

POLITICAL SCIENCE * * *
ADVANCED EMPIRICAL ANALYSIS FOR POLITICAL AND POLICY ANALYSIS

University of Michigan
Department of Political Science
Spring 2018

Instructor:	Jesse M. Crosson	Class Time:	T-W-TH
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Course Description:

Modern political and policy research places a premium on the empirical validity of causal claims. Does incumbency status actually inflate a candidate's reelection prospects? Do ballot initiatives increase voter turnout? To what extent does exposure to new technology improve political outcomes in emerging democracies? In this class we will learn about, practice, and apply a variety of increasingly popular empirical techniques for improving the quality of causal claims in your research. The course will focus in particular on the "causal inference" or potential outcomes framework, and the econometric techniques that accompany it.

The goals of this course are 1) to sharpen your ability to think critically about causal claims and mechanisms, 2) to understand the first-order importance of research design, and 3) to improve the quality of evidence you present in your own work. Not all research questions are equally amenable to these techniques. However, much of the value of this course lies in honing your ability to recognize when and how your own research could improve through more thoughtful research design—and how to assess your empirical claims accordingly.

Course Pages:

All course materials, except for textbook chapters, can be found at this course's Canvas site. Please check the site regularly, as I will be providing announcements and updates via that channel.

Required Texts:

There are no required textbooks for this course, but here are some resources you may find helpful throughout the semester:

- Angrist, Joshua D., and Jörn-Steffen Pischke. 2008. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.
- Manski, Charles F. 2013. *Public policy in an uncertain world: analysis and decisions*. Harvard University Press.
- Morgan, Stephen L., and Christopher Winship. 2015. *Counterfactuals and causal inference: Methods and principles for social research*. Second ed. Cambridge University Press.

Prerequisites:

Prior to taking this course, you should have taken introductory and intermediate statistics courses that

familiarized you with probability theory, parameter estimation, generalized linear models, and other common econometric techniques.

Grading Policy and Relevant Dates:

Laboratory and Homeworks	50%
Midterm Exam	15%
Final Project	35%
Midterm Exam Sent	x, xxxx
Midterm Exam Due	x, xxxx
Student Presentations	x, xxxx

Laboratory and Homeworks

Each week will feature a hands-on class period that applies the methods learned at the beginning of the week. The work will be done in a hybrid lecture-collaborative setting (i.e., groups of 3 or 4), where I provide example code to get you started, and your group is responsible for a variety of extensions.

This work will prepare you for the weekly homework assignment, which I will circulate at the beginning of each week. It will be due a week from assignment date. You are welcome (and even encouraged) to work together on these assignments, but do not copy explanations or other answers verbatim. You are required to turn in your own assignment each week, and will be graded accordingly. Copying will severely restrict your learning of the subject material.

Midterm Examination (Take Home)

For the midterm exam, students will be given a dataset at the beginning of Week 8. With the dataset, students will be asked to perform a variety of tasks and functions. Students will be required to send their completed exams to me via Canvas by the end of the week. Additional details about the exam and its contents will be available as we approach the exam date.

Final Project

Each student will use the skills she learned in the class to develop a research design for a publishable manuscript by the end of this class. The research design must make use of one of the empirical strategies discussed in this class, or a direct extension of one such technique.

In order to complete this assignment, you will need to meet several deadlines throughout the semester. First, you will be responsible for choosing a topic by Week 3. Please, come by and speak with me about your topic! Second, you will need to provide an outline (one-page summary) of your design, by Week 6.

During the last week of class, you will each deliver an APSA-style presentation of the design. Unlike APSA, however, you will be assigned your own discussant—one of your classmates. This will allow you to practice discussant skills, as well as presentation skills. After the presentation, you will be expected to turn in a write-up of your design on Canvas, by the beginning of finals week. Late papers will not be accepted; please let me know if you think there will be a problem with your meeting the deadline.

Not all of you will be able to collect data in the time period between Week 6 and the last week of class. However, if you can include data analysis in your final presentation and paper, you are encouraged to do so. The hope is that, following the end of class, you can turn around quickly and turn your design into a publishable paper.

