

Syllabus
PUBL 611: Causal Inference

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OVERVIEW AND COURSE OBJECTIVES

A central goal of evaluation and policy research is estimating the causal effect of an intervention, program, or policy change on behaviors and outcomes. Often a randomized experiment can provide the best causal evidence. However, in many policy contexts experiments are infeasible or unethical, and alternative research designs and analytic strategies can be employed to address causal questions.

This course provides instruction and practice in research designs and analytic strategies that are commonly employed to address causal questions in evaluation and policy research such as propensity score matching, instrumental variable, regression discontinuity, difference-in-differences, and others. We consider the underlying logic of each method, how and when to apply them to a policy research question, model assumptions and how they can be tested, and data requirements and limitations. Students will learn from illustrative examples and hands-on experience using data and Stata statistical software.

LEARNING OBJECTIVES

Upon completion of this course, students are expected to be able to:

- assess the appropriateness of different research designs and analytic strategies
- apply different research designs and analytic strategies to estimate specific causal relationships
- test the validity of assumptions upon which different research designs and analytic strategies rest
- interpret results
- communicate methods and results to a policy audience

PREREQUISITES

Students should have prior experience with regression analysis and statistical software (preferably Stata). PUBL 600 (Research Methods) and PUBL 604 (Statistical Analysis) are required.

TEXTBOOKS

Angrist, J.D. and Pischke, J.S. (2015). *Mastering Metrics: The Path from Cause to Effect*. Princeton University Press.

Murnane, R.J. and Willett, J.B. (2011). *Methods Matter: Improving Causal Inference in Educational and Social Science Research*. Oxford University Press

SOFTWARE – *Stata 16 (earlier versions ok)*

Free download for UMBC students at <https://wiki.umbc.edu/display/faq/Stata>.

REQUIREMENTS

1. Skills review (10 points)

2. Data projects (5 x 30 points each)

Conduct analysis in Stata to replicate research results. Each project will be workshopped in class. Projects are due at the beginning of class. No late projects are accepted (ever).

Data for projects can be downloaded here:

<https://stats.idre.ucla.edu/other/examples/methods-matter/>

2. Take-home Exam (60 points)

Take-home exam will test mastery of theory and execution of research design, statistical terms, foundational statistical tools and interpretation of results.

Pass/fail registration is not permitted in this course.

ACADEMIC INTEGRITY

Students are strongly encouraged to work together on all assignments. However, you must turn in original work that is your own. You will not receive credit for projects or exams that are identical to another student's work. If you use outside sources, you must cite them.

For more information on UMBC policies regarding academic integrity:

<http://oue.umbc.edu/home/home/academic-integrity/>

STUDENT DISABILITY SERVICES (SDS)

UMBC is committed to eliminating discriminatory obstacles that may disadvantage students based on disability. Services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act of 1990, the ADAA of 2009, and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would allow for students to have equal access and inclusion in their courses.

If you have a documented disability and need to request academic accommodations, please refer to the SDS website at <https://sds.umbc.edu/> for registration information or visit the SDS office in the Math/Psychology Building, Room 212. For questions or concerns, you may contact us at disability@umbc.edu or (410) 455-2459. If you require accommodations for this class, please make an appointment to meet with me to discuss your SDS-approved accommodations.

READINGS AND ASSIGNMENTS

Session 1: Introduction to Causal Inference & Skills Review

Shadish, Cook, and Campbell – Chapter 1 (BB)

Murnane & Willett – Chapter 2-3

Angrist & Pischke – Chapter 1

- ✓ Install STATA from UMBC
- ✓ Complete human subjects training

Session 2: Regression Analysis and Omitted Variable Bias

- ✓ Skills review due

Angrist & Pischke – Chapter 2

Research article (Self Selection)

Dale, Stacy Berg and Krueger, Alan (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables.” *Quarterly Journal of Economics*, 117(4), 1491-1527.

Session 3: Regression with Experimental Data

Murnane & Willett – Chapter 4 (skim chapters 5-6)

Research article:

Howell, W., Wolf, P., Campbell, D., & Peterson, P. (2002). School Vouchers and Academic Performance: Results from Three Randomized Field Trials. *Journal of Policy Analysis and Management*, 21(2), 191-217.

Session 4: Regression with Clustered Randomized Data

Murnane & Willett – Chapter 7

Research article:

Borman, G.D. et al (2005). Success for all: First-year results from the national randomized field trial. *Educational Evaluation and Policy Analysis*, 27(1), 1-22.

Session 5: Workshop 1 – Fixed and Random Effects

- ✓ Workshop Project 1 – Murnane & Willett Chapter 7

Session 6: Natural Experiments (Difference-in-Differences & Interrupted Time Series)

Murnane & Willett – Chapter 8

Angrist & Pischke – Chapter 5

- ✓ Project 1 due

Research article:

Carpenter, C., & Dobkin, C. (2011). The Minimum Legal Drinking Age and Public Health. *The Journal of Economic Perspectives*, 25(2), 133-156.

Session 7: Workshop 2 – Difference in Differences

- ✓ Workshop Project 2 – Murnane & Willet Chapter 8

Session 8: Regression Discontinuity

Murnane & Willett – Chapter 9

Angrist & Pischke – Chapter 4

- ✓ Project 2 due

Carpenter, C., & Dobkin, C. (2009). The Effect of Alcohol Consumption on Mortality: Regression Discontinuity Evidence from the Minimum Drinking Age. *American Economic Journal: Applied Economics*, 1(1), 164-182.

Session 9: Workshop 3 – Regression Discontinuity

- ✓ Workshop Project 3 – Murnane & Willett Chapter 9

Session 10: Instrumental Variables

Murnane & Willett – Chapter 10-11

Angrist & Pischke – Chapter 3

- ✓ Project 3 due

Research articles:

Dee, T. (2004). Are there civic returns to education? *Journal of Public Economics*, 88(9-10), 1697-1720.

Angrist, J., Dynarski, S., Kane, T., Pathak, P., & Walters, C. (2012). Who Benefits from Kipp? *Journal of Policy Analysis and Management*, 31(4), 837-860.

Session 11: Workshop 4 – Instrumental Variables

- ✓ Workshop Project 4 – Murnane & Willett Chapter 10

Session 12: Propensity Score & Other Matching Techniques

Murnane & Willett: Chapter 12

- ✓ Project 4 due

Final Exam Distributed

Session 13: Workshop 5 – Propensity Scores

- ✓ Workshop Project 5 – Murnane & Willett Chapter 12

Final Due Dates:

- ✓ Final exam – last day of class
- ✓ Project 5 – one week after workshop 5