UNIVERSITY OF PITTSBURGH
SCHOOL OF EDUCATION

PSYED 3472: CAUSAL INFERENCE IN EDUCATIONAL RESEARCH

Fall 2019

Tuesdays, 9:00 – 11:40 AM

INSTRUCTOR:	Dr. Lindsay C. Page Associate Professor	
CONTACT INFORMATION:	Office: 804 LRDC Email: lpage@pitt.edu	
CLASS TIME:	Tuesdays 9:00 – 11:40 AM August 27 – December 12	
CLASS LOCATION:	4318 Posvar Hall	
OFFICE HOURS:	Mondays, 4:00 – 5:30 PM & by appointment. To schedule a meeting, please contact Lindsay via email.	
TEACHING FELLOWS:	Alberto Guzman-Alvarez alg223@pitt.edu	Danielle Lowry danielle.lowry@pitt.edu

OVERVIEW

Many key questions in the field of education are framed causally. Do investments in full-day kindergarten pay off in terms of improved school readiness? Does project-based learning in mathematics and science increase the pipeline of students into STEM-related fields? Does the introduction of a generous merit-based scholarship program improve students' motivation to prepare rigorously for postsecondary education? Despite this causal framing, analytic tools commonly applied to questions such as these allow for statements about relationships but not about causation. For example, we may observe correlational evidence that communities with full-day kindergarten also have higher levels of school readiness. These same communities, however, may also serve children from higher-income families. Given students' backgrounds, their levels of readiness may have been unchanged by participation in full-day kindergarten.

In this course, we will focus on framing research questions with a causal lens and on research designs and analytic techniques that provide the tools for answering these key questions in a causal framework. Specifically, we will learn about research designs for drawing causal inferences, including randomized trials, regression discontinuity, differences-in-differences, instrumental variables, and propensity score and other matching techniques. Our learning will be grounded

through the semester in reading scholarly articles in which these techniques are applied to questions in education. Assignments throughout the semester will include preparation for class participation, a referee report to critique the work of another scholar, and a final course project. At the start of the semester, students will be asked to identify an area of focus and potential sources of data for the final course project.

PREREQUISITES

EDUC 3103: Intermediate Quantitative Methods – Regression Analysis or the equivalent.

COURSE TEXTS AND MATERIALS

Required: Murnane, R. J., & Willett, J. B. (2010). *Methods matter: Improving causal inference in educational and social science research*. Oxford University Press.

Additional readings will primarily consist of academic articles that will be posted to a course box folder.

Suggested:

Angrist, J. D., & Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.

Angrist, J. D., & Pischke, J. S. (2014). *Mastering metrics: The path from cause to effect*. Princeton University Press.

Imbens, G. W., & Rubin, D. B. (2015). *Causal inference in statistics, social, and biomedical sciences*. Cambridge University Press.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton, Mifflin and Company.

GRADING AND STUDENT RESPONSIBILITIES

Class attendance and participation	50%
Referee report	10%
Final project	30%
Final project presentation	10%
TOTAL	100%

As a member of the course, you will be expected to: (a) attend all classes, arriving on time, (b) complete all assigned reading, (c) be well prepared for each class, (d) participate fully in class

discussion, (e) complete all course assignments on time, (d) prepare and deliver a conference-style presentation of your own project at the end of the semester, and (f) submit a written final project on time.

Weekly Readings and Class Discussion: Each week, your primary work will be to read selected papers and chapters from *Methods Matter*. You will be required to prepare explicit responses to detailed lists of questions that will be posted to the course box folder. Class discussion will focus on, but not necessarily be limited to, your answers to these questions. I strongly encourage you to form study groups to aid in preparing for, and conducting the work associated with, the class.

My goal is that our class discussions are a time of deep, collaborative learning. I expect you to be well prepared for each class. Class discussions will be a combination of free-flowing conversation and working through your answers to the prepared questions. To ensure that students are prepared for discussions and to ensure that we hear from everyone in the class, I will call on students *at random* to share their answers to the prepared questions. I recognize that this random calling may induce some degree of stress. Please know that my philosophy regarding these questions is that it is okay to be unsure of the answer, but only after you have really tried and engaged with the course material to answer the questions. **In short, it's okay not to know; it's not okay not to have tried**.

