Probability and Statistical Methods - Econ 6140[1]

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Course Time: MWF 12.05-12.55pm

Course website on T-Square

Office Hours: Monday 1-2pm

Wednesday 2-3pm

Course Overview[2]

This course is designed to give you an understanding of probability theory, descriptive statistics, statistical inference and basic regression. 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 advanced econometrics courses such as ECON 6160 and other quantitative methods courses.

In the first few weeks of the course we will cover a very large amount of material. Some of you likely have seen this material before so we will cover it quickly but a thorough understanding is important for you to succeed in the rest of the course.

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. Analyze cross-sectional data with statistical software
3. Draw statistical inference from point estimates of estimated parameters and interpret these estimates

Textbooks

For the first half of the semester we will be using the Miller and Miller textbook and therefore it is the only textbook you need to purchase now. When we get to regression we will be using the Wooldridge textbook. This is also the textbook you will use if you take ECON 6160.

You are welcome to purchase any edition of the textbooks that you like. I have only examined the 7th and 8th editions of the Miller and Miller book and the 4th and 5th editions of the Wooldridge book. There are not many differences between these two editions and often times older books are cheaper. All of the problem sets will reference problem numbers in the 8th and 5th editions respectively.

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[1]This is the preliminary version of the syllabus and may be changed during the semester to accommodate changes in the course.

[2]The 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.

Miller, I., and M. Miller (2012), *John E. Freund's Mathematical Statistics with Applications*, 8th ed., Upper Saddle River, NJ: Prentice Hall.

Wooldridge, J.M. (2013), *Introductory Econometrics: A Modern Approach*, 5th ed., Mason, OH: South-Western Cengage Learning.

Assignments

Problem Sets

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 future courses or the exams. You are encouraged to work through all of the exercises at the end of each chapter in Miller and Miller.

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.***

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.[3] If you wish to use another program to solve the problem sets you are more than welcome to do so.

You are responsible for learning how to use STATA (or your preferred statistical software package) on your own. I will occasionally do some demonstrations in class using STATA. 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`.

Data Analysis Portfolio

Probability and statistical theory, while useful and necessary to understand more advanced econometrics, has limited use without being able to apply that knowledge to situations that require analytical answers. In order to teach you to apply statistical theory you will create a data analysis portfolio throughout the semester.

You will be expected to obtain a data set that is of particular interest to you in order to learn how

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[3]For 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.

to explore quantitative data, depict it visually, and conduct basic analysis. During the semester you will be expected to clean the data, display meaningful information about it, and analyze it in different ways. This will be a semester-long project with intermediate deadlines for completing different tasks. At the end of the semester you will need to turn in a written report of the analysis you have conducted, your findings, useful graphical displays of the data, and the code you used to conduct your analysis. The interim assignments will coincide with the topics we are currently covering in class. These will typically be assigned with the analytical problem sets.

Exams

There will be three exams, spaced approximately equally across the term. Exams will consist mainly of analytical problems and proofs. 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 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 15% weight and the other will receive a 20% weight. This does not apply to the final exam. The final exam will be given 20% weight.

Grading

Your course grade will be based on five components:

Problem Sets	30%
Data Analysis Portfolio	15%
First Exam	15%
Second Exam	20%
Final Exam	20%

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 210 and the website is `http://www.adapts.gatech.edu`.

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

- Practice all of the analytical problems multiple times and find similar types of problems to help you study for the exam. Simply watching someone else solve the problems or following along is much less helpful.
- 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.
- Office hours are for you to use!