Schedule and Weekly Learning Goals

The schedule is tentative and subject to change. Please note that **all readings listed with each date should be completed by the date under which they are listed!**

Selection on Observables

Week 1, 09/08 - 09/12: Introduction to Potential Outcomes Framework

Key Concepts: Fundamental problem of causal inference, counterfactuals, treatment assignment and mechanisms, confounding

- Alberto Abadie and Matias D. Cattaneo. 2018. "Econometric Methods for Program Evaluation." *Annual Review of Economics*. 465-470.
- Holland, Paul W. 1986. "Statistics and Causal Inference." *Journal of the American Statistical Association* 81 (396): 945-960

Week 2, 09/15 - 09/19: Experiments and Randomization Inference

Key Concepts: Experiments and the fundamental problem of causal inference, random assignment, sampling-based inference, inference on a sharp null

- Alberto Abadie and Matias D. Cattaneo. 2018. "Econometric Methods for Program Evaluation." *Annual Review of Economics*. 470-475.
- Fisher, Ronald A. 1935. *Design of Experiments*. New York: Hafner. Chapters I and II, pp. 1-26.
- Rubin, Donald B. 1990. "Comment: Neyman (1923) and Causal Inference in Experiments and Observational Studies." *Statistical Science* 5 (4): 472-480

Week 3, 09/22 - 09/26: Conditioning on Confounding Variables: Matching Methods

Key Concepts: Treatment assignment in nonexperimental settings, conditional independence, matching on covariates v. matching on propensity score, regression v. matching

- Alberto Abadie and Matias D. Cattaneo. 2018. "Econometric Methods for Program Evaluation." *Annual Review of Economics*. 475-482.
- Sekhon, Jasjeet S. 2009. "Opiates for the matches: Matching methods for causal inference." *Annual Review of Political Science* 12: 487-508.
- Abadie, Alberto, and Guido Imbens. 2011. "Bias-Corrected Matching Estimators for Average Treatment Effects." *Journal of Business & Economic Statistics* 29 (1).

Week 4, 09/29 - 10/03: Regression and "Natural Experiments"

Key Concepts: Regression as selection on observables, research design and plausibility of regression and matching estimates

- Angrist and Pischke (2008), Chapter 3 (Canvas).
- Dunning, Thad. 2007. "Improving causal inference: Strengths and limitations of natural experiments." *Political Research Quarterly*.
- Sekhon, Jasjeet S., and Rocio Titiunik. 2012. "When natural experiments are neither natural nor experiments." *American Political Science Review* 106 (01): 355-7.

Selection on Unobservables**Week 5, 10/06 - 10/10: Regression Discontinuity, Part 1**

Key Concepts: Identification within RDDs, continuity and local randomization, parametric and non-parametric estimation, selection of local estimation procedure

- Alberto Abadie and Matias D. Cattaneo. 2018. “Econometric Methods for Program Evaluation.” *Annual Review of Economics*. 492-496.
- McCrary, Justin. 2008. “Manipulation of the running variable in the regression discontinuity design: A density test.” *Journal of Econometrics* 142 (2): 698-714
- Calonico, S., Cattaneo, M.D., Farrell, M.H. and Titiunik, R., 2016. “Regression discontinuity designs using covariates.” *Review of Economics and Statistics*, (0).
- Lee, D.S., 2008. “Randomized experiments from non-random selection in US House elections.” *Journal of Econometrics*, 142(2), pp.675-697.
- Skovron, C. and Titiunik, R., 2015. “A practical guide to regression discontinuity designs in political science.” *American Journal of Political Science*, pp.1-47.