My overarching goal is to facilitate a classroom environment that is **psychologically safe**. As my colleague Shannon Wanless (2016) describes, this means that you will feel enabled take interpersonal risks that will not "result in embarrassment, ridicule or shame" but that will, instead, enable you to "engage, connect, change and learn" together.

Final Course Project: You will be required to complete an original research project, present it to other members of the class in a public presentation, and submit a final written paper. **In conducting this research project, you have the option to collaborate with a partner in the class.** Collaboration is increasingly the norm in the scholarly community of researchers who conduct quantitative research. There are many possibilities for what constitutes a viable final course project. We will have an opportunity to discuss and negotiate this during the semester. Among the possibilities, you may:

- Replicate and extend a published study that has (or should have) made use of one or more of the techniques taught in the course.
- Conduct and report on your own original quantitative research, preferably using, or intending to use, methods introduced in the course.
- Write an integrative review describing how methodological differences – particularly those related to the methods of the course -- explain puzzles in published findings in your area of interest.
- Write a critical review of selected research studies that have made use of one or more of the techniques taught in the course to address a causal question in your area of interest.
- Write a proposal describing future (original) research that will make use of one or more of the techniques taught in the course.

My strong preference is that you devise a project that will ultimately lead to a scholarly product that will appear on your CV. This includes, but is not limited to conference presentations, published

papers, proposals, qualifying papers, or a dissertation. In order to ensure that you make suitable progress throughout the semester, you will be required to submit an initial one-page overview, submit a completed outline and make a public presentation to obtain peer feedback prior to submitting your final paper.

ACADEMIC INTEGRITY

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity.

DISABILITY SERVICES

If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the second week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call (412) 648-7890 (Voice or TTD) to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union on the Oakland campus.

STATEMENT ON CLASSROOM RECORDING

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

DEPARTMENTAL GRIEVANCE PROCEDURE

The purpose of grievance procedures is to ensure the rights and responsibilities of faculty and students in their relationships with each other. When a PSYED student or a student in a PSYED class believes that a faculty member has not met his or her obligations (as an instructor or in another capacity) as described in the Academic Integrity Guidelines, the student should follow the procedure described in the Guidelines by (1) first trying to resolve the matter with the faculty member directly; (2) then, if needed, attempting to resolve the matter through conversations with the program chair; (3) then, if needed, resolving the matter through conversations with the department chair; (4) if needed, next talking to the associate dean of the school; and (5) if needed, filing a written statement of charges with the school-level academic integrity officer. [Dr. Michael Gunzenhauser is the Associate Dean and Integrity Officer.]

TENTATIVE COURSE SCHEDULE

Week 1, August 27: Course introduction

Required readings:

Methods Matter, chapters 1 – 3

Hoxby, C. (2016). The immensity of the Coleman data project. *Education Next*, *16*(2).

Prepare for: Experimental design

Week 2, September 3: Experimental design

Required readings:

Methods Matter, chapters 4 & 5

Journal article(s):

Dynarski, S., Libassi, C. J., Michelmore, K., & Owen, S. (2018). *Closing the Gap: The Effect of a Targeted, Tuition-Free Promise on College Choices of High-Achieving, Low-Income Students* (No. w25349). National Bureau of Economic Research.

Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *The American Economic Review*, *94*(4), 991-1013.

Prepare for: Experimental design and instrumental variables to handle non-compliance

Week 3, September 10: Using instrumental variables to adjust for treatment non-compliance

Required readings:

Mastering Metrics, Chapter 3

Journal article(s):

Abdulkadiroglu, A., J. Angrist, S. Dynarski, T. Kane and P. Pathak (2009). Accountability and flexibility in public schools: Evidence from Boston's charters and pilots. *Quarterly Journal of Economics*, *126*(2): 699-748.

Russell, L. (2017). Can learning communities boost success of women and minorities in STEM? Evidence from the Massachusetts Institute of Technology. *Economics of Education Review*, *61*, 98-111.

