

# EKT 816: Econometrics

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## Course Description

This is a graduate course in econometrics. Our goal is to learn some basic techniques that economists use to (try to) establish causal claims. At a higher level, you will also need to learn how to assemble such claims together so as to build a coherent argument, but you have a little longer to learn how to do that.

## Required Texts

## Class Schedule

Please read at least the prescribed readings before class, even if you find it hard to follow everything. It will become easier with practice.

### Week 01, 02/04 - 02/08: Probability and Statistics Review

Distributions, expectations, quantiles. Laws of large numbers and the central limit theorem. Estimation: mean square error vs bias. Sufficient and ancillary statistics.

### Week 02, 02/11 - 02/15: Probability and Statistics Review (continued)

Consistency and precision in estimation. Weighting and sample design. Identification. Hypothesis testing: size vs power.

### Week 03, 02/18 - 02/22: Counterfactuals and Causal Inference

Potential outcomes notation. Randomization delivers the ATE; brief aside on SUTVA, peer effects and general equilibrium. Examples of causal claims (especially implicit ones). Typical obstacles to estimating counterfactuals: simultaneity, measurement error, self-selection. Internal and external validity, and the value of understanding mechanisms. The importance of a clear research design. Another aside on partial identification and “structural estimation”. Prediction vs causation.

*Readings (all optional)*

- Acemoglu (2010); Muralidharan and Niehaus (2017)
- Angrist and Pischke (2010); Keane (2010b)
- Heckman (2008); Sims (2010); Deaton (2010); Heckman (2010)

- Manski (1995); Keane (2010a)
- Mullainathan and Spiess (2017)

## Week 04, 02/25 - 03/01: Mechanical Properties of OLS

Derivation of the OLS formula; Frisch-Waugh-Lovell theorem. Implications for interpreting regression output.

## References

- Acemoglu, Daron. 2010. "Theory, General Equilibrium, and Political Economy in Development Economics." *Journal of Economic Perspectives* 24 (3): 17–32. <http://pubs.aeaweb.org/doi/abs/10.1257/jep.24.3.17>.
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- Deaton, Angus. 2010. "Instruments, Randomization, and Learning about Development." *Journal of Economic Literature* 48 (2). American Economic Association: 424–55. doi:[10.1257/jel.48.2.424](https://doi.org/10.1257/jel.48.2.424).
- Heckman, James J. 2008. "Econometric Causality." *International Statistical Review* 76 (1): 1–27. doi:[10.1111/j.1751-5823.2007.00024.x](https://doi.org/10.1111/j.1751-5823.2007.00024.x).
- . 2010. "Building Bridges Between Structural and Program Evaluation Approaches to Evaluating Policy." *Journal of Economic Literature* 48 (June): 356–98. doi:[10.3386/w16110](https://doi.org/10.3386/w16110).
- Keane, Michael P. 2010a. "A Structural Perspective on the Experimentalist School." *Journal of Economic Perspectives* 24 (2): 47–58. doi:[10.1257/jep.24.2.47](https://doi.org/10.1257/jep.24.2.47).
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- Manski, Charles F. 1995. *Identification Problems in the Social Sciences*. Harvard University Press.
- Mullainathan, Sendhil, and Jann Spiess. 2017. "Machine Learning: An Applied Econometric Approach." *Journal of Economic Perspectives* 31 (2): 87–106. doi:[10.1257/jep.31.2.87](https://doi.org/10.1257/jep.31.2.87).
- Muralidharan, Karthik, and Paul Niehaus. 2017. "Experimentation at Scale." *Journal of Economic Perspectives* 31 (4): 103–24. doi:[10.1257/jep.31.4.103](https://doi.org/10.1257/jep.31.4.103).
- Sims, Christopher A. 2010. "But Economics Is Not an Experimental Science." *Journal of Economic Perspectives* 24 (2): 59–68. doi:[10.1257/jep.24.2.59](https://doi.org/10.1257/jep.24.2.59).