



STATISTICS AND PROGRAM EVALUATION
PUBPOL 870K

Statistics and Program Evaluation

Fall 2017

Dates / contact hours: 300 minutes of contact hours for 14 weeks

Academic Credit: 1 course credit

Course format: Lecture + Lab Sessions (after class TBD)

Instructor's Information

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Office hours: MW 10:30 AM-11:30 AM or by an appointment

Prerequisite(s), if applicable

This is an iMEP core course. There are no prerequisites. Students are highly encouraged to participate in the summer boot camp prior to enrollment.

Course Description

This course is designed to give students a foundation in statistics and program evaluation related to environmental policy. Program evaluations seek to identify the causal effect of a program/regulation/policy on some outcome of interest. In the environmental area, this often involves evaluating whether a program has a causal effect on environmental quality. Through this class, students will learn to become critical thinkers in program evaluations and use these evaluations to improve policy.

The course has two components, theory and applications. The first component of the course helps students learn the major empirical methods in program evaluation. How do we measure the causal effect of regulation on the environment? What type of information do we need to make valid inferences on policy effectiveness from data? The second component of the course applies these tools to international environmental policy choices, where students will read and analyze evaluations of the effectiveness of different policy instruments.

Course Goals / Objectives

This course introduces standard statistical concepts and tools and lays the groundwork for program evaluation. We will study standard statistical concepts and tools and lays the groundwork for becoming evidence-based thinkers of policy-relevant research based on the quantitative data analysis. The topics that we will cover include:

- Using statistical methods for describing and summarizing data
- Applying basic rules of probability including, confidence intervals, significance testing, correlation, and linear and logistic regression analysis
- Incorporating statistical inference in relation to economics, public policy, and political science decision-making
- Evaluating critically current global environmental policy case studies such as energy use, water conservation, environment and health.

Labs and problem sets will involve manipulation and analysis of data, provide practical experience for future courses and applied work.

Required Text(s)/Resources

Text: Diez, D., C. Barr, and M. Cetinkaya-Rundel. OpenIntro Statistics. 2nd Edition. 2012. Available as a free pdf within the Archive at openintro.org. Referred to as “OI” in syllabus.

The other required readings for this course consist of journal articles and working papers.

Recommended Text(s)/Resources

Angrist, Joshua D. and Jorn-Steffen Pischke, Mostly Harmless Econometrics, (Princeton, NJ: Princeton University Press 2009).

Hernán MA, Robins JM. Causal Inference. Chapman and Hall, 2014.
<http://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/>

Shadish, William, Thomas Cook, and Donald Campbell, Experimental and Quasi-Experimental Designs for Generalized Causal Inference, (Boston, MA: Houghton Mifflin 2002)

Course Requirements / Key Evidences

Problem Sets:

Problem sets must be turned in by 5 pm on the day that they are due to the instructor’s office. Problem sets are graded on a 100 point scale. No late assignments will be accepted.

Article Evaluation:

The article evaluation is an opportunity to think critically and write a short memo about a piece of policy-oriented research. The evaluation should be no more than 1,000 words, not including reference and bibliography. When you write an article evaluation or a memo on a dataset or analysis, you will need to reference articles and potentially other material that you draw upon. For proper referencing guide, please see additional information on the home page of the Duke University library (see “Citing Sources”). If you are unsure about how to reference a particular source, consult this reference guide:
http://www.chicagomanualofstyle.org/tools_citationguide.html

Technology Considerations, if applicable

STATA will be used in the lab to analyze data. You may purchase a one-year license (Stata 15) for your own computer via Duke software licensing webpage. STATA has a learning curve, and a very useful guide is located at the UCLA Institute for Digital Research and Education (<http://www.ats.ucla.edu/stat/>).

Assessment Information / Grading Procedures

Problem sets:	30% (3 problem sets, equal weight)
Midterm:	20%
Term paper assignment	20 %
Presentation and Article Evaluation:	15% (policy relevant evaluation for critical thinking)
Class Participation:	15% (active classroom engagement and participation)

Diversity and Intercultural Learning (see Principles of DKU Liberal Arts Education)

As an international, intellectual community that encourages diversity, openness and creative learning, Duke Kunshan encourages diversity and intercultural learning.