Week 6, 10/13 - 10/17: Regression Discontinuity, Part 2

Key Concepts: bandwidth selection, robust nonparametric inference, identification with multiple scores/-cutoffs, geographic RD, additional applications

- Calonico, Sebastian, Matias D. Cattaneo, and Rocio Titiunik. 2014. Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs. *Econometrica* 82 (6): 2295-2326
- Cattaneo, Matias D., Brigham Frandsen, and Rocio Titiunik. 2014. “Randomization Inference in the Regression Discontinuity Design: An Application to Party Advantages in the U.S. Senate.” *Journal of Causal Inference*.
- Cattaneo, M.D., Titiunik, R., Vazquez-Bare, G. and Keele, L., 2016. “Interpreting regression discontinuity designs with multiple cutoffs.” *The Journal of Politics*, 78(4), pp.1229-1248.
- Feigenbaum, J.J., Fourinaies, A. and Hall, A.B., 2017. “The majority-party disadvantage: revising theories of legislative organization.” *Quarterly Journal of Political Science*.
- Lee, D.S. and McCrary, J., 2017. “The deterrence effect of prison: Dynamic theory and evidence.” In *Regression Discontinuity Designs: Theory and Applications* (pp. 73-146). Emerald Publishing Limited.

Week 7, 10/20 - 10/24: Instrumental Variables

Key Concepts: instrumentation, key assumptions, weak v. strong instruments, marginal treatment effects

- Alberto Abadie and Matias D. Cattaneo. 2018. “Econometric Methods for Program Evaluation.” *Annual Review of Economics*. 486-492.
- Angrist, Joshua D., Guido W. Imbens, and Donald B. Rubin. 1996. Identification of Causal Effects Using Instrumental Variables. *Journal of the American Statistical Association* 91 (434): 444-455.
- Imbens, Guido W., and Paul Rosenbaum. 2005. Randomization Inference with an Instrumental Variable. *Journal of the Royal Statistical Society, Series A* 168: 1091-26 Brinch, CN, Mogstad M., and Wiswall, M. 2017. “Beyond LATE with a discrete instrument.” *Journal of Political Economy*.
- Sovey, A.J. and Green, D.P., 2011. “Instrumental variables estimation in political science: A readers guide.” *American Journal of Political Science*, 55(1), pp.188-200.

Week 8, 10/27 - 10/31: Differences-in-Differences

Key Concepts: parallel trends assumption and test, standard errors under DID, parametric v. nonparametric DID

- Alberto Abadie and Matias D. Cattaneo. 2018. “Econometric Methods for Program Evaluation.” *Annual Review of Economics*. 482-484.
- Donald, Stephen G., and Kevin Lang. 2007. “Inference with difference-in-differences and other panel data.” *The Review of Economics and Statistics* 89 (2): 221233.
- Abadie, Alberto. 2005. “Semiparametric difference-in-differences estimators. *The Review of Economic Studies* 72 (1): 119.
- Callaway, Brantly and Sant’Anna, Pedro H.C. 2018. “Difference-in-Differences with Multiple Time Periods and an Application on the Minimum Wage and Employment.” Working paper.

Week 9, 11/03 - 11/07: Synthetic Control

Key Concepts: synthetic v. comparative case studies, weight calculation,

- Alberto Abadie and Matias D. Cattaneo. 2018. “Econometric Methods for Program Evaluation.” *Annual Review of Economics*. 484-486.
- Abadie, Alberto, and Javier Gardeazabal. 2003. “The Economic Costs of Conflict: a Case-Control Study for the Basque Country.” *American Economic Review* 92 (1).
- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. “Synthetic control methods for comparative case studies: Estimating the effect of California’s tobacco control program.” *Journal of the American Statistical Association* 105 (490).
- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2014. “Comparative politics and the synthetic control method.” *American Journal of Political Science*.
- Abadie, Alberto and L’Hour J. 2017. “A penalized synthetic control estimator for disaggregated data.” Working paper.

Week 10, 11/10 - 11/14: Causal Mechanisms and Mediation

Key Concepts: mediation v. moderation,

- Imai, Kosuke, Luke Keele, and Teppei Yamamoto. 2010. “Identification, inference and sensitivity analysis for causal mediation effects.” *Statistical Science*: 5171.
- Imai, Kosuke, Luke Keele, Dustin Tingley, and Teppei Yamamoto. 2011. “Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies.” *American Political Science Review* 105 (04): 765789.
- Keele, Luke, Dustin Tingley, and Teppei Yamamoto. Forthcoming. “Identifying Mechanisms behind Policy Interventions via Causal Mediation Analysis.” *Journal of Policy Analysis and Management*.
- Green, D.P., Ha, S.E. and Bullock, J.G., 2010. “Enough already about ‘black box’ experiments: Studying mediation is more difficult than most scholars suppose.” *The Annals of the American Academy of Political and Social Science*, 628(1), pp.200-208.

