47-811 Econometrics I

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147 on most days
227 on Sep-6, Sep.13, Oct-4

Lectures: TuTh 1:30-3:20, Tepper 147
Website: http://cmu.edu/blackboard

Objectives. Course serves as an introduction to statistical analysis of economic data, and concentrates on multivariate linear regression model in matrix form, with a brief introduction to binary choice models. Students will learn to derive and analyze the estimates, test hypotheses, recognize violations of model assumptions (most notably endogeneity and serial correlation), understand and their consequences, and use appropriate estimation techniques to mitigate these violations.

Prerequisites. There are no formal prerequisites, but course assumes that students are familiar with Probability theory and Statistics, Linear Algebra and Real Analysis. If you it was a while since you uses these, there are reference links on Blackboard.

Textbook. Main text is "Econometric Theory and Methods" by Davidson & MacKinnon. It presents material at the level expected from you at exams and qualifiers, and its notation will be used in the lectures. Still, it assumes that reader is well-prepared, so if you need more help with material, consider buying "Econometric Analysis" by Greene -- it serves to "bridge the gap" between undergraduate and PhD-level textbooks.

Software. Homework solutions will use MATLAB. You are free to use other programming languages or statistical packages (gretl, R, C, Fortran), but you will still be responsible for producing the same numerical results. You are not allowed to use Excel, and it will become increasingly hard to do so anyway.

Lecture notes. Slides used in class will be posted on the Blackboard by 5pm before the day of class. They will not replace attending lectures as many details will be derived on in class, using the white-board.
**Homework.** Both proving theoretical results and analyzing data and are practical skills, so doing problem sets is the best way to understand the material. There will be 3-4 problem sets, and lowest-scoring one will not affect your grade.

You can work in teams of up to three people. If you do, submit a single solution but write down the names of all the team members. You can switch teams or choose to work alone.

**Communication.** In addition to office hours, you can request a meeting time by e-mail. Professor will respond to the e-mail questions within 24 hours, or 36 hours if the e-mail was sent on a weekend. Phone communication should be kept to a minimum.

**Final exam** will be scheduled during the final week. We can discuss the details in class.

**Grading.** 60% of the grade will determined by the problem set scores (excluding the lowest one, as described above) and 40% - by the take-home final.

**Copyright.** You are not allowed to make audio or video recordings of the class without instructor’s permission. You are not allowed to share course materials with people outside this course, though any means (including internet).

**Integrity.** You are bound by the University’s academic integrity rules. Which means you write your name on the work of others (including your classmates) without naming them. General rule is: when in doubt, cite your source.

**Acknowledgements.** Part of the course materials were graciously provided by Fallaw Sowell who taught this course in previous years.
**Topics**

The tentative list of topics and class dates is below. It is subject to change depending on pace of the class. Our textbooks are designed for year-long courses, we will be covering selected sections which will be posted on the Blackboard as we approach each topic.

Week 1 (Aug.27-30): Multivariate OLS: estimate and interpretations
   - DmK chapters 1-2.
   - Greene(6th ed.) chapters 2-3

Week 2 (Sep.3-6): Inference: Hypothesis testing and confidence intervals.
   - DmK chapter 4, section 5.2
   - Greene(6th ed.) section 4.7, chapter 5

Week 3 (Sep.10-13): Assumptions and properties of OLS estimator
   - DmK chapter 3
   - Greene(6th ed.) chapter 4

Week 4 (Sep.17-20): Endogeneity and instrumental variables
   - DmK chapter 8
   - Greene(6th ed.) chapters 12-13

Weeks 5-6 (Sep.24-Oct.4). Applications of Generalized Least Squares (GLS):
   - DmK chapter 7
   - Greene(6th ed.) chapters 8, 9, 19

Week 7 (Oct.8-13) Examples of Maximum Likelyhood:
   - Binary Choice and Censored Data models.
   - DmK chapters 10, 11
   - Greene(6th ed.) chapters 16, 23, 24

More specific reading lists will be provided in lecture notes and on Blackboard.
Greene likes to reshuffle the chapters in each new edition, so references are provided for 6th edition, and might not work in other editions.

For those continuing with the sequence, Econometrics II course will move beyond the linear model and cover more general estimation methods, most notably Generalized Method of Moments (GMM) and general form of Maximum Likelyhood model.