**PPHA42000**
**Steven N. Durlauf**
**Fall 2025**

# Public Policy 42000: Applied Econometrics I

This course is the first in a three part doctoral-level introduction to econometrics. This course explores the nature of statistical models of socioeconomic data with a primary focus on linear systems. The course is concerned with the construction and interpretation of models, not estimation.

Peizan Sheng, peizan@uchicago.edu, is the Teaching Assistant.

**Lectures:**

In-person lectures will be given on Mondays 5:00-7:50 pm.

**TA sessions**: Fridays 1:30 - 2:30 PM, 2112 Keller.

**Readings**: The course is based on lecture notes. William Greene *Econometrics* is a good compendium of econometric results. Robert Ash and Melvin Gardner, *Topics in Stochastic Processes*, is a deep discussion of the underlying mathematics for many of topics of this course. Other readings will involve scholarly articles.

**Grading**: Grades are homework assignments, a midterm exam, and a final exam. The weights are as follows: Final 50% Homework 30% Midterm 20%.

**Homework** There will be 8 homework assignments. The assignments will be due 10/5, 10/12, 10/19, 10/26, 11/3, 11/10, 11/17, 12/05. All assignments will receive equal weight. Assignments should be submitted on-line on Canvas and are due at 23:59 pm on due dates. No late assignments will be accepted.

**Exams:** Midterm: November 3 5:00-6:20. (Regular Lecture will follow)**;** Final: December 8 5-7pm Keller 2112.

**Office Hours**

**Professor**: Mondays 4:00-5:00 pm Central Time, 3035 Keller

**TAs:** Thursdays 6:00 - 7:00 PM, 2054 Keller.

## Topics

### Topic 1: Probability Theory

Lecture Notes 1: Probability Theory

Ash and Gardner, Chapter 3

Greene, Appendix B.1-B.6

### Topic 2: Statistical Decision Theory

Lecture Notes 2: Decisions and Data

Greene, Sections 16.1-16.2

Brock, W., S. Durlauf, And K. West. 2003. "Policy Analysis in Uncertain Economic Environments (with discussion)." *Brookings Papers on Economic Activity* 1: 235-322.

Draper, D. 1995. "Assessment and Propagation of Model Uncertainty." *Journal of the Royal Statistical Society series B 57*: 45-97.

Gustafson, P. and B. Clarke. 2004. "Decomposing Posterior Variance." *Journal of Statistical Planning and Inference* 119: 311-327.

Marschak, J. 1953. "Economic Measurements for Policy and Prediction." *Studies in Econometric Method.* W. Hood and T. Koopmans, ed. New Haven: Yale University Press.

Sims, C. 1982. "Policy Evaluation with Econometric Models (with discussion)." *Brookings Papers on Economic Activity* 1: 107-164.

### Topic 3: Models and Identification

Lecture Notes 3: Identification

Gustafson, P. 2005. "On Model Expansion, Model Contraction, Identifiability and Prior Information: Two Illustrative Examples Involving Mismeasured Variables." *Statistical Science* 20: 111-140.

Heckman, J. 2000. "Causal Parameters and Policy Analysis in Economics: A Twentieth Century Perspective." *Quarterly Journal of Economics* 115: 45-97.

Koopmans, T. 1949. “Identification Problems in Economic Model Construction.” *Econometrica* 17: 125-144.

Lewbel, A. 2019. “The Identification Zoo: Meanings of Identification in Econometrics.” *Journal of Economic Literature* 57: 835-903.

**Topic 4: Linear System Theory**

Lecture Notes 4: Linear System Theory

Greene, Appendix A.1-A.4

**Topic 5: Linear Statistical Models/Regression**

Lecture Notes 5: Linear Regression

Greene, Chapters 2, 3

Buja, A., L. Brown, R. Berk, E. George, E. Pitkin, M. Traskin, K. Zhang, and L. Zhao. 2019. “Models as Approximations I: Consequences Illustrated with Linear Regression.” *Statistical Science* 34: 523-544.

White, H. 1980. “Using Least Squares to Approximate Unknown Regression Functions.” *International Economic Review* 21: 149-170.

**Topic 6: Time Series**

Lecture Notes 6: Linear Time Series Analysis

Lecture Notes 7: Frequency Domain Approach to Time Series

Lecture Notes 8: Trends

Ash and Gardner, Chapters 1-3.

