

Quantitative Methods for Program Evaluation PUBPOL 639 – WINTER 2019

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Office Hours: Sign up via [Google calendar](#), Weill 4216

GSI: Pedro Magana Saenz (pmaganas@umich.edu)

Office Hours: Mondays 11:30am–1:30pm and Wednesdays 9am–10am, Weill 3212

GSI: Lydia Wileden (lwileden@umich.edu)

Office Hours: Mondays 8:30am–10am and Fridays 10am–12:30pm, Weill 3212

Lecture: Mondays & Wednesdays 10:00am–11:30am, Weill 1120

Sections: Fridays 1:00–2:30pm, Weill 1120 & 1210

Final Exam: Wednesday, May 1 from 4–6pm, Location TBD

COURSE OVERVIEW AND OBJECTIVES

This course introduces students to multiple regression analysis and other tools of causal inference and program evaluation. The course will focus on applying these tools to real data on various policy topics. Applications will be drawn from a range of policy areas including education, welfare, employment, health, environment, and economic development.

The goals of the class are to:

- Train students to critically consume empirical research. We will teach you to read and understand technical, empirical studies and to judge whether they constitute a firm, evidentiary basis for policy.
- Train students to thoughtfully produce their own empirical research. We will develop a core set of analytical tools that will allow you to conduct empirical research in a professional setting.

PREREQUISITES

The course requires introductory statistics (hypothesis testing, t-statistics, confidence intervals, etc.) at the level of PUBPOL 529 or EDUC 793. Introductory calculus and microeconomics are strongly recommended but not strictly required.

COURSE READINGS

Since the course is primarily a methods course, most readings will be from one of the course textbooks. Both are required and should serve as a useful reference in your future work:

- Stock and Watson, *Introduction to Econometrics*, 3rd edition (any edition should be fine)
- Angrist and Pischke, *Mastering Metrics*, paperback edition

The textbook readings will be supplemented with additional readings including academic journal articles and policy reports. These readings will be provided on Canvas or via web links. All readings should be done before lecture.

SECTIONS

Your GSIs will be leading sections every Friday. Sections will mostly be used to demonstrate how to put quantitative methods into practice using Stata and to provide guidance on the problem sets. The GSI may also use the time to clarify or expand on material covered in lecture or the readings. Section attendance is strongly encouraged.

COURSE COMPONENTS

The final grade will be based on:

- In-class quizzes (5) – drop lowest score (25%)
- Homework assignments (6) – drop lowest score (40%)
- Course participation (10%)
- Final exam (25%)

In-class quizzes

Short in-class quizzes will begin in lecture promptly at 10:00am and last about 20 minutes. They will test material from both the readings and lectures. Quizzes will be cumulative but focused on the most recent material. The quizzes are closed-book. You may consult a single index card of notes and use a non-graphing, pocket calculator (no cell phones). Quizzes cannot be made up, so plan your schedule accordingly. Your lowest quiz score will be dropped.

Quiz dates: (1) Mon, Feb 4th; (2) Mon, Feb 25th; (3) Mon, Mar 18th; (4) Wed, Apr 3rd; (5) Wed, Apr 17th

Homework assignments

Homework assignments consist of data analysis and short essays (1-3 paragraphs) that interpret your findings and evaluate the methods in readings. You are encouraged to discuss the assignments in groups of three or four, but your answers *must be written up individually, in your own words*. So that we can confirm you have written up answers in your own words, list your study group members on each problem set. The final assignment will ask you to describe and critically evaluate two empirical papers which we provide to you and will be done in small groups.

Assignments will be graded on a three-point scale: check (=acceptable), check-plus (=great), check-minus (=lacking). For the purpose of comparing problem set grades to quiz and exam grades, a check-plus will count as 100%, a check will count as 85% and a check-minus will count as 70%. Students who do not turn in the assignment at all, or turn in one that is largely incomplete, will receive a score of 0% on that assignment for the purpose of calculating the final course grade.

Assignments will be distributed 7-14 days before the due date. All assignments are due by 11:59pm on the date listed. Answers should be typed and posted using the assignment tool in Canvas in a single PDF

file. Stata do-files and log files should accompany all your assignments (in the same PDF). No late assignments will be accepted, so plan accordingly. Your lowest assignment score will be dropped.

Assignment due dates: (1) Mon, Jan 28th; (2) Wed, Feb 20th; (3) Fri, Mar 15th; (4) Mon, Apr 1st; (5) Mon, Apr 15th; (6) Wed, Apr 24th

Course participation

Effective class participation requires that you arrive at class on-time and prepared, having done the readings assigned for that lecture. Your contributions to the class discussion will be evaluated based on a combination of quality and quantity. The best comments and questions are those that enrich the learning experience of your fellow classmates. Your course participation grade will be based primarily on your participation in i>clicker exercises in class. You will receive 1 point for a correct answer, 0.75 points for an incorrect answer, and zero for no answer (i.e. you were not in class).

