials online. Please familiarize yourself with this web interface if you are not already familiar with it.

Course Overview¹

This course is designed to give you an understanding of probability theory, descriptive statistics, and statistical inference. These tools are necessary for you to be a good practitioner and consumer of empirical economics. The material we cover in this class will lay the foundations for, and enable to you succeed in more econometrics and regression courses such as ECON 3161 and other quantitative methods courses.

The first few weeks we will provide a cursory review of the necessary mathematical foundations that we will be using later in the semester. These include the mechanical process of single and multiple variable differentiation and integration as well as the graphical and intuitive concepts behind these ideas. I will assume that you have taken a course in single variable differentiation and integration and we will expand these concepts to multiple variables. The concepts will be important when we discussion probabilistic concepts such as expectations, standard deviations, and conditional expectations.

Learning Objectives

After this course you will be able to:

1. Describe the properties of discrete and continuous distributions of random variable and discuss the appropriateness of using each distribution in particular situations
2. List desirable finite-sample and asymptotic properties for estimators
3. Draw statistical inference from point estimates of estimated parameters and interpret these estimates
4. Demonstrate statistical properties of estimators using simulation techniques in STATA.

Textbooks

We will be using one textbook for the semester, but I will supplement the textbook with a few journal articles at various points during the semester. All supplements will be posted to T-Square.

¹The course material assumes that you are familiar with multivariate calculus and basic matrix algebra. If you need help with these topics, I would be happy to refer you to good supplementary readings.

Larsen, R. J. and Marx, M. L. (2001), *An Introduction to Mathematical Statistics and Its Applications*, 3rd ed., Upper Saddle River, NJ: Prentice Hall.

Assignments

I will assign problem sets approximately every two weeks during the course. You will be expected to turn the problem sets in at the beginning of class on the date it is due.

The best way to learn statistics is to practice solving problems and to apply your knowledge to different situations. The problem sets will help you focus your efforts on learning the major points of the course but are not intended to cover all of the material you will need to understand for the exams. You are encouraged to work through extra exercises on concepts that you are having troubles with.

In addition to the analytical problem sets, you will be assigned a few problem sets in which you will need to empirically examine properties of estimators STATA. I will provide you with a primer on how to use STATA, a common statistics software suite. STATA is available on the computers in the lab in the basement of the School of Economics as well as Ivan Allen College's Statistics Server.² If you wish to use another program to solve the problem sets you are more than welcome to do so, but neither Carolina nor I will likely be able to help you with the programming.

You are responsible for learning how to use STATA (or your preferred statistical software package) on your own. I will spend one class period providing a brief introduction to STATA and some of the functions you will need to use. I will announce this class period ahead of time and you are welcome to bring your laptop and work through the example at the same time.

UCLA has developed a number of tutorials that will help you familiarize yourself with STATA and learn how to perform basic tasks. Please explore these modules to help you complete the STATA portions of the assignments. The tutorials can be found at: <http://www.ats.ucla.edu/stat/stata/sk/default.htm>.

You are encouraged to work with your classmates on all homework assignments, but I expect everyone to write up their own set of solutions to each assignment. Writing up your own solution set will help cement the concepts in your mind. If you do work with classmates on assignments, please make a note of who you worked with at the top of your assignment.

Late assignments will not be accepted.

Exams

There will be three exams, spaced approximately equally across the term. Exams will consist mainly of analytical problems and some derivations. The exams will cover the material covered in lecture and from the assigned portions of the textbook. Each exam will focus on the material covered since the previous exam, but may contain questions from earlier portions of the course as well. To succeed on the exams you will need a good understanding of all of the previous examined

²For information on how to access the server, visit <http://it.iac.gatech.edu/stats-server>. If you have trouble accessing the server please let me know.

material due to the cumulative nature of the course. **You must attend all exams.** If you miss an exam for an emergency (verified by the Dean of Students Office) your imputed grade for that exam will be the average of the other two exams.

In order to give you some extra room for improvement, the highest of your two grades from the first two exams will receive a 20% weight and the other will receive a 25% weight. This does not apply to the final exam. The final exam will be given 30% weight.

Grading

Your course grade will be based on 4 components:

Problem Sets	25%
First Exam	20%
Second Exam	25%
Final Exam	30%

Grades in the class will be assigned by the following rubric:

A	90% or above
B	below 90% and 80% or above
C	below 80% and 70% or above
D	below 70% and 60% or above
F	below 60%

If the class mean on a particular test falls below 76%, I will add a curve to that test to bring it up to 76%. For example, if the class mean on the second exam is 73%, I will add a 3% curve to that exam. This protects you from tests that may be somewhat more difficult than others. If there is a curve, I will make a specific announcement about it. Only individual tests are curved if necessary. There is no additional curve at the end of the semester.

Attendance

You are expected to attend all class sessions and to have completed the assigned reading. If you need to miss a class, you are responsible to find out what material was covered in class and any announcements that were made. We will typically cover the material on the syllabus for that date, but there may also be deviations from the schedule listed on the syllabus.

Honor Code and Plagiarism

You are expected to follow the Georgia Institute of Technology Honor Code at all times. As mentioned above, you are allowed to collaborate with your fellow classmates on the homework and studying for exams. However, exams are an individual endeavor and you may not consult any outside information sources (other students, textbooks, notes, etc.) except as noted on the exam. For any questions involving these or any other Academic Honor Code issues, please consult me or <http://www.honor.gatech.edu>.

Email Policy

Substantiative questions are best asked in person during my office hours and will typically not

be answered over email. However, you should feel free to email about clarifications and minor questions. I will do my best to answer your email within 48 hours (and hopefully sooner). It is your responsibility to ensure that you are regularly checking your email for class announcements. I will send class announcements through T-Square.

Special Accommodations

If you need any special accommodations to due to a physical or learning disability, please let me know during the first week of class. In order to receive the requested accommodations you will need to obtain a form from the Access Disabled Assistance Program for Tech Students (ADAPTS) and give me this form. The ADAPTS Office is located in the Smithgall Student Services Building, Suite 220 and the website is <http://www.adapts.gatech.edu/index.html>.

Also, if you will be missing any classes for religious holidays or other events, let me know as soon as you know you will be missing class. You will still be required to know the material from that class period.

Keys to Success

- Watching others solve analytical problems helps your performance on exams as much as watching gymnastics helps you become a better gymnast. Practice all of the analytical problems multiple times.
- Come to class having read the assigned sections of the textbook so that you can ask questions about the portions you do not understand.
- Come talk to me about any problems you are having with the material or the class.
- Take advantage of my office hours. We are here to help you learn and succeed in the class. Seeking help after you do poorly on an exam is a sub-optimal strategy since you'll need to catch up on the concepts as well as learn the new concepts that are built on the old ones.

Course Outline

- Probability
- Random Variables
- Special Distributions
- Estimation
- Hypothesis Testing
- The Normal Distribution
- Types of Data: A Brief Overview
- Causality
- Regression