Econometrics I
Tepper School of Business

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Class Meetings: Section A1 Tuesday & Thursday 1:30pm - 3:20pm rm 147
mini 1: August 25 to October 8

COURSE DESCRIPTION

This course is an introduction to the basic questions, tools and techniques used in empirical social science research. Students will learn to calculate and perform correct inference on parameter estimates.

The course focuses on the multivariate linear model. Topics include: consistency and asymptotic normality of the parameter estimates, sampling distributions, hypothesis testing parameter restrictions and specification tests. Students will learn the impact of departures from traditional assumptions in the linear model (e.g. correlated errors, heteroscedastic errors, correlation between the regressors and the errors) and how to address these situations. Students are expected to be familiar with multivariate calculus, linear algebra, and basic probability and statistics.

Students will write MATLAB programs on problem sets.

GRADING

The students will be graded on three problem sets, some in-class quizzes and a final exam.

The course grade will be determine by: 50% problem sets and quizzes and 50% a final exam.

TEXTBOOKS

Some useful econometric books are

- Wooldridge, Jeffrey M., **Introductory Econometrics: A Modern Approach** 4^{th} , South-Western College Publishing, 2008, *An advanced undergraduate text, very nicely written.*
- Greene, William, **Econometric Analysis** 6^{th} edition, Prentice Hall, 2007. *First year graduate school book in econometrics. A nice bridge from an undergraduate econometrics course. Asymptotic theory in the appendix.*
- Davidson, Russell and James MacKinnon, **Econometric Theory and Methods**, Oxford University Press, 2003. *First year graduate school book in econometrics. Asymptotic theory in the text.*
- Hayashi, Fumio, **Econometrics**, Princeton University Press, 2000. *A fairly advanced first year graduate school book in Econometrics. Chapter 2 concerns asymptotic theory. This is the level most of you should obtain before qualifiers.*
- Gallant, A. Ronald, **An Introduction to Econometric Theory**, Princeton University Press, 1997. *An introductory book on measure theoretic probability and statistics. This can help you read some papers in economics and econometrics but will not help you run a regression.*

I will cite sections of the Davidson and MacKinnon book to complement the lectures.

THE GENERAL OUTLINE

- Weeks 1 and 2. Introduce the linear model. Alternative ways to interpret linear regression: Least squares, moment estimation, projection and maximum likelihood. Statistics for linear regression for iid normal errors. Sampling distributions and inference.

  D&M Chapters 1, 2, 3, 4 and 5.

- Week 3. Problems with regression. Introduction to the LLN and the CLT. Introduction to asymptotic theory. The delta method.

  D&M Sections: 4.5 and 5.6.

- Week 4 and 5. Linear regression when the errors are not iid. Generalized least squares. Heteroscedasticity and autocorrelation. Durbin-Watson test statistic. White standard errors.

  D&M Chapter 7.

- Week 6. Linear regression when the errors and the regressors are correlated. Instrumental variables (IV).

  D&M Chapter 8.

- Week 7. Introduction to maximum likelihood. Discrete dependent variables.

  D&M Chapters 10 and 11.