

Quantitative Methods for Program Evaluation

PUBPOL 639 – WINTER 2020

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Instructor OH:	Neggers	Sign up via Google calendar ,	Weill 4216
	Dynarski	Sign up via Google calendar ,	Weill 5123
GSI:	Sarah Posont	sposont@umich.edu	
	Tanvangi Tiwari	tanvangi@umich.edu	
GSI OH:	Sarah	Mondays & Wednesdays 4:00–5:30pm,	Weill 3204
	Tanvangi	Tuesdays & Thursdays 10:00–11:30am,	Weill 3204
Lecture:	Mondays & Wednesdays 1:00pm–2:20pm		
	Neggers	Weill 1120	
	Dynarski	Weill 1110	
Section:	Fridays 1:00pm–2:20pm		
	Weill 1110 & 1120		

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

There are 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 required.

COURSE COMPONENTS

The final grade will be based on:

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| ○ In-class quizzes (4) – drop lowest score | 20% |
| ○ Homework assignments (5) – drop lowest score | 25% |
| ○ Course participation | 10% |
| ○ Midterm exam | 20% |
| ○ Final exam | 25% |

In-class quizzes

Short in-class quizzes will begin at the start of lecture and last about 25 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 3"x5" 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.

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.

Assignments will be graded on a five-point scale: check (=acceptable); check-plus, check-double-plus (=great); check-minus, check-double-minus (=lacking). 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.

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).

Midterm and Final exams

There will be an in-class midterm exam and a final exam during exam week (scheduled by the registrar). During each exam, you may consult a single 3"x5" notecard and use a non-graphing, pocket calculator (no cell phones). There will be no alternate arrangements made for the midterm or final.

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 an affordable price. Order through the Stata website: <http://www.stata.com/order/new/edu/gradplans/student-pricing/>. We recommend Stata/IC 16 (6-mo license: \$48, 12-mo license: \$94, perpetual license: \$225).
- 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/>.

ELECTRONIC DEVICES

To keep us focused on the class and each other, laptops, tablets, cell phones and other electronic devices will not be permitted during class. Such use has been shown to create negative externalities on neighboring classmates. We will distribute copies of the lecture slides at the start of class 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. We 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 Computer Showcase in the Shapiro Library or Pierpont Commons for \$29/\$39 (used/new).

ACCOMMODATIONS

If you need an accommodation for a disability, please let us know as soon as possible. If a problem arises during the semester, you should see us as soon as you can. Some aspects of this course maybe modified to facilitate your participation and progress. As soon as you make us aware of your needs, we can work with the Office of Services for Students with Disabilities to help us determine appropriate accommodations. We 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: small updates may occur during the semester; ** indicates a reading that is required for the augmented section only)

Assignments and Quizzes

WEEK 1	Wed	8-Jan	Lecture 1: Overview & Introduction	Angrist & Pischke Introduction	
	Friday	10-Jan	No Section		
WEEK 2	Monday	13-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	15-Jan	Lecture 3: Causal Inference II & Selection Bias	Angrist & Pischke Ch. 1 (continued)	
	Friday	17-Jan	Section		
WEEK 3	Mon	20-Jan	No Class - MLK Day		
	Wed	22-Jan	Lecture 4: Randomized Trials I	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 Ch. 1, 3.5 3. Look over in general: Stock & Watson, Chs. 2 & 3 (to review t-tests, p-values, confidence intervals, hypothesis testing, all of which we will use in class today)	
	Friday	24-Jan	Section		
WEEK 4	Mon	27-Jan	Lecture 5: Randomized Trials II		Assignment 1 due
	Wed	29-Jan	Lecture 6: Observational Analysis; Bivariate Regression	Stock & Watson Ch. 4.1-4.2, Appendix 4.1	Quiz 1
	Fri	31-Jan	Section		
WEEK 5	Mon	3-Feb	Lecture 7: OLS & Hypothesis Testing	Stock & Watson Ch. 4.5, 5.1-5.2	
	Wed	5-Feb	Lecture 8: Heteroskedasticity, Dummies, and Interpreting Output	Stock & Watson Ch. 4.3-4.4, 5.3-5.4, 5.7	
	Fri	7-Feb	Section		
WEEK 6	Mon	10-Feb	Lecture 9: Multiple Regression & Presenting Results	Stock & Watson Ch. 6.2-6.4, 6.6	

