

Course Syllabus

Lecture: Tuesdays and Thursdays 9:30am-11:00am

Location: <https://uwmadison.zoom.us/j/91236224903>

Professor Sam Trejo

Office: Social Sciences 4440

Office Hours: Tuesdays 11:00am-12:30pm

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“To one with a hammer, everything looks like a nail.”

Course Description

Does having health insurance make a person live longer? Do toxic exposures in childhood affect health later in life? Does wearing a mask reduce the spread of infectious disease? Assessing the causal effects of policies and practices is a fundamental goal of research in the social sciences. This course introduces the key conceptual and methodological tools used in public program evaluation, with an emphasis on understanding the forces that shape health and disease as well as various policy solutions.

Students will be taught to distinguish causation from correlation using counterfactual thinking. To that end, students will be introduced to the *Potential Outcomes Framework*, also known as the *Rubin Causal Model*. This framework for understanding cause and effect is widespread in economics and public policy and has recently begun to influence research in sociology, political science, education, and public health. We will explore a wide variety of experimental and quasi-experimental strategies used to estimate causal effects, including randomized experiments, regression, matching, instrumental variables, fixed effects, regression discontinuity, difference-in-differences, and synthetic control.

This course provides a non-technical introduction to the causal inference methods that are most salient to policymakers. Class meetings will typically be divided into lecture, student presentations, and group discussions. Questions and comments are highly encouraged throughout.

Requisites: None

Course Designations and Attributes: Social Science Breadth Attribute (S)

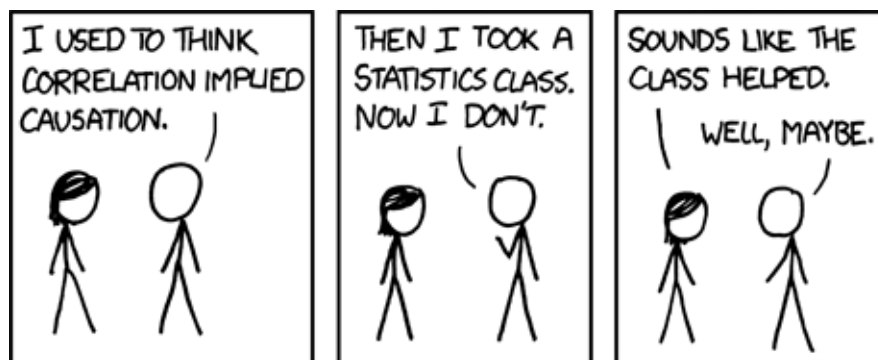
Instructional Mode: Online Only (Synchronous)

Learning Objectives

After completing this course, students will be able to:

- distinguish causal from correlational evidence in both general and academic texts
- identify relevant counterfactuals using the *Potential Outcomes Framework*
- interpret the external and internal validity of an estimated causal effect
- conceptually apply quasi-experimental methods to health policy issues
- communicate the strengths and weaknesses of previous research into the causal effects of various health interventions

More broadly, my hope is that this course will allow students to sharpen the skills required to distinguish true empirical reality from attractive falsehood. I hope that you will feel able to explain the concepts and techniques we discuss to your friends, from the first week on. Most of all, I hope the course helps you see how using counterfactual thinking to distinguish causation from correlation can impact how you see the world around you and choose to live your life.



Prerequisites

There are *no prerequisites* for this course, apart from being a curious seeker after truth.

Course Website

I will post all course materials, including lecture slides and required readings to the course Canvas website. The address is <https://canvas.wisc.edu/courses/244768>.

Credit Hours

This course counts for **3 credits**.

Course Structure

This class meets for two, 75-minute class periods each week over the spring semester and carries the expectation that students will work on course learning activities for about 3 hours out of the classroom for every class period. This syllabus contains information about meeting times and expectations for student work.

Preparing for Class

You are expected to read the required texts and submit discussion questions *before* the class period which the materials are discussed. Lectures will follow the material presented in the readings.