Course Policies and Guidelines

- Academic integrity
- Attendance
- Attention to assignment deadlines
- No inappropriate use of cell phone, laptop, or other technology during class

Tentative Course Outline or Schedule

Week 1: Statistics Foundation I

Statistics and Data in Public Policy

OI pp. 13-19

Describing data and looking for relationships

OI pp. 19-41

Week 2: Statistics Foundation II

Probability and Sampling

OI section 2.1 – 2.5

Random Variables

OI sections 3.1, 3.2, 3.4

Lab 1: STATA nuts and bolts, using STATA to explore variables

Week 3: Statistical Inference I

Confidence Intervals and Hypothesis Testing

OI sections 4.1, 4.2, 4.3, 4.4, 4.6

Week 4: Statistical Inference II

Inference for Distributions and Proportions

OI section 5.1 – 5.4

OI sections 6.1-6.4, 6.6

Lab 2: Descriptive statistics, t-tests

Week 5: Regression I

Simple Linear Regression

OI section 7.1, 7.2, 7.4

Multiple Linear Regression

OI sections 8.1-8.3

Week 6: Regression II

Indicator Variables and Interaction Terms

Categorical Dependent Variables

OI section 8.4

Lab 3: Simple linear regression and multivariate linear regression

Week 7: Midterm

Week 8: Applications of Random Assignment to Environment and Health

Benneer, Lori S., Alessandro Tarozzi , Alexander Pfaff, Soumya H. Balasubramanya, Kazi Matin Ahmed, and Alexander van Geen (2013) Impacts of a Randomized Controlled Trial in Arsenic Risk Communication on Household Water-Source Choices in Bangladesh, *Journal of Environmental Economics and Management*, 65(2): 225-240.

Week 9: Experiments in Energy and Water Conservation

Alcott, Hunt and Todd Rogers (2014) "The Short-Run And Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation," *The American Economic Review*, 104(10): 3003–3037

Ferraro, Paul and Michael Price (2013) "Using Non-Pecuniary Strategies to Influence Behavior: Evidence From A Large Scale Field Experiment," *The Review of Economics and Statistics*, 95(1): 64-73.

Week 10: Controversy about Experiments in Development Economics

Banerjee, Abhijit and Esther Duflo (2009) "The Experimental Approach to Development Economics," *Annual Review of Economics* 1:1.1-1.28.

Week 11: Selection on Observables—Matching

Ferraro, PJ, C McIntosh and M Ospina. (2007) The Effectiveness of Listing under the U.S. Endangered Species Act: An econometric analysis using matching methods. *Journal of Environmental Economics and Management* 54(3): 245-261.

Week 12: Evaluating Program Evaluations—The Controversy over Observational Study Designs

Ferraro, Paul and Juan Jose Miranda (2017) "Panel Data Designs and Estimators As Substitutes For Randomized Controlled Trials In The Evaluation Of Social Programs," *Journal of the Association of Environmental and Resource Economists*, 4(1)

Week 13: Selection on the Unobservables: IV, DID, and RDD

Angrist, Joshua D., and Alan B. Krueger (2001) "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments." *Journal of Economic Perspectives*, 15(4): 69–85.

Galiani, S., Gertler P., Schargrodsky E. (2005) Water for Life: The Impact of the Privatization of Water Services on Child Mortality. *Journal of Political Economy*

Chay, Kenneth Y. and Michael Greenstone (2003), "Air Quality, Infant Mortality and the Clean Air Act of 1970," *National Bureau of Economic Research, Working Paper Number w10053*.

Rivera, Jorge (2002) "Assessing a voluntary environmental initiative in the developing world: The Costa Rican Certification for Sustainable Tourism" *Policy Sciences* 35: 333-360.

Week 14: The Role of Program Evaluation in Environmental Policy

Benbear and Coglianese (2005) Measuring Progress: The Role of Program Evaluation in Environmental Policy," *Environment* 47(2): 22-39.