Description

This is the first course in our graduate econometric series and will focus on the basic theory and practice of estimating economic relationships. The emphasis will be on application of least squares procedures to single equation, multivariate relationships. Multiple equation models and other more advanced topics are taken up in our second econometrics course, ResEc 703. An understanding of statistics, linear algebra and multivariable calculus are prerequisites for this course.

Goals and Objectives

Our goal is to guide you as you develop an understanding of econometric theory and develop applied econometric. More broadly, we want you to develop key critical thinking skills that will serve you well in your future endeavors. We have a variety of activities planned for you to satisfy the following objectives in building your understanding of econometric theory and your applied econometric skills:

- Develop an understanding of the theory behind the methods used to estimate economic models.
- Develop an understanding of the important role economic data play in those estimation methods for economic models.
- Build an appreciation of the qualities these estimation methods possess and the assumptions that are required to determine these qualities (desirable properties).
- Understand problems that can arise that violate the required assumptions, how these problems really ruin the desirable properties, and how we can go about solving those problems.
- Practice! Gain experience estimating models and solving the problems that arise due to bad assumptions and data problems.

Texts

The course text is: Learning and Practicing Econometrics, by W. Griffiths, R. C. Hill and G. Judge (GHJ). I think the text is a good one for a first MS/PhD level econometrics course. I also recommend Kennedy’s A Guide to Econometrics, a very readable companion text. Basic Econometrics by Gujarati, also makes an excellent companion text. For PhD students, I’d recommend Econometric Analysis by W. Greene. The Greene text is used in our second course, ResEc 703. There are copies of my undergraduate course notes floating around, which you may find of value; I’ll also post a set on Moodle.

Prerequisites

You must be familiar with basic statistical concepts, linear algebra and multivariable calculus. The text by GHJ reviews the necessary basic statistical concepts in Chapters 2-4. You are responsible for that material. You should also be familiar with the basics of matrix algebra, which greatly simplifies presentation of the material. The basic matrix algebra concepts are covered in Appendix 3B in GHJ.

Examinations

There will be 2 mid-semester exams and a final exam; you can drop your low score. All exams are comprehensive. Mid-semester exams are tentatively scheduled for March 3 and April 21, 6:00 – 8:00 PM. Exams will comprise 60% of the final grade, with each exam carrying equal weight.

Problem Sets

There will be a number of problem sets and occasional short in-class writing assignments sprinkled through the semester that will comprise 15% of your grade. Form a team with one of your colleagues and submit problem sets
with your partner. Most problem sets will have theoretical and applied components. You will typically have one week to complete problem sets. **All essays on problem sets must be word-processed.** We really love seeing nicely word processed derivations submitted as part of your required problem sets, but that is not a good use of your time. Please just submit lovely hand written answers for the derivations on problem sets. We will grade these on a scale of 1-10. For the random in-class writing assignments, you’ll have about 5 minutes at the start of class!

**Project**

Your team will also complete a term project (25% of your grade). The project is to be an econometric application requiring that you gather data and estimate an econometric model. You can choose a topic of interest or you can contact us for ideas; we have a number of data sets that might be used. **Your complete paper is due on Friday, April 29.**

**Grading**

I anticipate the following boundaries for assigning final grades based on your course average. These boundaries are based on previous years: greater than 90 is A; 85 to 90 is A-; 80 to 85 is B+; 75 to 80 is B; 70 to 75 is B-; 65 to 70 is C+ and 60 to 65 is C.

**Computer Software**

This is an applied course and application of econometrics requires the use of computers. Knowledge of Windows and spreadsheets (Excel) are expected and will be part of the problem sets. However, most problem sets will require the use of a “professional” package such as SAS, Stata, etc. I will use SAS and Stata for in-class examples and problem set keys. You will be required to understand how to interpret SAS programs and SAS and Stata output. If there is interest, we can try to find lab space to run a few introductory sessions for SAS and/or Stata.

The outline on the following pages follows closely the text I chose and provides all prerequisites to our second course, ResEc 703. I reserve the right to change things around a bit with sufficient notice. I also plan to use the course management system Moodle. You’ll be able to find announcements, problem sets, keys, additional notes, etc. on Moodle.

**I. Introduction** – Developing econometric models.

GHJ: Chapter 1
Kennedy: Chapter 1

**II. The Simple Linear Model** – The two variable linear regression model is used to illustrate most concepts.

Basic Concepts and Estimation - Ordinary Least Squares.

GHJ: Chapter 5
Kennedy: Chapter 2 (and 3)

Classical Regression Model: Assumptions and properties of estimators.

GHJ: Chapter 6
Kennedy: Chapter 3 (and 2).

Confidence Intervals and Hypothesis Tests.

GHJ: Chapter 7

Goodness of Fit, Forecasting and Non-Linear Models.

GHJ: Chapter 7 and Chapter 8
III. **General Linear Statistical Model** – Multiple regression model.

Classical Regression Model, Ordinary Least Squares, Specification Bias and "Goodness of Fit"

- **GHJ**: Chapter 9
- **Kennedy**: Chapters 5-7

Inference in the General Linear Model: Hypothesis Tests and Analysis of Variance

- **GHJ**: Chapter 10
- **Kennedy**: Chapter 4

Estimation with Non-Sample (Prior) Information: Restricted Least Squares

- **GHJ**: Chapter 11
- **Kennedy**: Chapter 12

IV. **Extensions of the General Linear Model**

- Dummy Variables and Varying Coefficients
  - **GHJ**: Chapter 12
  - **Kennedy**: Chapter 14

- Multicollinearity
  - **GHJ**: Chapter 13
  - **Kennedy**: Chapter 11

- Unobservables, Measurement Error and Instrumental Variables Estimation
  - **GHJ**: Chapter 14
  - **Kennedy**: Chapter 9

V. **Linear Model with a Generalized Covariance Matrix**

- Heteroskedasticity
  - **GHJ**: Chapter 15
  - **Kennedy**: Chapter 8

- Autocorrelation
  - **GHJ**: Chapter 16
  - **Kennedy**: Chapter 8

VI. **Limited Dependent Variable Models**

- **GHJ**: Chapter 23
  - **Kennedy**: Chapter 15 (and Chapter 16)

VII. **Introduction to Simultaneous Equations**

- **GHJ**: Chapters 18 and 19