Laptop Use

A growing body of evidence suggests that the use of laptops, tablets, and phones in classrooms tends to be detrimental to learning. In general, I discourage their use on during lecture. However, if you want to use a device during class, I ask that you contact me outside of class to make this request. For more context on this policy, see [this video](#).

Required Texts

Mastering 'Metrics: The Path from Cause to Effect by Joshua D. Angrist and Jörn-Steffen Pischke (Princeton University Press, 2015).

Assignments & Grading

The typical UW–Madison grading scale will be used. The maximum score in the course is 100 points: 100-93 = A, 92-88 = AB, 87-83 = B, 82-78 = BC, 77-70 = C, 69-60 = D, <60 = F. Your final grade will weight the assessments as follows, with late assignments counting for only half credit:

Class Participation	15%
Discussion Questions	15%
Policy Memos	30%
Academic Paper Presentation	15%
Final Presentation	25%

Class Participation: Students are expected to attend class and actively participate in discussions.

Discussion Questions: Students are required to email 3 discussion questions to me by the midnight before class. In weeks without guests, these must be Socratic style questions about the required reading. Clarifying questions and content questions are also encouraged but do not count towards a student's required number of questions. In weeks with guests, these questions must instead be about the visitor's interests, skills, or professional journey.

Policy Memos: Each student will submit two 800-word policy memos over the course of the semester. In these memos, students will draw on the causal inference methods discussed in class to inform a policy issue of their choice. One option is to write a newspaper style op-ed that uses evidence and arguments regarding causation and correlation to supporting a particular solution to a policy problem. The first policy memo is due **March 5th** and the second policy memo is due **April 9th**.

Academic Paper Presentation: Each week, a student will give an informal 15 minute presentation on the required readings. Each student's week of presentation will be assigned at the start of the semester.

Final Presentation: During the final week of class, students will give a 15-minute presentation on a policy of interest to them. This presentation should highlight on unanswered policy question and propose a strategy using quasi-experimental methods to advance our understanding of the issue.

Attendance Policy

You may miss one class without penalty. After that, unless you have an excuse, you will be docked two percentage points out of a hundred on your final grade for each unexcused absence. If an extenuating circumstance causes you miss class more than once, please let me know in advance via e-mail and we will work out a solution. The course will respect all religious holidays; let me know if this affects your attendance or other work in the course.

Academic Integrity

In my class, you must take full responsibility for what you say or write. If you use words or ideas that are not your own in any paper or presentation, cite your sources. I expect students to conform to the highest standards of academic integrity in this course. Do not lie, cheat, or try to pass off someone else's work as your own.

University Statement: By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct Community Standards for additional review.

For more information, refer to more information from the Office of Student Conduct and Community Standards [here](#).

Accommodations for Disabilities

If you have a disability, I will happily adapt this course to your needs in accordance with University policy. If any condition limits your ability to participate fully, please request appropriate academic accommodations from the McBurney Disability Resource Center. Please do not be a stranger—I will help to the best of my ability.

McBurney Disability Resource Center Statement: The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

Please find more information and resources from the McBurney Disability Resource Center [here](#).

COVID-19

I will make every effort to accommodate students who become ill or are asked to isolate or quarantine.

Course Reading

Causation vs. Correlation

- Chetty et al. 2016. *The Association Between Income and Life Expectancy in the United States, 2001-2014*. Journal of the American Medical Association.
- Chetty 2013. *Yes, Economics Is a Science*. The New York Times.
- Smith 2018. *How Econ Went From Philosophy to Science*. Bloomberg.

The Problem of Confounding I

- Zeng et al. 2020. *Association of Daily Wear of Eyeglasses With Susceptibility to Coronavirus Disease 2019 Infection*. JAMA Ophthalmology.
- Dolgin 2015. *The Myopia Boom*. Nature.

