Resource Economics 312  
*Introductory Econometrics*  
Spring 2015

**Description**

The growing importance of information technologies and the increased availability of electronic data make data analysis tools very important in today’s job market. This is the third course in the Department of Resource Economics sequence of Statistics and Econometrics. This course will focus on expanding your data analysis tool kit to include regression analysis. The emphasis will be on regression analysis and problems encountered in estimating economic models. Basic statistics, algebra and some calculus are prerequisites for this course; you must have completed an introductory statistics course through simple regression and an introduction to multiple regression. We will rely on statistical concepts and algebra throughout the course. Application of calculus is limited to simple and partial differentiation.

**Goals and Objectives**

Our goal is to guide you as you develop valuable econometric skills that you can add to your skill set on your resume. Many of our graduates have gone on to apply econometrics in business and government to estimate or predict impacts of policy changes. Our alums used the tools they’ve learned to estimate how advertising and shelf-position in stores affects sales, the market potential of new drugs, enrollment rates at academic institutions, how costs affect firm pricing decisions, and the effects of EPA policies on consumer welfare to name a few applications. More broadly, we want you to develop key critical thinking skills that all employers seek in their applicants. When you read reports as part of your first job, you will understand what analysts did to generate their results and you will be prepared to think critically about the methods they used and whether they were appropriate.

We have a variety of materials ready for you to satisfy the following objectives in building your econometric skills:

- Develop an understanding the theory behind the methods you will use to estimate economic models of firm, consumer and government choices.
- Develop an understanding how economic data are used with those methods to estimate economic models.
- Build an appreciation of the qualities these estimation methods possess and the crucial assumptions that must be made to ensure the methods possess these qualities (we'll call them desirable properties).
- Understand how bad assumptions can really ruin those desirable properties and how we can go about solving the problems caused if the initial assumptions were bad.
- Take advantage of the opportunities for practice and experience using economic data and computer software so that you are comfortable applying proper procedures and solving problems that might arise.

You’ll feel well prepared and well-practiced by semester’s end and your term project will demonstrate that! As you read through these course requirements, you will note that there is a lot to do. Learning econometrics, like statistics, requires that you stay on-task. I want you to leave this course with skills that are highly valued and utilized in business and government decision-making and to do that requires regular active learning exercises in small doses that are reinforced during class. Econometrics, like statistics can be viewed as *discovery through data.*
Course Requirements

Texts: This is a transition year. The course text in prior years has been: Essentials of Econometrics, by Damodar Gujarati (GU), third edition. We are moving to a stronger text, Basic Econometrics (now in its 4th ed.), also by Gujarati (GU2). For each text, there are earlier editions online that are fine. The basic theory has not changed over time - there are some improved exercises in the texts and additional references, but I would buy the less expensive option. The Basic Econometrics volume is a much better resource; it covers additional econometric topics making it an excellent resource if you want to work in the field or if you want to take additional courses in econometrics. Copies of my course notes from previous years will be available.

OWL: There will be OWL Pre-Lecture assignments (5% of your grade) due by 2:00 PM the day of each lecture. OWL quizzes (15% of your grade) will be based on Pre-Lecture assignments, lectures, readings from the text and lab exercises. OWL quizzes will be posted about every week. You’ll have at least 5 days to complete each quiz and you will have two attempts on each question. One quiz score will be dropped in determining your quiz average.

Class Response System (CRS): We’ll use the iClicker system to encourage daily interaction in the class. The CRS grade will be 10% of your grade. Your two lowest scores will be dropped. We will start on January 22.

Labs: We will meet in the experimental economics lab in Room 308 Stockbridge to apply econometric methods to real data and test theory through experiments. Prior to those sessions, I’ll provide a 2-3 page handout explaining the plan and objective for the lab session. These exercises are designed to apply and extend the lecture material.

You must get to the lab on time - it is very disruptive to arrive late and catching up is at best difficult. Thanks in advance for your help! ☺

Course Project: Form a team with two other members of the class, and think about a project for the semester. You may encounter econometric analyses in your other courses. I have data sets posted on Moodle that I encourage you to use. If you don’t find an idea that strikes you quickly, talk with me and we’ll find a project for you. Begin your project immediately by reviewing the literature related to your topic. Synthesize the literature you read to help formulate an economic model. Once you have your model, you’ll then gather data, compile some descriptive statistics and estimate your econometric model. Mid-semester project installments are due: (1) February 13, a review of the literature on your topic, your model specification, and a description of the data you will use (10% of your grade); (2) April 3, build on your first prior installment including data organization and presentation, descriptive statistics, and your initial regression analysis with inference (10% of your grade). Throughout the semester, you should regularly apply methods/tools we cover in class to your project data. Your final project, a revision of your prior installments plus your final analysis, is due May 1 at 4:00 PM. Installment grades are based on the organization and quality of your work, your writing. I would really like to find time for in-class presentations of your term projects. Think of this project as a way to build your portfolio for prospective employers!