Greene, Chapters 20-21.

Engle, R. and C. Granger. 1987. “Co-Integration and Error Correction: Representation, Estimation and Testing.” *Econometrica* 55: 251-276.

Granger, C. and P. Newbold. 1974. “Spurious Regressions in Econometrics.” *Journal of Econometrics* 2: 111-120.

Hansen, L. and T. Sargent. 1981. “A Note on Wiener-Kolmogorov Prediction Formulas for Rational Expectations Models.” *Economics Letters* 8: 255-260.

Phillips, P. 1986. “Understanding Spurious Regressions in Econometrics.” *Journal of Econometrics* 33: 311-340.

Sims, C. 1980. “Macroeconomics and Reality.” *Econometrica* 48: 1-48.

**Topic 7. Deep Roots**

Lecture Notes 9: Deep Roots

Bisin, A. and A. Moro. 2021. “LATE for History.” *Handbook of Historical Economics*. A. Bisin and G. Federico, eds. volume 1. London: Academic Press.

Durlauf, S. 2023. “The Journey of Humanity by Oded Galor: A Review Essay.” *Population and Development Review* 49: 403-421.

Durlauf, S. 2024. “*How the World Became Rich* by Mark Koyama and Jared Rubin and *Slouching Towards Utopia*, by J. Bradford DeLong: A Review Essay.” *Journal of Economic Literature*, forthcoming.

Heckman, J. and B. Singer. “Abducting Economics.” *American Economic Review* 107: 298-302.

Katz, Rebecca, and Burton Singer. 2007. “Can an Attribution Assessment Be Made for Yellow Rain?” *Politics and the Life Sciences* 26: 24-42.

Kelly, M. 2019. “Understanding Persistence.” Working Paper.

Voth, H.-J. 2021. “Persistence-Myth and Mystery.” *Handbook of Historical Economics*. A. Bisin and G. Federico, eds. volume 1. London: Academic Press.

**Topic 8. Markov Chains**

Bartholomew, D. 1973. Stochastic Processes for Social Processes, second edition. New York: John Wiley, chapters 1-2.

Butaeva, K., L. Chen, S. Durlauf, and A. Park, 2025. “A Tale of Two Transitions: Mobility Dynamics in China and Russia after Central Planning,” Working Paper.

Durlauf, S., G. Kim, D. Lee, and X. Song. 2025. “The Evolution of Black-White Differences in Occupational Mobility Across Post-Civil War America” Working Paper.

Song, X. 2021. "Multigenerational Social Mobility: A Demographic Approach." *Sociological Methodology* 1: 1-43.

## Topic 9. Functional Data Analysis

Lecture Notes 11: Functional Data Analysis

Chang, Y., S. Durlauf, S. Lee, and J. Park. 2023. "A Trajectories-Based Approach to Measuring Intergenerational Mobility." Mimeo.

Morris, J. 2015. "Functional Regression." *Annual Review of Statistics and Its Application* 2015 2: 321-359.

Wang, J.-L. J.-M. Chiou, and H.-G. Müller. 2016. "Functional Data Analysis. *Annual Review of Statistics and Its Application* 3: 257-295.

## Topic 10. Simultaneous Equation Systems, Instrumental Variables

Lecture Notes 10: Linear Simultaneous Equations Systems

Greene, Sections 8.4, 10.4.

Angrist, J. and A. Krueger. 2001. "Instrumental Variables and the Search for Identification" From Supply and Demand to Natural Experiments." *Journal of Economic Perspectives* 15: 69-85.

Blume, L., W. Brock, S. Durlauf, and R. Jayaraman. 2015. "Linear Social Interactions Models." *Journal of Political Economy* 123: 444-496.

Imbens, G. 2014. "Instrumental Variables: An Econometrician's Perspective." *Statistical Science* 29: 323-358.

## Topic 11. Functional Data Analysis

Lecture Notes 11: Functional Data Analysis

Chang, Y., S. Durlauf, S. Lee, and J. Park. 2023. "A Trajectories-Based Approach to Measuring Intergenerational Mobility." Mimeo.

Morris, J. 2015. "Functional Regression." *Annual Review of Statistics and Its Application* 2015 2: 321-359.

Wang, J.-L. J.-M. Chiou, and H.-G. Müller. 2016. “Functional Data Analysis. *Annual Review of Statistics and Its Application* 3: 257-295.