	Wed	12-Feb	Lecture 10: Omitted Variable Bias and Joint Hypothesis Testing	1. Stock & Watson Ch. 6.1, 6.5, 6.8, 7.1-7.5 ** 2. DiNardo and Pischke (1997). "The Returns to Computer Use Revisited. Have Pencils Changed the Wage Structure Too?" Quarterly Journal of Economics, 112(1): 291-303.	
	Fri	14-Feb	Section		
WEEK 7	Mon	17-Feb	Lecture 11: Multiple Dummy Variables and Multicollinearity	Stock & Watson Ch. 6.7	Quiz 2
	Wed	19-Feb	Lecture 12: Multicollinearity and Modeling Nonlinearity	Stock & Watson Ch. 8.1, 8.3	Assignment 2 due
	Fri	21-Feb	Section		
WEEK 7	Mon	24-Feb	Lecture 13: Midterm Review		
	Wed	26-Feb	MIDTERM		
	Fri	28-Feb	No Section		
WEEK 8	Mon	2-Mar	No Class - Winter Break		
	Wed	4-Mar	No Class - Winter Break		
	Fri	6-Mar	No Section - Winter Break		
WEEK 9	Mon	9-Mar	Lecture 14: Interactions	Stock & Watson Ch. 8.3 (cont.)	
	Wed	11-Mar	Lecture 15: Interactions II		
	Fri	13-Mar	Section		
WEEK 10	Mon	16-Mar	No Class		
	Wed	18-Mar	Lecture 16: Nonparametrics and Polynomials	Stock & Watson Ch. 8.2	
	Fri	20-Mar	Section		
WEEK 11	Mon	23-Mar	Lecture 17: Logarithms	Stock & Watson Ch. 8.2 (cont.)	
	Wed	25-Mar	Lecture 18: Binary Dependent Variables	Stock & Watson Ch. 11.1	Quiz 3
	Fri	27-Mar	Section		
WEEK 11	Mon	30-Mar	Lecture 19: Binary Dependent Variables II	Stock & Watson Ch. 11.2-11.3	

	Wed	1-Apr	Lecture 20: Addressing Unobservables		Assignment 3 due
	Fri	3-Apr	Section		
WEEK 12	Mon	6-Apr	Lecture 21: Differences in Differences	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." American Economic Review, 84(4): 772-93.	
	Wed	8-Apr	Lecture 22: Fixed effects	Stock & Watson Ch. 10.1-10.4	
	Fri	10-Apr	Section		
WEEK 13	Mon	13-Apr	Lecture 23: Instrumental Variables	1. Angrist & Pischke Ch. 3.1-3.2 ** 2. Angrist, Joshua (1990). "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records" American Economic Review, 80(3): 313-336.	Assignment 4 due
	Wed	15-Apr	Lecture 24: Regression Discontinuity	1. Angrist & Pischke Ch. 4.1 ** 2. Carpenter & Dobkin (2009). "The Effect of Alcohol Access on Consumption and Mortality: Regression Discontinuity Evidence from the Minimum Drinking Age." American Economic Journal: Applied Economics, 1(1): 164-82.	
	Thur	16-Apr			Quiz 4
	Fri	17-Apr	Section		
WEEK 14	Mon	20-Apr	Lecture 25: Wrap Up	Angrist & Pischke Ch. 4.2	
	Wed	22-Apr	No Class - Study Days		
	Fri	24-Apr	Section		Assignment 5 due
WEEK 15	Wed	29-Apr	Final Exam, 4:00-6:00pm		