Final exam

A comprehensive final exam will be held Wednesday 5/1 from 4-6pm in 1120 Weill Hall. The exam is closed-book. You may consult a single 3x5 notecard during the exam. There will be no alternate arrangements made for the final, so plan your schedule accordingly.

SOFTWARE

We will conduct analysis in Stata, a software program used widely by policy analysts. We will provide links to online Stata tutorials and offer training in sections. You can access Stata in one of three ways:

- Stata is available for license or purchase for a very affordable price. Order through the Stata website: <http://www.stata.com/order/new/edu/gradplans/student-pricing/>. We recommend Stata/IC 15 (6-mo license: \$45, 12-mo license: \$89, perpetual license: \$198).
- Stata is available in computing labs across campus.
- Access is available through Virtual Sites at UM: <https://its.umich.edu/computing/computers-software/campus-computing-sites/virtual-sites/>.

LAPTOPS

To keep us focused on the class and each other, laptop use will not be permitted during class. Such use has been shown to create negative externalities on neighboring classmates. I will distribute copies of overhead slides for you to take notes on. If you want to store all class material on your laptop, transcribing your handwritten notes after lecture is a great a way to absorb the material. I will post a PDF of the slides after lecture to facilitate this process.

I>CLICKERS

We will use i>clickers during class to facilitate discussion and to provide feedback to me about your understanding of the material. You can purchase one from the UofM Computer Showcase in the Student Union or North Campus for \$29/\$39 (used/new). You will most likely need these starting in Lecture 2.

ACCOMMODATIONS

If you need an accommodation for a disability, please let me know as soon as possible. If a problem arises during the semester, you should see me as soon as you can. Some aspects of this course 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 to help us determine appropriate accommodations. I will treat any information you provide as private and confidential.

FORD SCHOOL ACADEMIC EXPECTATIONS

Please review the discussion of the Ford School's statement on academic integrity, student mental health and wellbeing, inclusivity, and expectations for communications, attendance, assignments, and technology here: <http://fordschool.umich.edu/academics/expectations>

DIVERSITY AND INCLUSIVITY

Members of the Ford School community represent a rich variety of backgrounds and perspectives. We are committed to providing an atmosphere for learning that respects this diversity. While working together to build this community we ask all members to:

- share their unique experiences, values and beliefs
- be open to the views of others
- honor the uniqueness of their colleagues
- appreciate the opportunity we have to learn from each other in this community
- value one another's opinions and communicate in a respectful manner
- keep confidential discussions that the community has of a personal or professional nature
- use this opportunity together to discuss ways in which we can create an inclusive environment in Ford classes and across the UM community

We also recognize the importance of advancing diversity, equity, and inclusion in the study and practice of quantitative methods specifically. Sometimes DEI issues will be central to the topic, such as when we use quantitative methods to measure the extent of racial discrimination in the labor market. Other times DEI issues bubble below the surface, such as when we classify people into discrete categories for the purpose of analysis, even if these categories are an inadequate representation of individuals' lived experiences. Instead of confining this critical and complicated topic to one lecture, these issues will be integrated throughout the semester. Within each lecture, I will strive to raise questions related to diversity, equity, and inclusion as it may be relevant to that lecture's topic. I also encourage you to propose questions, topics, and examples from your experience throughout our time together.

STUDENT MENTAL HEALTH AND WELLBEING RESOURCES

The University of Michigan is committed to advancing the mental health and wellbeing of its students. We acknowledge that a variety of issues, such as strained relationships, increased anxiety, alcohol/drug problems, and depression, can directly impact students' academic performance. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) and/or University Health Service (UHS). For a listing of other mental health resources available on and off campus, visit: <http://umich.edu/~mhealth/>.

DETAILED COURSE SCHEDULE

(Note: Slight updates to readings may occur during the semester)

PART I: CAUSAL INFERENCE BASICS				<u>Assignments</u>
WEEK 1	Wed	9-Jan	Lecture 1: Overview & Introduction Angrist & Pischke Introduction	
WEEK 2	Mon	14-Jan	Lecture 2: Causal Inference I 1. Angrist & Pischke Ch. 1 2. Paul W. Holland (1986). "Statistics and Causal Inference." <i>Journal of the American Statistical Association</i> , 81(396): 945-60.	Diagnostic quiz
	Wed	16-Jan	Lecture 3: Causal Inference II & Selection Bias 1. Angrist & Pischke Ch. 1 (continued) 2. Stock & Watson Ch. 1	
PART II: REGRESSION (BIVARIATE AND MULTIVARIATE)				
WEEK 3	Wed	23-Jan	Lecture 4: Randomized Trials 1. Bertrand and Mullainathan (2004). "Are Emily and Greg More Employable than Lakisha and Jamal? Evidence on Racial Discrimination in the Labor Market from a Large Randomized Experiment." <i>American Economic Review</i> , 94(4): 991-1013. 2. Stock & Watson, Chs. 2 & 3 (to review t-tests, p-values, confidence intervals, hypothesis testing, all of which we will use in class today)	
WEEK 4	Mon	28-Jan	Lecture 5: Observational Analysis & Introduction to Bivariate Regression Stock and Watson Ch. 4.1-4.4, Appendix 4.1	Assignment 1 due
	Wed	30-Jan	UM closure	
WEEK 5	Mon	4-Feb	Lecture 6: Bivariate Regression & Testing Hypotheses Stock and Watson Ch. 4.5, 5.1-5.2	Quiz 1
	Wed	6-Feb	Lecture 7: Dummy Variables, Heteroskedasticity Stock and Watson Ch. 5.3, 5.4	
WEEK 6	Mon	11-Feb	Lecture 8: Interpreting Output, Intro to Multiple Regression Stock & Watson 5.7, 6.1-6.3	