Week 11, 11/17 - 11/21: Treatment Spillover and Violations of Independence

Key Concepts: SUTVA violations, network analysis for addressing spillover

- Carrell, Scott E., Bruce I. Sacerdote, and James E. West. 2013. "From natural variation to optimal policy? The importance of endogenous peer group formation." *Econometrica* 81 (3): 855-882.
- Bowers, Jake, Mark M Fredrickson, and Costas Panagopoulos. 2013. "Reasoning about interference between units: a general framework." *Political Analysis* 21 (1): 97-124.
- Sinclair, Betsy, Margaret McConnell, and Donald P. Green. 2012. "Detecting spillover effects: Design and analysis of multilevel experiments." *American Journal of Political Science* 56 (4): 1055-1069.
- Transue, J.E., Lee, D.J. and Aldrich, J.H., 2009. "Treatment spillover effects across survey experiments." *Political Analysis*, 17(2), pp.143-161.

Week 12, 11/24 - 11/28: Heterogeneous Treatment Effects

Key Concepts: average v. subgroup treatment effect, fusion of machine learning and causal inference, ensemble methods

- Imai, K. and A. Strauss. 2011. "Estimation of heterogenous treatment effects from randomized experiments, with application to the optimal planning of the get-out-the-vote campaign." *Political Analysis* 19, 119.
- Imai, K. and M. Ratkovic. 2012). "Estimating treatment effect heterogeneity in randomized program evaluation." *Annals of Applied Statistics*.
- Grimmer, J., Messing, S. and Westwood, S.J., 2017. Estimating heterogeneous treatment effects and the effects of heterogeneous treatments with ensemble methods. *Political Analysis*, 25(4), pp.413-434.

Week 13, 12/01 - 12/05: Student presentations, Week 1**Week 14, 12/08 - 12/12:** Student presentations, Week 2

Key Concepts:

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Classroom Environment

Please note that the classroom is a space where participation of all students is welcome, protected, and expected, regardless of differences in race, sex, gender, nationality, disability, religion, ideology, or otherwise. Students will be respectful of each other both during section and while completing any assignment outside of class that requires group interaction. I will not tolerate intimidation of any kind, nor will I tolerate snide remarks following in-class questions or remarks.

Please let me know if you feel the classroom lose such a level of respect at any time, so that we can address your concerns. Additionally, if you feel that you are being disrespected in outside-the-classroom interactions related to this course, please do not hesitate to speak with me.

Academic Misconduct and Grade Appeals

While the vast majority will not engage in academic misconduct, it must be reiterated that academic misconduct will not be tolerated. Please see the LSA website (<http://www.lsa.umich.edu/academicintegrity/>) regarding this topic for more thorough explanation of the plagiarism, cheating, and general academic misconduct policies.

Grade appeals must be submitted in writing to me at least 24 hours after the grade is returned. I will review your appeal and choose to either keep the same grade or change it.

Accommodations for Students with Disabilities

If you think you need an accommodation for a disability, please let me know at least two weeks prior to the time when the accommodation will be needed. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate academic accommodations. SSD (734-763-3000; <http://www.umich.edu/sswd>) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.

Contacting Me

My office, office hours, and e-mail can be located at the top of the syllabus. The best way to contact me is to come to office hours (or by scheduling an appointment if necessary). Office hours are intended as a resource for you; they are a time where we can discuss questions about the material, assignments, or your experience in class. You can also contact me through e-mail. I will respond to e-mails within 24 hours on a weekday and within 48 hours on the weekend and holidays. If you wish to contact me this way, please include "PS***" in the subject line of the e-mail.