The Problem of Confounding II

- Herzog 2018. *The Baffling Connection Between Vegetarianism and Depression*. Psychology Today.
- Cramer 2019. *Another Benefit to Going to Museums? You May Live Longer*. The New York Times.
- Chen 2019. *Dog People Live Longer. But Why?* NPR.
- Gillespie 2020. *Chili Pepper Study Says They Can Help You Live Longer*. Health.com.

The Potential Outcomes Framework

- *Mastering 'Metrics* p. xi-17

Statistical vs. Causal Inference

- Holland 1986. *Statistics and Causal Inference*. Journal of the American Statistical Association.

Internal vs. External Validity

- Roe & Just 2009. *Internal and External Validity in Economics Research*. American Journal of Agricultural Economics.

Randomized Experiments I

- *Mastering 'Metrics* p. 18-33

Randomized Experiments II

- Baicker et al. 2013. *The Oregon Experiment—Effects of Medicaid on Clinical Outcomes*. *New England Journal of Medicine*.
- Krueger 1999. *Experimental Estimates of Education Production Functions*. *Quarterly Journal of Economics*.

Regression

- *Mastering 'Metrics* p. 47-74

Matching

- Segev et al. 2010. *Perioperative Mortality and Long-term Survival Following Live Kidney Donation*. *Journal of the American Medical Association*.
- Venkataramani et al. 2018. *Association Between Playing American Football in the National Football League and Long-term Mortality*. *Journal of the American Medical Association*.

Instrumental Variables I

- *Mastering 'Metrics* p. 98-139

Instrumental Variables II

- Angrist & Chen 2011. *Schooling and the Vietnam-Era GI Bill: Evidence from the Draft Lottery*. *American Economic Journal: Applied Economics*.
- *Mendelian Randomization*. *Journal of the American Medical Association*.

Fixed Effects

- Black et al. 2007. *From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes*. *Quarterly Journal of Economics*.

Regression Discontinuity I

- *Mastering 'Metrics* p. 147-174

Regression Discontinuity II

- Almond et al. 2010. *Estimating Marginal Returns to Medical Care: Evidence from At-Risk Newborns*. Quarterly Journal of Economics.
- Venkataramani et al. 2016. *Regression Discontinuity Designs in Healthcare Research*. BMJ.

Difference-in-Differences I

- *Mastering 'Metrics* p. 178-203
- Card & Krueger 1994. *Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania*. American Economic Review.

Difference-in-Differences II

- Rossin-Slater et al. 2020. *Local Exposure to School Shootings and Youth Antidepressant Use*. Proceedings of the National Academy of Sciences.

Synthetic Control

- Abadie et al. 2010. *Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program*. Journal of the American Statistical Association.

Course Calender

TUESDAY		THURSDAY	
Jan 26th Introduction & Overview	1	28th Causation vs. Correlation	2
Feb 2nd The Problem of Confounding I	3	4th The Problem of Confounding II	4
9th The Potential Outcomes Framework	5	11th Statistical Inference vs. Causal Inference	6
16th Internal Validity vs. External Validity	7	18th Randomized Experiments I	8
23rd Randomized Experiments II	9	25th <i>Guest Visit (Daphne Martschenko, Stanford)</i>	10
Mar 2nd Regression	11	4th <i>Guest Visit (Kara Duggan, Civic Links)</i>	12
9th Matching	13	11th Individual Meetings (No Class)	14
16th Instrumental Variables I	15	18th <i>-No Class-</i>	
23rd Instrumental Variables II	16	25th Fixed Effects	17
30th Regression Discontinuity I	18	Apr 1st <i>Guest Visit (Olivia Larsen, GiveWell)</i>	19
6th Regression Discontinuity II	20	8th Individual Meetings (No Class)	21
13th Difference-in-Differences I	22	15th Difference-in-Differences II	23
20th <i>Guest Visit (Murphy Anne Carter, Casa Marianella)</i>	24	22nd Synthetic Control	25
27th In-Class Activity	26	29th Final Presentations	27