Stanford University
Department of Economics
Economics 102C: Advanced Topics in Econometrics (Spring 2015)
Monday & Wednesday 11:00 – 12:50, Room 300-300

Dr. Michael Best
Email: mbest@stanford.edu
Office Hours: Monday 9:15-10:45 in SIEPR 222

Purpose & Requirement:

- This course covers selected advanced topics in econometrics, both theoretically and in applications. The applications will include the study of the effects of economic policies on economic outcomes (e.g. tax rates on earnings, social security payments on unemployment duration) and the effects of human capital and demographic variables on earnings and other labor market outcomes (e.g. experience and tenure on earnings, ethnicity and gender on unemployment duration). The focus will be on microeconometric data.
- Econ 102B is a prerequisite. If you have not mastered the topics covered in 102B, you will have difficulties taking this class.

Evaluation:

- 4 problem sets (20%)
- Mid-term exam (30%)
- Final exam (50%)

Problem sets will usually include:

- A theoretical section, with questions on economics and econometrics, and;
- An applied section, with questions on the results drawn from relevant papers in the empirical literature, and/or hands-on exercises with real data. The software we will use is Stata.

Problem sets are due at the beginning of class on the due date. Late work will not count for course credit and will not be graded. It will get a grade of zero. No exceptions.

Textbooks:

There is no required textbook for this course. You can use the textbook from Econ 102B for refreshing your knowledge of intermediate econometrics concepts. However, the following texts may be useful

- General econometrics texts
  - Jeffrey M. Wooldridge, "*Introductory Econometrics: A Modern Approach*", 5th edition, 2012, Cengage Learning

- Joshua Angrist & Jörn-Steffen Pischke, "*Mostly Harmless Econometrics: An Empiricist's Companion"*, 2009, Princeton University Press
- Advanced references
  - Jeffrey M. Wooldridge, "*Econometric Analysis of Cross-Section and Panel Data"* 2nd edition, 2010, MIT Press
  - William H. Greene, "*Econometric Analysis"* 6th or 7th edition, Prentice Hall
- Stata
  - Christopher F. Baum, "*An introduction to Modern Econometrics Using Stata*", 2006, Stata Press
  - A. Colin Cameron & Pravin K. Trivedi "*Microeconometrics Using Stata"*, 2010, Stata Press [advanced]

All lecture notes, as well as problem sets and relevant articles will be available on my website. Other material will be distributed in class.

COURSE OUTLINE

(Note that some topics may be expanded or reduced)

1. Overview of the course. Logistics and administrative issues

2. Tooling up: The basics
   a. The evaluation problem. Why do we do (micro)econometrics?
   b. Matrices: Summarize all your data with a letter!
   c. Matrix operations
   d. Matrix algebra
   e. Matrix calculus
   f. Statistics and matrix algebra, some useful distributional results

3. Ordinary Least Squares (OLS): A faithful friend
   a. OLS with matrix algebra
   b. The Gauss-Markov Theorem
   c. Inference in the OLS model

4. Instrumental Variables (IV): econometric sleight of hand
   a. Why use IV, why can't I just use OLS? Identification, measurement error, and simultaneity.
   b. Inference with IV: How does a good instrument solve the problem?
   c. Problems with IV (1): What makes a good instrument? Overidentification and overidentifying restrictions: Testing whether your instruments are good.
   d. Problems with IV (2): What are you estimating? Local Average Treatment Effects (LATE)
   e. Applications

5. Panel Data: Getting the most out of data tracking outcomes for many people over time
    a. Pooling cross-sectional and time-series data
    b. Fixed effects
    c. Random effects
    d. Dynamic models (if we have time)
    e. Natural experiments and difference-in-difference estimators.
    f. Applications

6. Qualitative Responses and Limited Dependent Variables: What if the outcome we're studying is a category (e.g. work vs don't work), not a number (e.g. hours worked)?
    a. Linear probability models
    b. Random utility and index function
    c. Maximum likelihood estimation
    d. Probit and logit estimation
    e. Truncated and censored distributions
    f. Tobit estimation
    g. Applications

7. Regression Discontinuity Designs (RDD): Using thresholds to estimate causal effects without structural/parametric assumptions. (if we have time)
    a. Sharp RDD: Jumps at a threshold identify causal effects without assuming anything
    b. Estimating jumps at thresholds: Maybe we do need functional form assumptions
    c. Gaming the threshold: Testing identifying assumptions
    d. What have we estimated? LATE again
    e. Fuzzy RDD
    f. Applications