Examinations: There are two mid-semester exams and a final; all are comprehensive. Mid-semester exams are tentatively scheduled for February 25 and April 8. The final exam will be held during the final exam period. Exams will be held in the lab from 7:00 – 9:00 PM and require that you apply theory and methods from lectures and tools from labs to complete analyses and interpret the results. Exams will comprise 45% of your final grade; weights are 15% each.

Grading

Course grades combine course components according to the weights shown in the table. A final average of 91 and above is A, 88 to 91 is A-, 85 to 88 is B+, 82 to 85 is B, 78 to 82 is B-, 74 to 78 is C+, 70 to 74 is C, 66 to 70 is C-, 62 to 66 is D+ and 58 to 62 is D.

Computer Software

Applying statistics or econometrics requires the use of computers. I expect that you are proficient with Word and
Excel, which we regularly for exercises and assignments. We will also use the statistical packages Minitab and SAS. You will be required to demonstrate knowledge of Excel and Minitab or SAS on the exams. All machines in our computer lab (room 308) have Microsoft Office and Minitab on them. Most OIT PC labs also have Minitab and SAS, so no purchase is necessary. However, you can purchase a student version of Minitab at the Textbook Annex or University Store.

Attendance and Courtesy
You are responsible for everything announced, presented or discussed in class. The way to avoid any misunderstanding associated with this course is to attend class. We are all responsible for maintaining a classroom environment that is conducive to learning and discussion. To ensure that we all have the opportunity to gain from time spent in class, I propose these standards for creating a respectful learning environment.

- That the instructor and students notice and respect each other.
- Respect includes appropriate humor, enjoyment, or other indications of a comfortable and pleasant classroom community.
- We are on time for class: no late arrivals and no packing up early. I start promptly at 2:30 and will end class on time as well.
- We avoid disruptions during class such as private conversations, reading newspapers, use of a cell phone, using a laptop for something other than current classroom work, and, of course, sleeping.
- We avoid negative language that is considered racist, sexist, or homophobic or in other ways may exclude members of our campus and classroom community.
- Welcome to Introductory Econometrics, let's all enjoy the semester!

Course Outline
The outline on these pages is tentative. I reserve the right to change it as I see fit. I post my “inked slides” in Moodle following class.

References: GU, Essentials of Econometrics (third edition) by Damodar Gujarati. GU2, Basic Econometrics (now in its 4th ed.), also by Gujarati

I. Introduction: (Lecture 1)

GU: Chapter 1 – an overview of econometrics. Lecture Notes: Part I

II. Topics from Basic Statistics (Lecture 2)

Note: A review of basic stats is presented in GU Chapters 2 – 4.

Lecture Notes: Part II

III. Simple Regression ( Lectures 3 – 7)

Introduction - Basic Concepts and Ordinary Least Squares
Gu: Chapter 6
Gu2: Chapter 2 and Chapter 3 (pp. 52-59)
Classical Regression Model, Variances and Properties of Estimators
Gu2: Chapter 3 (59-74)
Confidence Intervals, Hypothesis Tests, "Goodness of Fit" and Forecasting
GU: Chapter 7: 178-188.
Gu2: Chapter 4 (pp. 101-107) Chapter 5 (pp. 115-136), pp. 785-790, pp. 74-85 and pp. 137-139
Reporting Results
GU: Chapter 7: pp. 189-190.
IV. Multiple Regression (Lectures 8 – 10)

Classical Regression Model, Ordinary Least Squares, Specification Bias and "Goodness of Fit"
GU: Chapter 8: pp. 208-218.
GU2: Chapter 7 (pp. 191-211 and pp. 231-235)
Hypothesis Tests and Analysis of Variance; Adjusted $R^2$
GU: Chapter 8: pp. 219-229.
GU2: Chapter 8

V. Extensions of Multiple Regression (Lecture 11 – 15)

Dummy Variables
GU: Chapter 10
GU2: Chapter 9

Functional Forms
GU: Chapter 9.
GU2: pp. 165-178; pp. 214-221

Scaling Variables
GU: Chapter 9.
GU2: pp. 161-165

VI. Problems and Specification Issues (Lectures 16 – 22)

Model Selection/Specification Issues
GU: Chapter 11
GU2: Chapter 13

Multicollinearity
GU: Chapter 12
GU2: Chapter 10

Heteroskedasticity
GU: Chapter 13
GU2: Chapter 11

Autocorrelation
GU: Chapter 14
GU2: Chapter 12

VII. Introducing Some Advanced Topics in Econometrics (Lectures 23 – 26)

Discrete Choice Models and Selected Topics
GU: Chapter 16 and additional course notes.
GU2: Chapters 15 and 17

Simultaneous Equation Models
GU: Chapter 15
GU2: Chapters 18 – 20

Lecture Notes: Part IV, Sections A - G
Lecture Notes: Part IV, Sections H & I
Lecture Notes: Part V, Section A
Lecture Notes: Part V, Section C
Lecture Notes: Part V, Section B
Lecture Notes: Part VI, Section A
Lecture Notes: Part VI, Section B
Lecture Notes: Part VI, Section C