

Econ 628
Econometrics I
Professor Tim Halliday
Class Time: MW 2:30-4:00
Office Hours: Friday 1:00-2:30

Course Description:

This is the first part of the graduate econometrics sequence at UHM. The course will be divided into two parts. The first will focus on probability theory. The emphasis of this part will be to lay down the mathematical foundations that you will need to understand the theory and practice of modern econometrics. Topics will include set theory, probabilities, random variables, distributions, expectations, asymptotic theory, inference and testing. The second part will provide an introduction to the linear regression model. Topics will include conditional expectations, Ordinary Least Squares (OLS), heteroskedasticity, measurement error, endogeneity, Instrumental Variables (IV), 2-Stage Least Squares (2SLS), specification tests, simultaneous equations and panel data. Emphasis will be placed on the finite and large sample properties of the estimators discussed.

Texts:

Hogg, R., McKean, J.W. and Craig, A. 1995. *Introduction to Mathematical Statistics*, 6th Edition, Prentice Hall

Wooldridge, J.M. 2002. *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

Both texts are required.

Course Requirements:

The requirements of this course are six problem sets, a midterm exam and a final exam. Your grade will be determined by the following formula:

Problem Sets	-	1/3
Midterm + Final	-	2/3

The highest score among the midterm and final will be weighted 2/3 and the lowest will be weighted 1/3.

Outline (Tentative):

Probability (HMC: Ch. 1)

Set Theory; Properties of Probabilities; Conditional Probability; Independence, Random Variables; Expectations

Distributions (HMC: Ch. 2 and 3)

Multivariate Distributions; Transformations; Conditional Distributions; Independence; Specific Distributions (Binomial, Poisson, Gamma, Normal, Chi Squared, t, F)

Asymptotic Theory (HMC: Ch. 4 and W: Ch. 3)

Definitions of Convergence, Central Limit Theorem, Delta Method, Consistency, Stochastic Rates of Convergence

Inference (HMC: Ch. 5)

Statistics, Order Statistics, Quantiles, Unbiasedness, Confidence Intervals, Hypothesis Testing

Maximum Likelihood (MLE) (HMC: Ch. 6)

Definition of MLE, Cramer-Rao Lower Bound, Efficiency, Numerical Algorithms (Newton-Raphson, EM)

Testing (HMC: Ch. 8)

Most Powerful Tests, Uniformly Most Powerful Tests, Neyman Pearson Theorem, Likelihood Ratio Tests

Linear Regression (HMC: Ch. 9, W: Ch. 2, Ch. 4 and Ch. 6)

Geometric Interpretation, Conditional Expectation, Linear Projection, OLS, Gauss Markov Theorem, Asymptotic Properties of OLS, Heteroskedasticity, Omitted Variables Bias, Measurement Error, Generated Regressors, Clustering

Instrumental Variables (W: Ch. 5 and Ch. 6)

Reasons for Using IV (Measurement Error, Omitted Variables, Simultaneity), Definition of IV, 2SLS, Asymptotic Properties, Pitfalls of IV, Specification Tests, Generalized Method of Moments (GMM)

Panel Data (W: Ch. 7 and Ch. 10)

Motivation, Random Effects, Fixed Effects, Hausman Tests, Generalized Least Squares, Strict Exogeneity, Predeterminedness, GMM Estimation of Panel Data Models, Dynamic Models

