Syllabus for E604
Econometrics
Winter 2017

Course: Econometrics

Lecture: Tuesdays 3:00pm - 5:50pm

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TA Sessions:	

Prerequisites: E603, or knowledge of matrix algebra, basic optimization, basic probability theory, and basic statistical theory, access to statistical software (like Stata) and computational software (like Matlab)

Required Text 1: *Econometric Analysis, Seventh Edition (Sixth edition is fine- Syllabus follows seventh edition.)*, Greene.

Required Text 2: *Identification Problems in the Social Sciences*, Charles F. Manski

Extra Recommended Text: *Mostly Harmless Econometrics*, Angrist and Pischke.

Textbooks info: Greene and Manski are required. For anyone who has an interest in doing empirical work, I would highly recommend picking up a copy of Mostly Harmless as well.

I will recommend portions to read as we go through the course. I will also be assigning readings out of a draft book by Peter Reiss. I will assign these in the same spirit as Angrist and Pischke- if you have an interest in doing empirical work, you should read them.

Referencing other texts can be useful. Here are some recommendations: *Econometric Analysis of Cross Sectional and Panel Data*, Wooldridge; *A Course in Econometrics*, Goldberger ; *Econometrics*, Hansen (It is free online from Bruce Hansen's website.), *Econometrics*, Hayashi.

Material to be Covered: We will cover the basics of identification and inference for estimation of models from economics, finance, marketing, and other management disciplines. We will also work on understanding empirical research as practiced in the profession.

Homework: There will be three problem sets as well as casual "exercises." You don't have to turn in exercises, though you should do them. You should confer and work with other class members, but please write up your own assignment and carry out all the derivations or computations yourself. It is more important that you do these problem sets correctly than that you turn them in on time. If anything is incorrect on a problem set, you should correct it and turn it back in again.

Exams: There will be a take home midterm and a take home final. Do the take home exams on your own. If there are mistakes on the midterm, you should correct them and turn it back in.

Grading: Max of the two columns.

Problem Sets	40%	40%
Midterm	30%	0%
Final Exam	30%	60%

Lecture 1: (Half week 1/10) Review of probability, data quality issues, purpose of empirical work, non-parametric estimation of density function, conditional predictions, neural nets, regression trees, random forest, linear model, estimation by least squares, inference, missing outcomes

Read: Griliches, "Economic Data Issues," Handbook of Econometrics, Volume 3, 1986, Pages 1465-1514

Reiss, "1: Overview", "2: Data", "3: Structure", "5. Non-parametric Methods"
Manski Introduction, Chapter 1
Greene 12.4, Chapter 1
Angrist and Pischke: Chapter 1

Lecture 2: (Two weeks 1/10, 1/17, 1/24) More on linear model, basic assumptions, regression algebra, estimation by maximum likelihood, estimation by method of moments, finite sample and asymptotic properties of estimators, classical measurement error, mechanics of the bootstrap

Read: Greene Chapters 2-6
Reiss, "4: Identification", "7. Linear Regressions"
Angrist and Pischke, Chapter 2, 3.1-3.2

Problem Set 1 Due Friday 1/20 by noon.

Lecture 3: (Half week 1/24) Heteroscedasticity, autocorrelation, generalized linear model, FGLS, White estimator, Newey-West estimator

Read: Greene Chapter 9 (Ignore sections about instrumental variables)

Lecture 4: (Two weeks 1/31 and 2/7) Endogoneity and simultaneity issues, linear supply and demand system, instrumental variables, 2SLS, empirical identification, credibility of instruments

Read: Manski Chapters 2, 6
Greene Chapters 8.1-8.5, 8.7-8.9, 10
Reiss "10: Endogoneity"
Angrist and Pischke, Chapter 4

Problem Set 2 Due Friday 2/3 by noon

Lecture 5: (One week 2/14) Panel data, fixed effects, least squares dummy variables, first differences, within and between variation, random effects, clustered standard errors

Read: Greene 11.1-11.5
Angrist and Pischke, Chapters 5 and 8

Take Home Midterm Due Monday 2/13 by Noon

Lecture 6: (Two weeks 2/21-2/28) Extremum estimation, maximum likelihood, likelihood ratio test, Wald test, Lagrange multiplier test, More on method of moments, optimal weighting matrix, GMM, optimal choice of instruments, over-identifying tests, numerical approximations to integral and derivative

Read: Greene Chapters 13 and 14.1-14.6
Whitney K. Newey, Daniel McFadden, Chapter 36 Large sample estimation and hypothesis testing, Handbook of Econometrics, 1994: Parts 1-5
"Bias in Cable News: Persuasion and Polarization" Martin and Yurukoglu

Problem Set 3 Due Friday 2/24 by Noon

Lecture 8: (One week 3/7) Discrete dependent variables, logit, probit, ordered probit. Sample selection models.

Read: Greene 11.11.1, 14.10, 15.7,17.1-17.3, 18.1-18.3, 19.5.1-19.5.2
Manski Chapters 4 and 5
Estimating Discrete-Choice Models of Product Differentiation, Steven T. Berry, The RAND Journal of Economics, Vol. 25, No. 2 (Summer, 1994), pp. 242-262

Lecture 9: (One week 3/14) Non-parametrics: Sieve Estimation and Neural Networks

Read: "Nonparametric Sieve Regression: Least Squares, Averaging Least Squares, and Cross-Validation" Hansen

Take Home Final Exam Due Tuesday 3/20 by Noon