Prepare for: initial half- to one-page description of final project. Consider classroom exercise for framing causal question, pair-share, share out.

Week 4, September 17

Workshop 1: Analyzing data from randomized trials and conducting instrumental variables adjustment for non-compliance

Due: initial description of final project

Prepare for: Statistical power and group randomized designs

Week 5, September 24: Statistical power and group randomized designs

Required readings:

Methods Matter, chapters 6 & 7

Journal article(s):

Carter, S. P., Greenberg, K., & Walker, M. (2016). The impact of computer usage on academic performance: Evidence from a randomized trial at the United States Military Academy.

Prepare for: Natural experiments and difference-in-differences methodology

Week 6, October 1: Natural experiments and difference-in-differences methodology

Required readings:

Methods Matter, Chapter 8

Journal article(s):

Dynarski, S. M. (2003). Does aid matter? Measuring the effect of student aid on college attendance and completion. *American Economic Review, 93*(1), 279-288.

Dee, T., & Murphy, M. (2018). *Vanished Classmates: The Effects of Local Immigration Enforcement on Student Enrollment* (No. w25080). National Bureau of Economic Research.

Prepare for: Regression discontinuity

Week 7, October 8: Regression Discontinuity

Required readings:

Methods Matter, chapter 9

Journal article(s):

Page, L. C., Kehoe, S. S., Castleman, B. L., & Sahadewo, G. A. (2019). More than dollars for scholars: The impact of the Dell Scholars Program on college access, persistence and degree attainment. *Journal of Human Resources, 54*(3), 683-725.

Prepare for: Regression discontinuity with "fuzzy" discontinuity

Week 8, October 15: Regression Discontinuity with "fuzzy" discontinuity

Required readings:

Mastering Metrics, pages 164 – 174

Journal article(s):

Ludwig, J. & Miller, D. (2007). Does Head Start improve children's life chances? Evidence from a regression discontinuity design," *Quarterly Journal of Economics, 122*(1), 159-208.

Dee, T. S., & Penner, E. K. (2017). The causal effects of cultural relevance: Evidence from an ethnic studies curriculum. *American Educational Research Journal, 54*(1), 127-166.

Prepare for: Referee report (Assigned. Report due on November 19.)

Week 9, October 22:

Workshop 2: Regression discontinuity and difference-in-differences methods

Due: Final project proposal (2-3 page description and/or outline of final project)

Prepare for: Instrumental variables estimation for capturing exogenous variation

Week 10, October 29: Instrumental variable estimation for capturing exogenous variation

Required readings:

Methods Matter, chapter 10

Journal article(s):

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

Currie, J. & Moretti, E. (2003). Mother's education and the intergenerational transmission of human capital: Evidence from College Openings." *Quarterly Journal of Economics*, *118*(4), 1495-1532.

Prepare for: Bias in observational studies

Week 11, November 5: Handling bias in non-experimental data

Required readings:

Methods Matter, chapter 12

Journal article(s):

Deming, D. (2009). Early childhood intervention and life-cycle skill development: Evidence from Head Start. *American Economic Journal: Applied Economics*, *1*(3): 111-134.

Goldin, C., & Rouse, C. (2000). Orchestrating impartiality: The impact of "blind" auditions on female musicians. *The American Economic Review*, *90*(4), 715-741.

Prepare for: Propensity scores & matching

Week 10, November 12: Propensity scores and other matching techniques

Required readings:

Methods Matter, chapters 13 & 14

Journal article(s):

Diaz, J. J., & S. Handa. (2006). An assessment of propensity score matching as a non-experimental impact estimator: Evidence from Mexico's PROGRESA program." *Journal of Human Resources*, *41*(2), 319-345.

Prepare for: class and conference presentations

Week 11, November 19:

Workshop 3: Propensity score methods

Class wrap-up

Due: Referee report

November 26: Thanksgiving break

Week 12, December 3: Class presentations

Week 13, December 10: Class presentations

December 12: Final paper due at 5 PM