**PPHA42000**

**Steven N. Durlauf**

**Fall 2021**

**Public Policy 42000: Applied Econometrics I**

This course is the first in a three part doctoral introduction to econometrics. The focus of this course is 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. At the same time, the teaching assistants will teach the software package Stata and there will be homework assignments involving actual estimation.

**Lectures:**

In-person lectures will be given Tuesdays and Thursdays 2:40-4:00 in Keller Center 0001

**TA sessions**:

Sections will be held 4:00pm-5:00pm Central Time, room TBD

**Readings**: The course is largely based on lecture notes. William Greene *Econometrics* is assigned as a required text as it 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 determined based on homework assignments (30%), a midterm exam (20%), and a final exam (50%).

There will be 6 homework assignments. The assignments will be due 10/10, 10/17, 10/24, 10/31, 11/14, 11/21.

**Homework**: Assignments should be submitted on-line on Canvas and are due at 23:59 pm (CT) on Sundays. No late assignments will be accepted.

**Exams**

* **Midterm:** November 2
* **Final**: December (exact date TBD)

**Office Hours**

* **Professor** (3035 Keller): Wednesdays 2:00pm-3:00pm Central Time
* **TAs** (Rooms TBD):
  + **Goya Razavi:** Tuesdays 10:30am-11:30am Central Time
  + **Steve Kim:** Thursdays 1:00pm-2:00pm Central Tim

**Topics**

**Topic 1: Probability Theory**

Lecture Notes 1: Probability Theory

Ash and Gardner, Chapter 3

Greene, Appendix B.1-B.6

**Topic 2: Data and Decisions**

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.](http://home.uchicago.edu/sdurlauf/includes/pdf/Model%20uncertainty%20and%20policy%20evaluation%20-%20Some%20theory%20and%20empirics.pdf)

[Gustafson, P. and B. Clarke. 2004. “Decomposing Posterior Variance.” *Journal of Statistical Planning and Inference* 119: 311-327](https://www.sciencedirect.com/science/article/abs/pii/S0378375802004913?via%3Dihub).

[Heckman, J. and B. Singer. “Abducting Economics.” *American Economic Review* 107: 298-302](https://www.aeaweb.org/articles?id=10.1257/aer.p20171118).

[Katz, R., and B. Singer. 2007. “Can an Attribution Assessment Be Made for Yellow Rain?” *Politics and the Life Sciences* 26: 24-42.](https://pubmed.ncbi.nlm.nih.gov/18208344/)

[Lindley, D. 2000. “The Philosophy of Statistics.” *Journal of the Royal Statistical Society, Series* D 49: 293-337.](https://rss.onlinelibrary.wiley.com/doi/10.1111/1467-9884.00238)

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.](https://www.brookings.edu/wp-content/uploads/1982/01/1982a_bpea_sims_goldfeld_sachs.pdf)

**Topic 3: Models, Identification, Causality**

Lecture Notes 3: Identification

Ashworth, S., C. Berry, and E. Bueno de Mesquita. 2015. “[All Else Equal in Theory and Data (Big or Small)](http://home.uchicago.edu/~sashwort/bigdata.pdf), PS: Political Science & Politics 48: 89-94.

[Freedman, D. “Statistical Models and Shoe Leather.” *Sociological Methodology* 21: 291-313.](https://www.jstor.org/stable/270939)

[Heckman, J. 2000. “Causal Parameters and Policy Analysis in Economics: A Twentieth Century Perspective.” *Quarterly Journal of Economics* 115: 45-97.](https://www.jstor.org/stable/2586935)

[Hoover, K. 2012. “Economic Theory and Causal Inference.” *Philosophy of Economics*. U. Mäki ed. Amsterdam: North Holland](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=930741)

Lewbel, A. 2019. “[The Identification Zoo: Meanings of Identification in Econometrics](https://ideas.repec.org/a/aea/jeclit/v57y2019i4p835-903.html).” [Journal of Economic Literature](https://ideas.repec.org/s/aea/jeclit.html) 57: 835-903.

[Marini, M. and B. Singer. 1988. “Causality in the Social Sciences.” *Sociological Methodology* 18: 347-409.](https://www.jstor.org/stable/271053)

**Topic 4: Linear System Theory**

Lecture Notes 4: Linear System Theory

Greene, Appendix A.1-A.4

**Topic 5: Linear Statistical Models**

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.](https://arxiv.org/abs/1404.1578)

[Manski, C. 1991. “Regression.” *Journal of Economic Literature* 29: 34-50.](https://www.jstor.org/stable/2727353)

[White, H. 1980. “Using Least Squares to Approximate Unknown Regression Functions.” *International Economic Review* 21: 149-170.](https://www.jstor.org/stable/2526245)

**Topic 6: Time Series**

Lecture Notes 6: Linear Structure of Time Series

Lecture Notes 7: Frequency Domain Approach to Time Series

Lecture Notes 8: Vector Autoregressions

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.](https://www.jstor.org/stable/1913236)

[Granger, C. and P. Newbold. 1974. “Spurious Regressions in Econometrics.” *Journal of Econometrics* 2: 111-120.](https://www.sciencedirect.com/science/article/abs/pii/0304407674900347)

[Hansen, L. and T. Sargent. 1981. “A Note on Wiener-Kolmogorov Prediction Formulas for Rational Expectations Models.” *Economics Letters* 8: 255-260.](https://www.sciencedirect.com/science/article/abs/pii/0165176581900756)

[Phillips, P. 1986. “Understanding Spurious Regressions in Econometrics.” *Journal of Econometrics* 33: 311-340.](https://www.sciencedirect.com/science/article/abs/pii/0304407686900011)

[Sims, C. 1980. “Macroeconomics and Reality.” *Econometrica* 48: 1-48.](https://www.jstor.org/stable/1912017)

**Topic 7. Simultaneous Systems and Endogeneity**

Lecture Notes 9: Linear Simultaneous Equations Systems

Lectures Notes 10: Thinking about Instrumental Variables

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.](https://www.aeaweb.org/articles?id=10.1257/jep.15.4.69)

[Bisin, A. and A. Moro. 2021. “LATE for History.” *Handbook of Historical Economics*. Alberto Bisin and Giovanni Federico, eds. Amsterdam: North Holland.](https://www.nber.org/papers/w28113)

[Blume, L., W. Brock, S. Durlauf, and R. Jayaraman. 2015. “Linear Social Interactions Models.” *Journal of Political Economy* 123: 444-496.](https://www.jstor.org/stable/10.1086/679496)

[Brock, W. and S. Durlauf. 2001. “Growth Empirics and Reality.” *World Bank Economic Review* 15: 229-272.](https://www.jstor.org/stable/3990263)

[Imbens, G. 2014. “Instrumental Variables: An Econometrician’s Perspective.” *Statistical Science* 29: 323-358.](https://www.jstor.org/stable/43288511)

[Matzkin, R. 2013. “Nonparametric Identification in Structural Economic Models.” *Annual Review of Economics* 5: 457-486.](https://www.annualreviews.org/doi/10.1146/annurev-economics-082912-110231)

[Manski, C. 1989. “Anatomy of the Selection Problem.” *Journal of Human Resources* 24: 343-360.](https://www.jstor.org/stable/145818)