	Wed	13-Feb	Lecture 9: Multiple Regression – Presenting results and Intro to Omitted Variable Bias	Stock & Watson 6.1–6.6	
WEEK 7	Mon	18-Feb	Lecture 10: Multiple Regression – Omitted Variable Bias and Intro to hypothesis testing	Stock & Watson Ch. 6.1–6.6, 7.1–7.5	
	Wed	20-Feb	Lecture 11: Hypothesis testing in multiple regression	Stock & Watson Ch. 7	Assignment 2 due
WEEK 8	Mon	25-Feb	Lecture 12: Multicollinearity and Intro to Nonlinearity	1. Stock & Watson Ch. 6.7 2. Angrist & Pischke Ch. 2	Quiz 2
	Wed	27-Feb	No lecture		
WEEK 9	Mon	4-Mar	Winter break (no class)		
	Wed	6-Mar	Winter break (no class)		
WEEK 10	Mon	11-Mar	Lecture 13: Nonlinearity (quadratics and logs)	Stock & Watson Ch. 8.1–8.2	
	Wed	13-Mar	Lecture 14: Nonlinearity (logs) and Interaction terms	Stock & Watson Ch. 8.1–8.5	Assignment 3 due (Fri 3/15)
WEEK 11	Mon	18-Mar	Lecture 15: Interaction terms	Stock & Watson Ch. 8.3 – 8.5	Quiz 3
	Wed	20-Mar	Lecture 16: Binary dependent variables: linear probability model	Stock & Watson Ch. 11	
	Fri	22-Mar	Lecture 17: Binary dependent variables: probit, logit	Stock & Watson Ch. 11	

PART III: ADDRESSING UNOBSERVABLES

WEEK 12	Mon	25-Mar	Lecture 18: Intro to addressing unobservables; Difference in differences		
	Wed	27-Mar	Lecture 19: Difference in differences II; Fixed effects	<ol style="list-style-type: none"> 1. Angrist & Pischke Ch. 5 2. Card and Krueger (1994). "Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania." <i>American Economic Review</i>, 84(4): 772-93. 	
WEEK 13	Mon	1-Apr	Lecture 20: Fixed Effects II; Instrumental Variables	<ol style="list-style-type: none"> 1. Stock & Watson Ch. 10 2. Angrist & Pischke Ch. 3 	Assignment 4 due
	Wed	3-Apr	Lecture 21: Instrumental variables II	<ol style="list-style-type: none"> 1. Angrist & Pischke Ch. 3 2. Angrist, Joshua (1990). "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records" <i>American Economic Review</i>, 80(3): 313-336. 	Quiz 4
WEEK 14	Mon	8-Apr	Lecture 22: Regression discontinuity	<ol style="list-style-type: none"> 1. Angrist & Pischke Ch. 4 2. Carpenter & Dobkin (2009). "The Effect of Alcohol Access on Consumption and Mortality: Regression Discontinuity Evidence from the Minimum Drinking Age." <i>American Economic Journal: Applied Economics</i>, 1(1): 164-82. 	
	Wed	10-Apr	Lecture 23: Regression discontinuity II	1. Jacob, Zhu, Somers, and Bloom (2012). A Practical Guide to Regression Discontinuity. [Optional: for additional details on method]	

PART IV: DECISION ANALYSIS

WEEK 15	Mon	15-Apr	Lecture 24: Decision analysis	Simulation background document	Assignment 5 due
	Wed	17-Apr	Lecture 25: Decision analysis II	<ol style="list-style-type: none"> 1. Hammond, Kenney, and Raiffa. "Smart Choices, Chapter 7: Uncertainty", p.109-133. 2. Stokey and Zeckhauser. "A Primer for Policy Analysis, Chapter 12: Decision Analysis", p.201-206. 	Quiz 5

WEEK 16 Mon 22-Apr Lecture 26: Wrap-up

Wed 24-Apr No class - Study Days

WEEK 17 Wed 1-May Final Exam, 4-6pm

Assignment
6 due